

**FACTORS AFFECTING PERFORMANCE OF THE MANAGEMENT
INFORMATION SYSTEM AT NATIONAL AGRICULTURAL RESEARCH
ORGANIZATION (NARO), UGANDA**

By

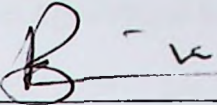
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**A DISSERTATION SUBMITTED TO THE HIGHER DEGREES
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INSTITUTE**

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DECLARATION

I, Geoffrey Ngerejaho, declare that this dissertation is my own original work, and it has never been presented to any university or institution for the award of any academic qualification.

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APPROVAL

The piece of work entitled "Factors affecting the performance of management information system in National Agricultural Research Organisation (NARO) in Uganda" written by GEOFFREY NGEREJAHO has been under our supervision and guidance.

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DEDICATION

This work is dedicated to my late father Charles Ngororabanga and my mother Margaret Nyirahabura for their love for my education.

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Am grateful to my supervisors Dr. Benon Basheka and Dr. David Onen for guidance and moral boosting that they provided to ensure that the final report was up to standard.

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May the Almighty GOD reward them abundantly.

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ABBREVIATIONS

CSIR:	Council for Scientific and Industrial Research
CVI:	Content Validity Index
DSS:	Decision Support Systems
EDP:	Electronic Data Processing
EIS:	Executive Information Systems
ISNAR:	International Service for National Agricultural Research
KBS:	Knowledge Based Systems
NaCRRI:	National Crops Resources Research Institute
NaFORRI:	National Forestry Resources Research Institute
NaLIRRI:	National Livestock Resources Research Institute
NARIs:	National Agricultural Research Institutes
NARL:	National Agricultural Research Laboratories
NARO:	National Agricultural Research Organisation
NARP:	National Agricultural Research Project
NaSARRI:	National Semi-Arid Resources Research Institute
TAM:	Technology Acceptance Model
TPB:	Theory of Planned Behaviour
TRA:	Theory of Reasoned Action
UMI:	Uganda Management Institute
UTAUT:	Unified Theory of Acceptance and Use of Technology
WAN:	Wide Area Network
ZARDIs:	Zonal Agricultural and Research Development Institutes

ABSTRACT

The study was aimed at establishing the factors affecting performance of the Management Information System at National Agricultural Research Organization (NARO), Uganda. Specifically, the study purposed to examine the effect of organizational, employee and technical related factors on the performance of management information systems of NARO. A sample of 75 respondents was used to provide the relevant data with 6 key staffs purposively selected as key informants and 69 relevant staff randomly selected from the different NARO institutes. The study had a very high response rate with 95.7% (n=66) responding to all questions and only 4.3% (n=9) lacking responses for certain questions. Qualitative and quantitative data were collected through face-to-face interviews and self-administered questionnaire surveys as well as document reviews. Measurements and conclusions on the variables were based on the Likert Scale of 1 – 5 (Strongly disagree to strongly agree). Statistical analyses were performed using SPSS Version 12 for windows by which means (m) of the responses and the Pearson Chi-square (χ^2) were calculated. On the basis of the average mean values, employee related factors take the lead among the factors that affect the performance of Management Information System at NARO where four of the eleven items yielded m=4 and above. Organizational related factors come second with four of the eleven items yielding m=3.5 and above. The technical related factors ranked lowest with only three of the eleven items yielding m=3.5 and above. On the other hand, the Pearson Chi-square tests and corresponding p values revealed that organizational related factors ($\chi^2=31.932$, $p=0.01$) had the statistically most significant influence on performance of MIS at NARO than the employee and technical related factors. The study recommends creation of favorable operating environment to improve all the factors affecting performance of MIS with emphasis on constructive organizational leadership style and culture, employee motivation and regular updating of software and hardware facilities.

It was concluded that in practical terms, organizational related factors have a bigger share of influence on the performance of any intervention including the MIS. This is because the organization has the capacity to determine the nature and mandate of the employees it engages in its operations and the nature of technology it acquires for its operations.

CHAPTER ONE

INTRODUCTION

1.0 Introduction

This study examined factors affecting performance of the management information system at National Agricultural Research Organization (NARO). The factors examined include organizational, employee and technical factors which were conceived as the independent variables while performance of the Microsoft Dynamics System SL (Solomon) was the dependant variable. This chapter presents the background to the study, the statement of the problem, the objectives, research questions, hypotheses, the scope of the study, significance, justification and definition of the terms and concepts.

1.1 Background to the Study

1.1.1 Historical Background

The term Management Information System (MIS) made its first appearance in the 1970s in the U.S. navy report on the use of computers to construct a single integrated system to manage all navy resources. Most of such '*new*' technologies have for long been known and reported to start in government military departments before penetrating the general public. MIS was designed to improve decision making through effective management and analysis of organizational information (Venkatesh, Morris, Davis & Davis, 2003).

The concept of MIS has changed substantially over the years. In the 50's and 60's, the management saw the potential of computers to process large amounts of data speedily and accurately. The departments that were involved with such activities were known as Electronic Data Processing (EDP) departments. The focus of EDP was record keeping e.g. accounting data

– payroll data (Seema, 2008). In the 70's however, there was a discernible shift from data to information. The focus was not on data but on the analysis of organization data. There was a shift in the philosophy of MIS. Such a concept came to be widely known as 'Management Information System'. In the 70's the top management relied on the staff of EDP and MIS to supply the necessary information.

The 80's saw the Personal Computer (PC) revolution. The Personal Computer and the desk-top metaphor changed the picture of MIS completely. The biggest pay-off for such direct use was the "what-if" analysis capability. This led to the emergence of Decision Support Systems (DSS). According to Seema (2008), the information and decision hungry managers of the 80's saw a huge potential in the expert systems as a result of spectacular growth in the Artificial Intelligence area. Combined with DSS philosophy, the expert systems could supply a superior class of managerial information support, known as Knowledge Based Systems (KBS). The EDP targeted the operational level of management. The MIS/DSS/KBS target the middle management. Attempts were made to provide information to top management as well, known as Executive Information System (EIS) (Seema, 2008). However, there are numerous examples where the expected benefits from Information Technology (IT) were not realized. In the 1990's, several high profile and costly projects failed dramatically, and part of the blame was assigned to technology. For example, the failure of the baggage handling system at Denver International Airport held developments at the airport for months. A glitch in London's automated ambulance transportation system left patients waiting for half an hour. And both the California Department of motor vehicle and the London stock exchange spent large sums of money on software that never became operational. These are examples of failures that were very expensive or even

harned people (Grinter, 1996) and contrast starkly with the expectations from information technology of greater efficiency, better decision making, and increased service to customers.

In 1987, the Council for Scientific and Industrial Research (CSIR) of Ghana and International Service for National Agricultural Research (ISNAR) conducted a review of Ghana's national agricultural research system. On the basis of the review's findings, the National Agricultural Research Project (NARP) was established in 1991. To implement the project successfully, a report by the World Bank in May 1991 recommended implementing a MIS that included an inventory of current research programs. ISNAR's INFORM MIS was chosen for this purpose. Despite a number of trainings that were conducted in 1992, 1994 and 1996, the quality of the data on the time spent by scientists on activities and projects was poor. The system could not be updated in 1994 and 1995 due to frequent changes in leadership of the monitoring and evaluation section. The software on which INFORM was based could not be used directly to show the relationship between research activities and scientists, because the data of the two variables were held in separate files. These items therefore had to be entered twice, making inconsistencies difficult to identify.

1.1.2 Theoretical Background

In 1986, Fred Davis developed the Technology Acceptance Model (TAM) to explain how and when users decide to accept and use a technology. The main elements of Davis's TAM model are "perceived usefulness" and "perceived ease of use." The model suggests that when users are presented with a new software package, "perceived usefulness" and "perceived ease of use" influence their decisions about how and when they will use the new software. Recently, numerous studies have been conducted using the original TAM—or an extended

version of TAM—to examine the usage of IT. For example, Davis, Bagozzi, and Warshaw (1989) examined an intention model called the Theory of Reasoned Action (TRA) with TAM to discover synthesizing elements of the two models in order to arrive at a more complete view of the determinants of user acceptance. Taylor and Todd (2001) extended, integrated, and compared the TAM model with two variations of the Theory of Planned Behaviour (TBP) to determine which model is the most helpful in understanding the technology usage. Venkatesh, Morris, Davis, and Davis (2003) extended TAM, building a new model called Unified Theory of Acceptance and Use of Technology (UTAUT), which helps managers assess the likelihood of technology success as well as understand the drivers of technology acceptance.

Literature reveals that there are many attempts to evaluate, integrate, and extend different models and approaches for analyzing the implications of the TAM theory. Different researchers have adopted different measures for technology in order to understand its usage. The different measurement criteria for evaluating technology usage included looking at technology as an entertainment tool (on-line games), a task-oriented tool (software for increasing organization productivity), a learning tool - soft-ware for school purposes, and an information-seeking tool - Internet (Taylor and Todd, 2001). The unit of analysis in most of these studies was individual users, and their usage of technology was based mainly on individual motivations and individual decision-making processes. Most of the past studies adopted quantitative research to test the hypotheses and evaluate the TAM theory. The contribution of the past research studies are the revisions and extensions of TAM theory to explain the usage of different technological tools. A major limitation of these studies is that the sample of the research does not allow generalizing the findings to broad sectors of technology users in general and public

sector employees in particular. This study however, borrowed from the TAM model to show the different factors affecting the use and productivity of MIS at NARO as a public institution. The variables therefore included the MIS technology- performance of Microsoft Dynamics System SL (Solomon) as the dependent variable and the factors (organizational, employee, and technical factors) affecting it in delivering the expected benefits for NARO as the independent variables. As indicated earlier, these factors were adopted from TAM Model-Theory of Reasoned Action (1986) and Venkatesh, Morris and Davis (2003) who extended TAM and built a new model called Unified Theory of Acceptance and Use of Technology (UTAUT), which helps managers assess the likelihood of technology success as well as understand the drivers of technology acceptance.

The researcher adopted the TAM model and the UTAUT model which look at perceived usefulness and perceived ease of use to influence the decisions about how and when the new software is used. Since the procurement of Microsoft Dynamics SL (Solomon) to enhance the performance of MIS at NARO, the programme has not yielded positive results and there could be a number of factors affecting the use of the software which the researcher endeavored to investigate in guidance of these models.

1.1.3 Conceptual Background

Laudon and Laudon (2002:26) define Management Information System (MIS) as a service to management by providing managers with reports and in some cases with on-line access (transaction) to the organization's current performance and historical records. MIS is a key to planning, controlling and decision making for management through transaction processing of systems for the data. Darkoh, Haidari and Mothatego (2004) looked at Management Information System as a mechanism that collected, organized and distributed data used by management,

usually being helped by use of computers in performing their management functions. They argued that the MIS has certain characteristics that make it useful for managing MIS performance factors. These include quality, timeliness, completeness and relevance of information that called for an automated system to replace the traditional manual system. Wetherbe (2007) also viewed MIS as an informal method of making information available to managers in order to facilitate accurate, timely and right decision making for organizational purposes. If the management information system was automated, reports would be done accurately and timely. In the current study, MIS were considered as systems that are used to capture, store, analyze data and provide reports by which management can base to take decision.

Being a system or process that provides support to enable effective organizational management, MIS is indispensable in the current competitive global economy. With evidence from the previous scholars, Management information systems are regarded to be a subset of the overall internal controls procedures in a business, which cover the application of people, documents, technologies, and procedures used by management accountants to solve business problems such as costing a product, service or a business-wide strategy (O'Brien, 2001).

With insight from the TAM Model, Hu et al. (1999) state that technology acceptance should be examined in three different contexts: individual, technological, and implementation. Therefore, an individual's acceptance behaviour is influenced by factors pertaining to the individual context, the technological context, and the implementation context (Chau & Hu, 2002). Individual context refers to the characteristics of individual end-users (such as Individual Attitude towards innovation, Employee's Computer Literacy and Employee's commitment and accountability); the technological context refers to the characteristics of the technology such as functionality (Hardware Factors like User systems specifications, Technical Effectiveness of the

system and user-friendliness and; Software Factors like Software Authenticity, Version Updates and Software compatibility); and implementation context refers to the user's professional environment (including organizational strategy, Training and Communication among others). The current study focused on the individual (employee), organizational and technical factors that affect the acceptance and productivity of the technology [Microsoft Dynamics System SL (Solomon)] at NARO as a public institution.

1.1.4 Contextual Background

In the past 20 years in Uganda, IT has revolutionized virtually every facet of people's everyday lives. Organizations of all types have long seen that IT when viewed comprehensively and deployed effectively can replace old challenges with new possibilities. However, one of the areas of slow evolution is the public sector organization system (Roos, 2007). Drawing from Ramesh, Babu and Singh (1987), national agricultural systems, especially in developing countries, tend to be very large. For example, in India, the national agricultural extension system employs about 125,000 people. Extension managers at various levels need relevant information in order to make effective decisions. In the absence of such information, they act only on the basis of their intuition and past experience. Data that have been processed, stored, and presented properly will aid them in analysing situations and to make effective decisions.

At every phase of the management process, managers need information in order to make effective decisions. This is called *management information*. It does not include purely functional information or technical information. Management information is the information required by managers as they make their decisions, such as the number of extension personnel employed by category, their training requirements, career development plans, job descriptions, budgets,

forecasts, benchmark surveys, reports on socioeconomic conditions of people served, and existing facilities (Ramesh et al, 1990).

Shortly after establishment in 1992, the management of the National Agricultural Research Organization (NARO) endorsed and adopted INFORM in 1993, an MIS developed by ISNAR (Nestel 1991). The overall objective was to provide research managers at all levels of the organization with accurate and up-to-date information on human, financial, and physical resources, as well as on research activities in order to expedite objective management decision making. Despite the earlier introduction of MIS at NARO in 1993 and the heavy investments in MIS since then, the reporting system is still a big problem as evidenced by late or non submission of reports, wrong reports, failure to follow reporting formats, inconsistency in reporting and a lot of glaring gaps.

1.2 Statement of the Problem

Measurement is an integral part of modern life. We measure our surroundings, ourselves, and the passage of time (Potter, 2000:7). Some have even suggested our advancement as a civilization is a direct consequence of our ability to measure (Sydenham, 2003:3). With regard to that, systems being part of our surroundings need to be evaluated so as to establish and improve their contribution to our advancement. As part of the efforts to automate its operations, NARO purchased Microsoft Dynamics System SL (Solomon) with a number of modules meant to improve reporting in all areas. The modules include; General Ledger, Cash Manager, Payroll, Human Resource, Accounts Payable, Accounts Receivable, Inventory Management and Project Controller (Auditor General's report, FY 2007/2008). A total of 258 employees were trained in

different categories in as far as MIS is concerned and a total of 1.2 billion shillings have so far been spent on acquisition of Microsoft Dynamics SL and various MIS trainings.

Despite the various staff trainings in the use of the entire package, only three modules; cash manager, payroll and general ledger are being used presenting challenges to reporting by NARO. Consequently, the organization failed to get fund releases from the Ministry of Finance, Planning and Economic Development on a number of occasions. For instance, during the period January to March 2010, the organization could not pay staff salaries in time because of non compliance. The concern here was; it was not yet explicitly clear whether it was the underutilization or mystification or some other factors intrinsic to the MIS system that contributed to and sustained the challenges in the reporting system. The study therefore intended to address the dilemma behind that situation by establishing how various factors affect performance of MIS at NARO.

1.3 General Objective

To examine the factors affecting performance of the Management Information System at NARO.

1.4 The Specific objectives of the study were:

1. To examine the effect of organizational related factors affecting performance of the management information system at National Agricultural Research Organization.
2. To examine the effect of employee-related factors on performance of the management information system at National Agricultural Research Organization.
3. To examine the effect of technical related factors on performance of the management information system at National Agricultural Research Organization.

1.5 The study was guided by the following research questions:

1. What is the effect of organizational related factors on performance of the management information system at National Agricultural Research Organisation?
2. What is the effect of employee related factors on performance of the management information system at National Agricultural Research Organisation ?
3. What is the effect of technical related factors on performance of the management information system at National Agricultural Research Organisation ?

1.6 The study aimed at verifying the following hypotheses:

1. Organizational related factors greatly affect performance of the management information system at NARO.
2. Employee-related factors significantly affect performance of the management information system at NARO.
3. Technical related factors greatly affect performance of the management information system at NARO.

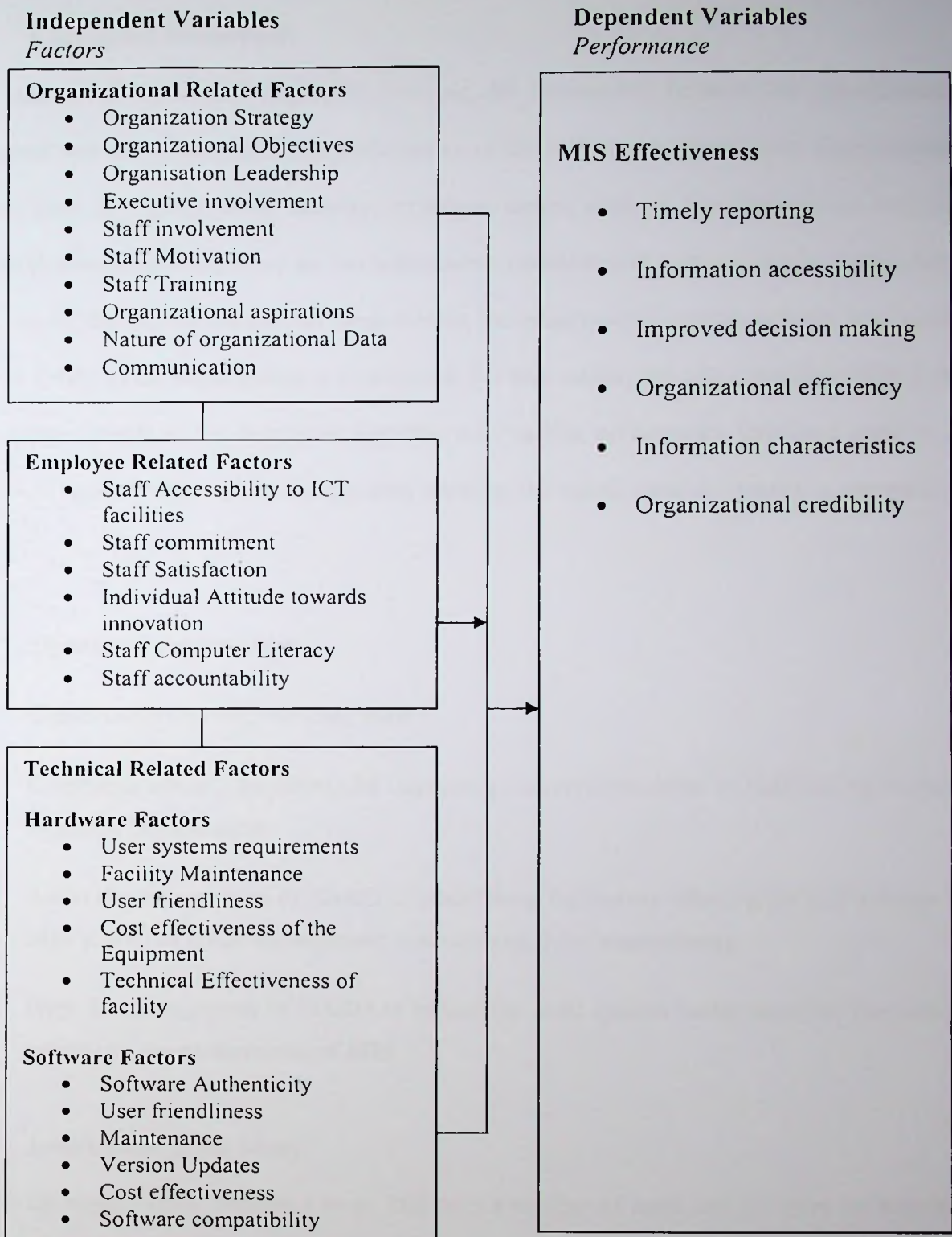


Figure 1: Conceptual Framework

Source: The Researcher with insight from the TAM Model (Davis, 1989).

1.7 Conceptual Framework

The conceptual framework (figure 1) lays out the relationship between the organizational, employee and technical factors and performance of the MIS in the organization. Organizational factors such as organizational strategy, employee factors such as commitment and technical factors (hardware and software) are the independent variables with various aspects studied under each one of the factors. Subject to these factors, the effectiveness of Management Information System (MIS) in the organization is determined. For that matter, the effectiveness of MIS in the organization stands as the dependent variable, with various performance indicators under it. A figurative representation of the relationship between the stated variables herein is presented in figure 1.

1.8 Significance of the Study

If effectively utilized, the study may:

Contribute towards the efforts for improving the reporting status in National Agricultural Research Organization.

Assist the management of NARO in establishing the factors affecting the performance of MIS as well as guide management in addressing them appropriately.

Help the management of NARO to reduce the audit queries being raised by the auditor general on the performance of MIS.

1.9 Justification of the Study

NARO has significantly invested a lot in MIS over a number of years and yet there are still inherent issues such as late or non submission of reports, wrong reports, and failure to follow reporting formats, inconsistency in reporting and a lot of glaring gaps. NARO procured

Microsoft Dynamics System SL (Solomon) with a number of modules but a few are operational which has led to audit queries raised by the Auditor General. The above factors triggered the research on the factors affecting the performance of MIS in NARO; case-studying selected Institutes of NARO.

1.10 Scope of the Study

Geographical Scope

The study was conducted at NARO Institutes in the country including NARL at Kawanda in Wakiso District, NACRRI at Namulonge in Wakiso, NAFORRI at Kifu in Mukono District, NALIRRI in Tororo and NASARRI at Serere in Soroti District as well as NARO Secretariat in Entebbe.

Content Scope

The study established how and by what intensity the organization, employees and technical factors (*as independent variables*) affect performance of Management Information System (*as the dependent variable*) at NARO. The study targeted finance staff, auditors, administrators and scientists.

Time Scope

The data considered for the study involved records in the period between 2005 and 2011. This is because Microsoft Dynamics SL (Solomon) was procured in 2005 to enhance the performance of MIS in NARO and since then, there are still inherent issues such as late or non submission of reports, wrong reports, and failure to follow reporting formats, inconsistency in reporting and a lot of glaring gaps.

1.11 Operational Definitions

Technology is a general term for the processes by which human beings fashion tools and machines to increase their control and understanding of the material environment. The term is derived from the Greek words *tekhne*, which refers to an art or craft, and *logia*, meaning an area of study; thus technology means, the study, or the science of crafting.

Information Technology is a term that covers the hardware and software used for storing, processing or communicating information. It is through IT that companies can define, gather, store, manipulate, and communicate data to smooth the flow of information.

Although the terms **data** and **information** tend to be used interchangeably, there is a real distinction between the two concepts. Data are raw, unanalysed numbers and facts about events. Information, in contrast, results when data are organized and analyzed in some meaningful way.

Management Information System is every system, which provides information for the managerial activities in an organization.

Technical Factors included both hardware factors (Hardware obsolescence, Systems Compatibility) and software factors (Electronic Viruses, Health Aspects, Version Updates, User friendliness).

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter presents review of related literature to MIS and performance in organizations. The chapter covers the theoretical review, actual literature review and summary of the literature review. In the review, the researcher identifies gaps which the current study attempted to fill so as to give credible and usable data for the various purposes.

2.1 Theoretical Review

According to Chuttur (2009), user acceptance of technology has been an important field of study for over two decades now. Although many models have been proposed to explain and predict the use of a system, Chuttur (2009) holds that the Technology Acceptance Model (TAM) has been the only one which has captured the most attention of the Information Systems community.

In the TAM, Davis (1985) proposed that system use is response that can be explained or predicted by user motivation, which in turn, is directly influenced by an external stimulus consisting of the actual system's features and capabilities such as Hardware Factors (like User systems specifications and Technical Effectiveness of the system) and Software Factors (like Software Authenticity, Version Updates and Software compatibility).

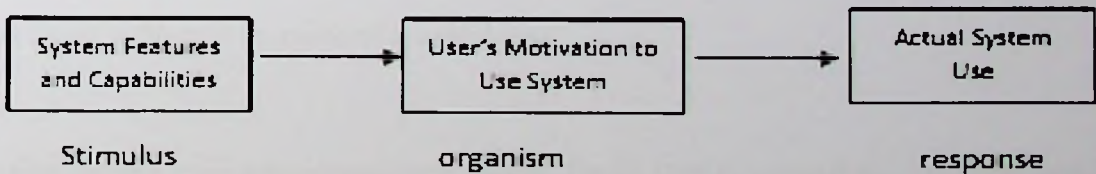


Figure 2: The Initial Technology Acceptance Model (Davis, 1985).

Source: Davis (1989)

Based on prior work done by Fishbein and Ajzen (1975), who formulated the Theory of Reasoned Action, and other related research studies, Davis further refined his conceptual model to propose the Technology Acceptance Model in figure 3.

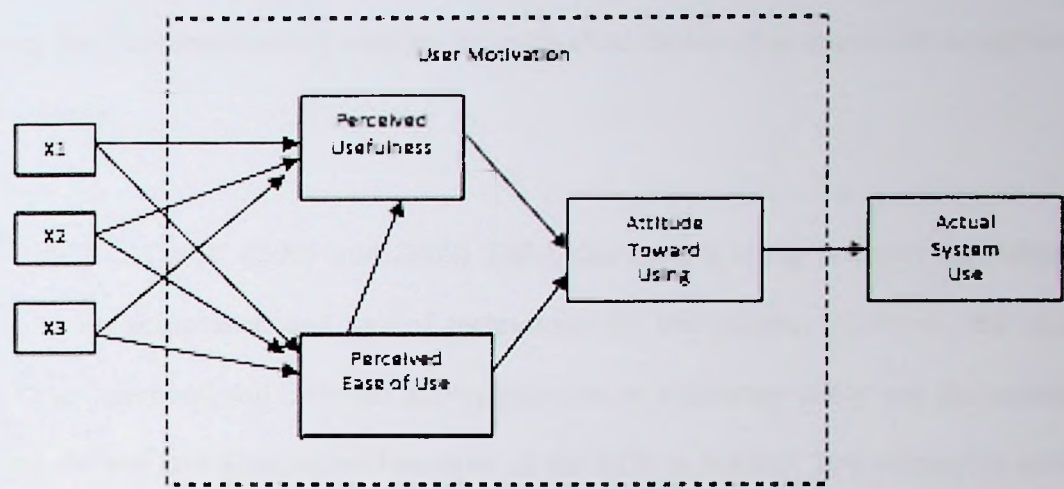


Figure 3: The Modified TAM (Davis, 1989)
Source: Davis (1989)

In his proposal, Davis (1985) suggested that users’ motivation can be explained by three factors: perceived ease, perceived usefulness and attitude toward using the system. Davis hypothesized that the attitude of a user toward a system was a major determinant of whether the user would actually use or reject the system. The attitude of the user, in turn was considered to be influenced by two major beliefs; perceived usefulness and perceived ease of use, with perceived ease of use having direct influence on perceived usefulness.

With time during later experimentation stages, Davis (1985) refined the TAM to include other variables and modified the relationships that had been formulated initially. In the same way, other researchers applied and proposed several additions to the TAM such that overtime, TAM

evolved into a leading model in explaining and predicting system use. However, some researchers claim that TAM may have attracted more easy and quick research, such that less attention has been given to the real problem of technology acceptance (Lee, Kozar, & Larsen, 2003). Nevertheless, the modified TAM laid foundation for other factors such as the environment within which the system is being utilized (including organizational strategy, Training and Communication) besides the individual factors that determine acceptance and use of technology.

With regard to Davis' (2005 and 2009) TAM, the current study borrows the scholar's views regarding the acceptance and use of technology by individuals. However, the study looked beyond the individual and included the organization as a separate entity and the technical factors affecting the use and ultimate performance of the MIS at NARO. The researcher structured the conceptual framework (Figure 1) in relation to the different individual aspects, organizational aspects and technological aspects which were later used to determine the effect of individual, organization and technological factors on the performance of the MIS at NARO.

2.2 Organizational Related Factors and the Performance of MIS

According to Stair and Reynolds (2007), the impact of MIS to the public sector organization can be categorized into two ways; a positive impact creates a positive attitude amongst system users and the organization as a whole, whereas a negative impact will always discourage users and top decision makers which greatly affects the performance of management information systems in public sector organizations.

In relation to diffusion, Gomez, Caceres and Lopez (2002) stated that when the management information system is successfully spread well within an organization like NARO, its performance is bound to be high as it's seen to be for the entire organization and not for the executives or its sponsors. In the same manner, a poorly spread system demands less attention from the organization which makes its performance low in an organization.

With reference to operating sponsors, Stair and Reynolds (2007) mentioned that when the users are motivated and informed, their performance levels are high, which makes the entire MIS performance levels high. In the same way, uninformed and unmotivated operating sponsors produce less performance levels, which entirely affect the performance of the management information system in public sector organization.

The level of commitment of executive sponsors form part of the organizational related factors affecting the performance of MIS. According to Gomez et al. (2002), committed and informed executive sponsors put in all what it takes to see the management information system prospering which positively affect its performance. However, uncommitted executive sponsors always keep a deaf ear towards the MIS which negatively affect its performance in public sector organization.

Alavi and Carlos (1991) mentioned organizational resistance as one of the organizational factors affecting performance of MIS. They state that effective management of organizational resistance to the management information system positively affect its performance as it creates support from staff members and executive decision makers which makes the system popular within the organization. If resistance is ineffectively managed, it makes the system unpopular within the

entire organization and its sponsors which negatively affect the system performance in the public sector organizations.

Link of business objectives as an organizational factor also affects performance of MIS. Connolly and Begg (2001) stated that a management information system with a clear link of business objectives is bound to have high performance levels as it involves the entire organization, attracts executive sponsors and acceptance which positively affect the system performance in a public sector organization. Systems that don't support business objectives score limited support from the stakeholders and sponsors hence leading to poor performance in public sector organizations.

Budgetary issues in terms of meeting budgeted criteria too determine performance of MIS in an organization and this relates to what DeLone and McLean (2003) stated; a management information system that continues to operate within the planned budget is bound to have positive performance results as it maximises organization's resources compared to the one that operates out of budget as it becomes a liability to the public sector.

In relation to data management as a factor affecting MIS performance, Connolly and Begg (2001), held that information is of a great importance in any organization; it's supposed to be managed and kept confidential for organization's continuity. However, they mentioned that appropriate data management increases the performance of the management information system as it gives a competitive advantage, whereas a poorly managed data negatively affects the performance of MIS since it's always vulnerable to security threats which leads to poor performance of MIS in public sector organizations.

2.3 Employee Related Factors and the Performance of MIS

Drawing from Connolly and Begg (2001), if the system is made available and employees are given access to interact with the system, it makes it more likely to produce high performance results compared to the one with limited access rights to users. However, there are cases where the employees may not necessarily want to access the system even when accessibility is possible. In that case, accessibility here is determined by individual willingness.

Davis (1974) mentioned that improvements in employee productivity determines the performance of a management information system in the public sector in that when the improvement in employee productivity is high, the performance levels will also be high compared to when employee productivity is low. Darkoh, Haidari, and Mothatego (2004) placed the onus on the users by stating that when the system is used by the intended users or employees, it is bound to produce high performance results in an organization, since it is always the users to determine the requirements of a successful system design. In that case, a management information system should always be accessed by only authorized users with knowledge on its usage if organizations are to improve the performance of their management information systems.

The other employee related factor that determines performance of MIS is level of satisfaction. According to Fisher (2001), the level of user/ employee satisfaction is very important in public sector organizations in that where it is low, performance is also low. In the same way, if the level of user satisfaction is high, performance is also bound to be high through user motivation; hence, motivated user equals high performance.

A management information system will never be successful, unless user and system requirements have fully been defined (Bada, 2000). In that case, requirements should ensure that users are in agreement that the system satisfies and fulfils the intended user needs, hence user and system requirements greatly affect the performance of MIS in public sector organization as they express user's attitude towards the system.

2.4 Technical Related Factors and the Performance of MIS

2.4.1 Software Related Factors

Stair and Reynolds (2007) hold that software that is user friendly is bound to result into increased user motivation which positively affect the general performance of the management information system through improving their working environment, on the other hand software that is not user friendly creates unfavorable environment to the users which negatively affect the performance of management information system in an organization.

Software obsolescence affects performance of management information systems through slowing down the efficiency and effectiveness of the system (Turban, McLean and Wetherbe, 2007). This is due to the fact that obsolescence software cannot support the organization's business objectives given that it is outdated and out of fashion, hence it poses a challenge to the competitive advantage of an organization.

As regards software compatibility, Avgerou and Walsham (2000) state that new technologies are developed daily including new software where some are compatible or incompatible to some systems. Compatible software will always support and improve the performance of a management information system in an organization. On the other hand, incompatible software is

most probably known for rendering systems inoperable which negatively affects performance management information system in organizations.

According to Mahmood Hall and Swanberg (2001), limited system space due to large sizes of some programs slows down the performance of some software which slows down the entire management information system in an organization. On the other hand, small sized software support system continuity and proper user of data or information management hence yield a positive effect on the performance of the entire management information system in an organization.

With regard to user friendliness, Heeks and Mundy (2001) indicated that when users are well conversant with how to use the software, there can be positive effect on the performance of management information as it improves their working environment. That is as compared to the software which users do not understand and expensive in terms of user training thus negatively affecting the performance of management information system in an organization.

Malicious software is developed by people who maliciously want to attack the system especially competitors. They are known for slowing down the systems, reducing system space and destroying data or information in the system, hence affecting the performance of management information system in an organization (Heeks & Mundy, 2001).

2.4.2 Hardware Related Factors

Hardware obsolescence affects performance of management information systems through slowing down the efficiency and effectiveness of the system (Turban, McLean and Wetherbe,

2007). This is due to the fact that obsolescent hardware cannot support latest software and organization's business objectives because it's always outdated and out of fashion, hence it can't give an organization a competitive advantage.

Writing in terms of compatibility, Avgerou and Walsham (2000) stated that new hardware devices are developed from time to time which may be either compatible or incompatible to some systems. Like software, Compatible hardware will always support and improve the performance of a management information system in an organization. On the other hand, incompatible hardware is most unlikely to enhance performance management information system in any institution/organizations.

In relation to monetary prices of the hardware, some hardware are too expensive for organizations and this affects systems that need hardware updates every time hence causing frustrations to the performance of management information system in an organization (Roos, 2007).

2.5 Summary of the Literature Review

Management information systems form bedrock of IT use in the public sector. They are therefore found in all sections of the public sector and in all organizations; however, their introduction in public sector organizations doesn't guarantee their success in performance. In this case, factors such as organizational, employee, software and hardware related factors are said by many scholars to be affecting the performance of management information system in public sector organizations as shown in the review above.

However, most of the literature captured in the review is older and not less than five years yet the concept of MIS keep changing over short periods of time. Newer and better technologies and applications are introduced from time to time. There was therefore need to gain more recent data on the subject of ICT and organizational management. This is a gap that the current study endeavored to fill.

The literature on organizational management and Management Information Systems in the review above is a general picture depiction. It does not give specific information on the performance of MIS in an agricultural related organization in a developing country like NARO in Uganda. The current study was set to fill this gap by studying and documenting the effect of organizational, employee and technical factors on the performance of MIS in the different NARO institutes as described in chapter three.

The theory reviewed (TAM) focuses more on individuals' acceptance and use of technology based on perceived use or perceived usefulness, but does not consider the influence of organizational and technological related factors and their effect on the performance of MIS. The current study sought to bridge this gap by examining all the three factors namely; individual, organizational and technical factors.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter presents the methods by which the study was conducted. It explains the research design, the area of study, the study population, sample selection methods and sample size, data collection and data analysis methods.

3.2 Research Design

The study was a case study with NARO (a simple instance) sampled from among the several other public institutions in the general complex public sector setting. A case study was chosen as it would allow for utilization of minimum resources to study a representative sample of the bigger population. The study was also descriptive and analytical in setting and both qualitative and quantitative information were gathered. NARO comprises 6 National Agricultural Research Institutes (NARIS), 9 Zonal Agricultural Research and Development Institutes (ZARDIS) and the Secretariat. Only six institutes were selected together with the Secretariat for this study. Qualitative methods were used to get data regarding the organizational, employee and technical factors affecting performance of Management Information System at NARO. The study also used quantitative methods to establish the extent by which the above organizational, employee and technical factors affect the performance of Management Information System at NARO.

3.3 Population of the Study

The study was conducted at the NARO institutes which included NARL at Kawanda in Wakiso District, NaCRRRI at Namulonge in Wakiso, NaFORRI at Kifu in Mukono District, NaLIRRI in Tororo, NaFIRRI in Jinja District and NaSARRI in Serere District as well as NARO Secretariat

in Entebbe. Drawing from the March 2011 NARO payroll, the sampled institutes have a total of 548 employees. However, the study targeted the top administrators and institutes heads, finance and internal auditors as well as scientists who are fully employed by NARO.

3.4 Sample Size

Table1. Summary of Sample selection and size by category

Category of employees	Target Population	Accessible Population	Sample Size	Sampling technique
Administrators and heads of institutes	42	30	6	Purposive sampling
Internal audit and Finance	101	35	20	Purposive sampling
Scientists and Support staff	656	483	49	Simple random sampling
Total	779	548	75	

Source: NARO Payroll March 2011

According to Yates et al. (2008), Sample size is given by $n/N(100) = 10\%$.

n Being the Sample size

N Being the population

Therefore, the sample for the current study was calculated as $n = 548(100) = 10.2\%$

This brings us to a final sample size of 56 respondents from $10.2/100 \times 548$. However, the study took a leap and utilized a total of 75 respondents with 6 key informants and 69 ordinary respondents. This was done to minimize errors that result from insufficiency of respondents.

3.5 Sampling Techniques and Procedure

The sample for this study was selected by two techniques including simple random sampling (*for the scientists*) and purposive sampling for the administrators, institute heads and internal audit and finance respondents. Simple random sampling was used for selection of the scientists given that they are considered implementers of decisions by top management while top administrators were selected by purposive sampling given that they are central in the decision making process and management of the organization. This placed them in a position to provide more in-depth information regarding NARO management in relation to MIS performance.

3.6 Data Collection Methods

3.6.1 In-depth interviews

These were one-on-one interviews between the researcher and the key informants including NARO Administrators and officers from the internal Audit and Finance department higher administrative offices in NARO institutes. This method facilitated collection of ample qualitative data as required by case studies to enable in-depth analysis and convey meaning of experiences. The major advantage of this method was that there was confidential atmosphere in which informants could share sensitive information regarding the subject matter under investigation. The informants were able to provide detail about their personal experiences, views, and behavior regarding the utilization, effectiveness and performance of MIS at NARO.

3.6.2 Questionnaire survey method

This method was used to obtain data from the scientists regarding employee related factors and technical related factors that could be affecting the performance of MIS at NARO. It involved pre-coded questions probing for data on investments in information technology by NARO and

the influence of organizational related factors, employee related factors and technical related factors on the performance of MIS at NARO. This method was convenient in gathering data from various respondents who were supplied with survey questionnaires which were later collected after completion.

3.6.3 Document review

This method included further review of earlier studies by different scholars regarding the use of Management Information System, and how organizational, employee and technical related factors affect the performance of MIS in organizations. A checklist was developed to guide this review.

3.7 Data collection instruments

3.7.1 Interview Guide

This instrument was used to capture data regarding organizational and employee related factors that could be affecting the utilisation and performance of MIS at NARO. The instrument enabled the researcher to guide and control the one-on-one discussions with the key informant respondents including NARO administrators and heads of departments.

3.7.2 Questionnaire

This instrument contained questions regarding the extent to which the organizational related factors, employee related factors and technical related factors influence utilization and ultimate performance of MIS at NARO. The method was partly adopted since it avoids ambiguity and lays foundation for soliciting for correct responses by minimizing bias (Jenkins and Dillman, 1995).

3.7.3 Documentary Checklist

This was used to guide the researcher in identifying relevant data under each theme during the document review process.

3.8 Reliability and Validity of instruments

3.8.1 Validity of items

Regarding the validity of instruments, the researcher requested five experts/judges to rate each item as valid or not valid. The researcher then computed the content validity index (CVI), using the following formula:

$$\text{CVI} = \frac{\text{No. of items declared valid}}{\text{Total No. of items}}$$

According to Amin (2005), the result is the inter-judge coefficient of validity for the instruments and when the CVI obtained for each instrument is 0.8 and above, it means that the instruments are valid for use in collecting data for this study. This procedure was repeated for all the items in each of the instruments and the means that were computed for each of the instruments gave a CVI of at least 0.8 and above.

3.8.2 Reliability of the instrument:

In order to assess the reliability or the degree to which the instrument could consistently measure the aspects it was meant to, the researcher conducted a pilot study using the draft questionnaires. After which a reliability coefficient was computed using Cronbach's Alpha coefficient (α) (Amin, 2005). The pre-testing ensured that the study instruments were appropriate for collecting

the right information for the study. The researcher identified, corrected and re-phrased the questions and statements in the cases where inappropriateness in the instruments was found.

Results of Cronbach's Alpha coefficient

Variable	Alpha	No. of Items
Organizational Factors	0.9	11
Employee Factors	0.9	11
Technical Factors	0.81	11
Effectiveness of MIS	0.83	12

Source: *Primary Data*

3.9 Procedure of Data Collection

In consideration of the major study themes directly drawn from the study objectives, well constructed survey questionnaire and interview guide were presented to the supervisor at UMI. The supervisor provided an introduction letter accompanied by the time table that was presented to NARO, granting the researcher to travel to the field to collect data. The researcher discussed and scheduled appropriate meetings for in-depth interviews with the key informants (NARO Management). The researcher also endeavored to review selected relevant documents used in the discussion of the study findings.

3.10 Data Processing and Analysis

3.10.1 Quantitative Data

This included findings on the extent to which organizational, employee and technical-related factors affect performance of Management Information System at NARO. The population characteristics of the respondents sampled was reflected under this in frequencies and percentage tables. Average mean values for all items that were used to test for the extent by which the study variables determine performance of MIS at NARO were calculated with SPSS version 12 for

windows. After collection, quantitative data was examined for errors and omissions and organized into categories before being captured into SPSS for final analysis.

3.10.2 Qualitative Data

This included specific information regarding ways by which organizational, employee and technical related factors affect the utilization and performance of MIS at NARO. Elaborate statements regarding the utilization of MIS and the resultant performance of the system at NARO given here facilitated in-depth understanding and discussion of the qualitative findings. After, collection, this data was edited before leaving the respondents, coded, sorted according to the themes and sub themes of the study and analyzed. The Pearson Chi-square was used to determine the depth of relationship between the variables that is; the level of association between organizational, employee and technical related factors and the performance of MIS at NARO.

3.11 Measurement of Variables

3.11.1 Average Mean

Variables were graded basing on the five point Likert Scale and average means (m) were generated to guide deductions on the effect of each variable on the performance of MIS at NARO.

3.11.2 Hypothesis testing

The validity or falseness of the stated hypotheses was established after analyzing the different characteristics of the collected data. The researcher used Pearson Chi-square values to test the hypotheses using a one-tailed test.

The Chi-square test that was used is reflected by the following formula:

$$\chi^2 = \frac{\sum (f_o - f_e)^2}{f_e}$$

Where;

χ^2 =Pearson Chi – square value

f_o = frequency of observed data

f_e = Expected frequency

Critical χ^2 was accepted or rejected at 95% confidence level implying that

The study:

Accepted hypotheses (H_1) when p value for $H_0 > 0.05$

Rejected hypothesis (H_1) when p value for $H_0 < 0.05$

The chi-square method was chosen because it could help the researcher to easily tell whether there exists the assumed relationship between the variables in the stated hypothesis and the level of association that is: the extent to which organizational, employee and technical factors affect performance of MIS at NARO.

CHAPTER FOUR

PRESENTATION, ANALYSIS AND INTERPRETATION OF RESULTS

4.1. Introduction

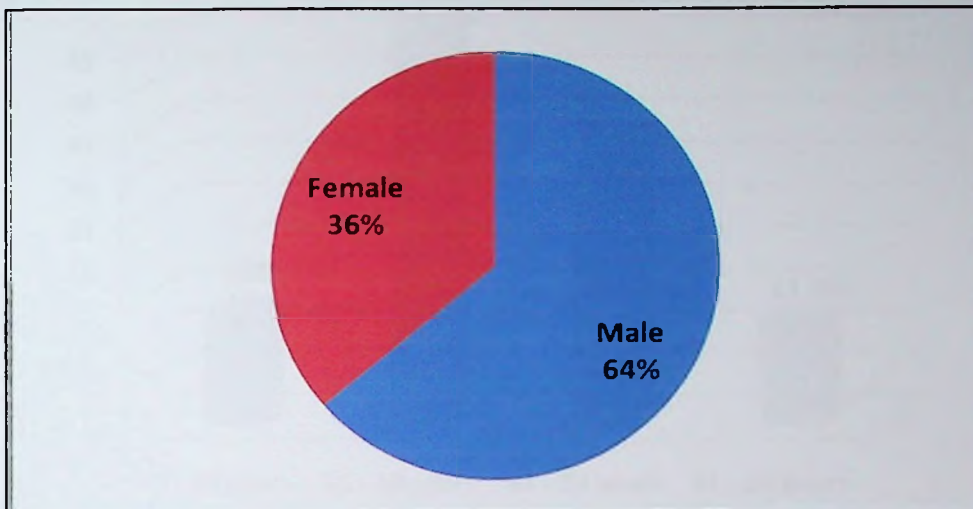
The findings in relation to the study objectives are presented in this chapter. A theme has been developed for each objective and the corresponding findings are presented and interpreted. Frequency tables with computed Mean values and graphical illustrations especially for the quantifiable findings have been made. For interpretation, the means of the studied items are measured in relation to the five point Likert Scale where 1=Strongly Disagree, 2=Disagree, 3=Neutral/indecision, 4=Agree and 5=Strongly Agree. Nevertheless, the presentation captures the demographic characteristics of the respondents first so as to give a picture of the kind of population the study dealt with.

Response Rate

Response rates are calculated by dividing the number of the complete surveys by the total number of respondents that were contacted and multiplying the result by 100. This can also be done for each item in the questionnaire to determine the response rate for each distinct item. The study had a very high response rate of 95.7% (n=66) responding to all questions and only 4.3% (n=9) lacking responses for a few items. This response rate is owed to the nature of questionnaire design that was used; it was clear and easy to respond to.

4.2 Demographic characteristics of the respondents

Below is a Chart representing the distribution of respondents by gender:

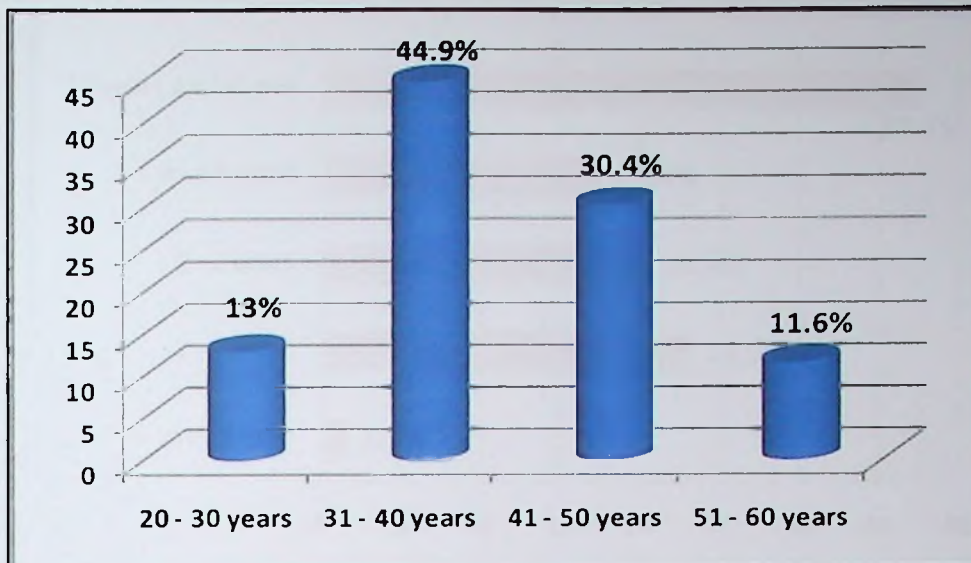


Source: *Primary Data*

Figure 4: Respondents by Gender

The majority of respondents were males 64% ($n=44$) while a section of 36% ($n=25$) were females. These statistics reflect a true personnel depiction in terms of gender composition at NARO where the majority of the employees are males. With regard to ICT, males tend to be more vigilant and eager to experiment and learn about technology. It is therefore hoped that the diffusion of new technology and the use of MIS in an organization like NARO whose majority employees are male should be faster than not.

Below is a graph representing respondents by age:

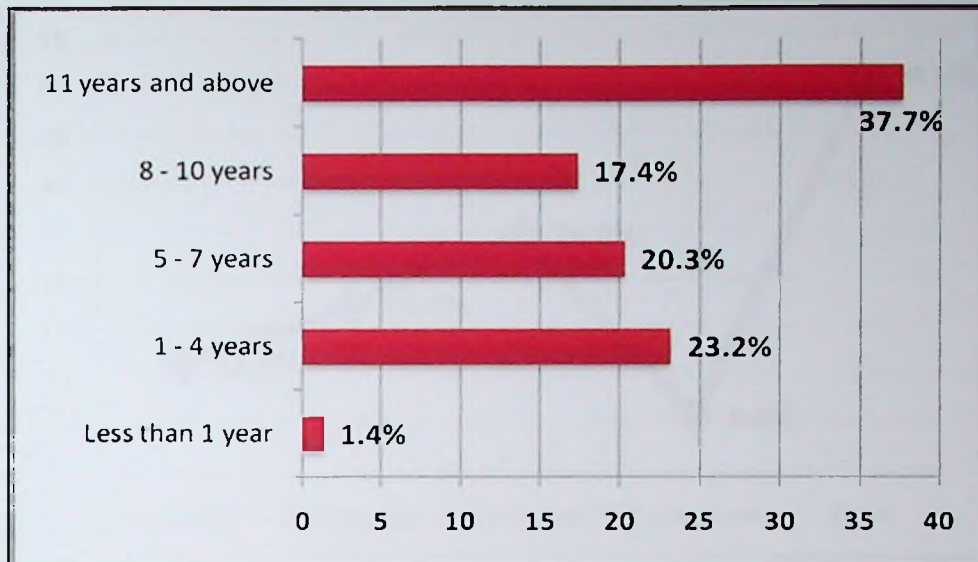


Source: *Primary Data*

Figure 5: Respondents by Age

Figure 5 shows that a considerable proportion of the respondents (44.9%, $n=31$) lay between 31 – 40 years of age, followed by 30.4% ($n=21$) of the respondents who lay between 41 – 50 years and 13% ($n=9$) of the respondents between 20 -30 years. The least section were respondents aged between 51 – 60 years of age (11.6%, $n=8$). Overall, majority of the respondents (57.9%, $n=40$) are in the youthful stage and are hoped to be versatile to innovation. The youthful tend to be more explorative with innovation and this applies in terms of absorption and used of ICT and most likely with MIS in particular. It is therefore expected that there should be less resistance to the acceptance and performance of MIS in an organization where majority of the employees are youth.

Below is a graph representing respondents by duration of service at NARO:

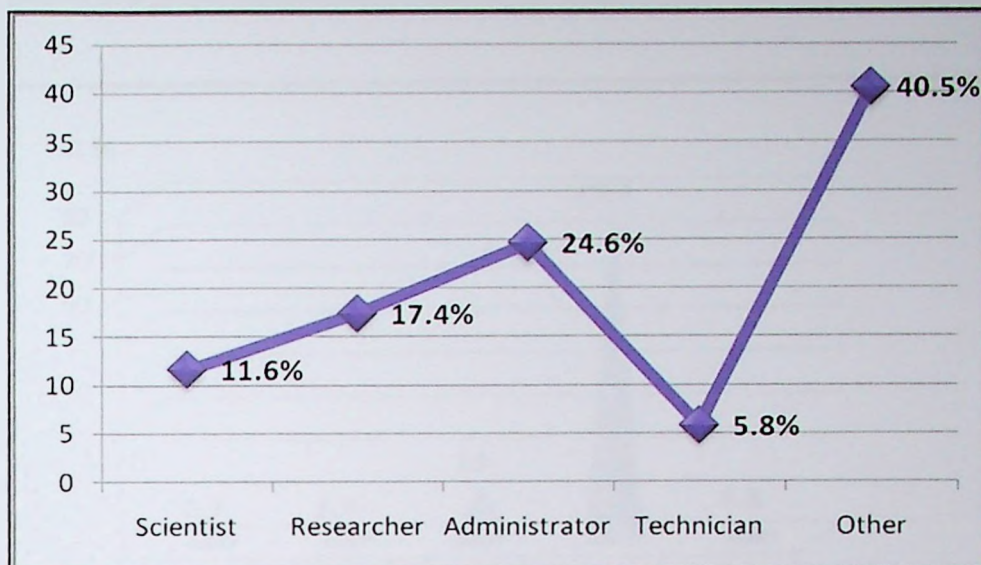


Source: *Primary Data*

Figure 6: Respondents by Duration of Service at NARO

As regards duration of service at NARO, figure 6 indicates that a considerable section of respondents (37.7%, n=26) have served for 11 years and above. These are followed by those who have served for 1 – 4 years (23.2%, n=16), for 5 – 7 years (20.3%, n=14) for 8 – 10 years (17.4%, n=12) and those who have served for less than 1 year accounting for 1.4% (n=1). Altogether, over half of the respondents had served in NARO for not less than 5 years and these could therefore give reliable information about the organization's MIS background and current status.

Below is a graph representing respondents by occupation:



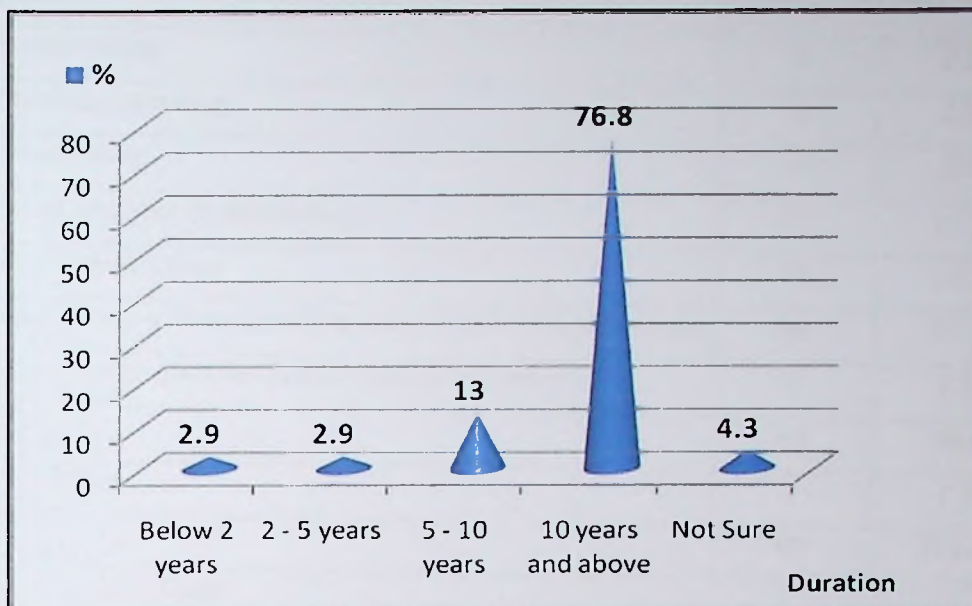
Source: *Primary Data*

Figure 7: Respondents by Occupation at NARO

In terms of occupation, figure 7 shows that administrators accounted for the biggest single occupation with 24.6% (n=17), followed by researchers with 17.4% (n=12), scientists with 11.6% (n=8) and technicians accounting for only 5.8% (n=4). Employees in all the mentioned occupation types require use of MIS in performing their roles in the organization. It is therefore expected that the sampled respondents have been and are still using MIS technology in the execution of their duties at NARO and constituted an appropriate population sample to this study. Being a research and learning based institution, NARO has definitely exposed her staff in different positions of responsibility to ICT facilities involving regular use of MIS which makes the sample's responses viable and reliable to the study.

Organization Specific Information

Below is a graph representing duration by which NARO has been computerized:



Source: *Primary Data*

Figure 8: Duration (in Years) for which NARO has been Computerized

Figure 8 shows that the majority of respondents (76.8%, n=53) as in figure 8 indicate that NARO has been computerized for 10 years and above. The rest indicated that NARO has been computerized for 5 – 10 years (13%, n=9) followed by 2 – 5 years and below 2 years each with 2.9% (n=2) respectively. However, a proportion of 4.3% (n=3) were not sure of the duration. These statistics reveal that NARO has been using MIS technology for at least half a decade, a period long enough to guarantee visibility of changes in the effectiveness of the organization especially regarding data management, reporting and decision making.

The table that follows below presents findings regarding the major uses of computers at NARO:

Table 2: Major uses of Computers at NARO

Response	Frequency	Percentage
Word processing	2	2.9
Information gathering	2	2.9
Communicating	2	2.9
Statistical analysis & forecasting	11	15.9
Document production	11	15.9
A Combination of Two or More uses with Word processing	38	55.1
Other uses other than the ones listed in the options	2	2.9
Sub Total	68	98.6
Non Response	1	1.4
Total	69	100.0

Source: *Primary Data*

A combination of two or more uses with Word processing was spotted as the major use of ICT facilities at NARO (55.1%, n=38). That was followed by document production, statistical analysis and forecasting each with 15.9% (n=11) respectively. Other specified uses included word processing, information gathering and communication each with 2.9% (n=2).

Additionally, 2.9% (n=2) of the respondents mentioned data storage among other non-specified uses of ICT facilities at NARO. It is therefore clear that MIS facilities are used for diverse purposes at NARO.

The table that follows below presents findings regarding the types of software under use at NARO:

Table 3: Types of Software under use at NARO

Response	Frequency	Percentage
Statistical	6	8.7
Web Browsing Software	8	11.6
Financial Management Packages	11	15.9
Document Processing	10	14.5
Statistical management	2	2.9
A Combination of Two or More types of Software	29	42.1
Sub Total	66	95.7
Non Response	3	4.3
Total	69	100.0

Source: *Primary Data*

Respondents were also required to indicate the types of software used with MIS systems at NARO and 42.1% (n=29) indicated a combination of two or more types of software from among the single listed software such as financial management packages (15.9%, n=11), document processing software (14.5%, n=10), web browsing (11.6%, n=8) and statistical software (8.7%, n=6). These software types correspond well with the major uses of ICT facilities as mentioned earlier in table 2.

4.3 The Effect of Organizational related factors affecting the Performance of Management Information Systems of National Agricultural Research Organization

This formed the first objective of the study. Respondents were required to give their views on eleven items regarding the organizational factors affecting the performance of MIS at NARO.

The table below presents findings regarding the Organizational related factors affecting the Performance of MIS at NARO:

Table 4: Organizational related factors affecting the Performance of MIS at NARO

Statements/Items	SD	D	UD	A	SA
	Results in %				
The organizational strategy facilitates effective adoption of MIS in NARO	2.9	13	7.2	59.4	13
The organizational objectives incorporate effective adoption of MIS in NARO	17.4	0	4.3	62.3	13
Organizational leadership style facilitates fast diffusion of MIS among staffs at NARO	4.3	18.8	14.5	52.2	5.8
Organizational culture promotes positive attitude among staff towards the adoption use of MIS	5.8	14.5	11.6	52.2	13
Top management is directly involved in the implementation of new technologies at NARO	4.3	20.3	11.6	44.9	18.8
I am consulted before new Technology is introduced in the organization	17.4	49.3	7.2	15.9	7.2
I am always oriented in the use of new technologies introduced in the organization	11.6	30.4	5.8	37.7	8.7
The nature of staff motivation at NARO allows straightforward acceptance of MIS	8.7	33.3	14.5	39.1	2.9
ICT is high ranking among the priorities of NARO	4.3	26.1	13	36.2	15.9
The nature of data at NARO allows effective use of MIS	8.7	15.9	20.3	37.7	14.5
There is regular feedback from top management about the implementation progress	15.9	26.1	13	36.2	7.2

Source: Primary Data

Key: SD = Strongly disagree, D = Disagree, UD = Undecided, A = Agree and SA = Strongly agree

A considerable proportion of respondents (59.4%, n=41) agreed that the organizational strategy facilitates effective adoption of MIS in NARO while a proportion of 62.3% (n=43) of the respondents indicated agreement that the organizational objectives incorporate effective adoption of MIS in NARO. In support of this, findings from the key informant interviews indicated that the organizational culture of NARO incorporates change from manual to computerized procedures in the execution of its operations where appropriate. The 59.4% (n=41) who agreed that organizational strategy facilitates effective adoption of MIS in NARO paint a picture that MIS performance in the organization is high-ranking.

In the same way, 52.2% (n=36) indicated that the organizational leadership style facilitates fast diffusion of MIS among staffs at NARO while an equal proportion (52.2%, n=36) agreed that the organizational Culture promotes positive attitude among staffs towards the adoption use of MIS.

While 49.9% of the respondents agreed that that top management is directly involved in the implementation of new technologies at NARO, 49.3% (n=34) indicated that they are not consulted before new technology is introduced in the Organization. In contrast to this, key informant interviews revealed that before any new technologies are introduced in the organization, a user needs assessments are conducted followed by trainings for the intended users to ensure effective implementation of the innovation in consideration. This is in agreement with the fact that 37.7% (n=26) of the respondents agreed that they are always oriented in the use of new technologies introduced in the organization while 30.4% (n=21) were in disagreement to the same.

In a similar way, although 39.1% (n=27) agreed that the nature of staff motivation at NARO allows straightforward acceptance of MIS, 33.3% (n=23) disregarded that by disagreeing to the statement. While 36.2% (n=25) agreed that ICT is high ranking among the priorities of NARO, 26.1% (n=18) disagreed to the same. In the same way, although 36.2% (n=25) agreed that there is regular feedback from top management about the implementation progress of ICT programs at NARO, 26.1% (n=18) disagreed to the same.

In addition to the findings as described, the key informant interviews revealed that the different institutes of NARO suffer from geographical challenges whereby each one of them is located far from the other and establishment of Local Area Network (LAN) to ease communication between the institutes is impossible. This was also said to hamper effective, communication and therefore, the progress in implementation of MIS at NARO. In addition, key informant interviews revealed that the ICT unit is a unit under the human resource department and would have been more effective but it is limited to one person. The same person oversees and plans network infrastructure. With regard to this, the key informants suggested for picking lessons from public corporations that have fully embraced MIS such as National Water and Sewerage Corporation (NWSC). They further suggested for continuous training for staffs and restructuring of the ICT department into a fully fledged department manned by several technical employees.

The table that follows (next page) gives a summary of the descriptive statistics on the eleven items under the organizational factors affecting performance of MIS at NARO:

Table 5: Descriptive Statistics for Organizational related factors affecting the Performance of MIS at NARO

Statements/Items	N	Mean	Std. Deviation
The organizational strategy facilitates effective adoption of MIS in NARO	66	3.6970	.9762
The organizational objectives incorporate effective adoption of MIS in NARO	67	3.7313	.9142
Organizational leadership style facilitates fast diffusion of MIS among staffs at NARO	66	3.3788	1.0193
Organizational culture promotes positive attitude among staffs towards the adoption use of MIS	67	3.5373	1.0917
Top management are directly involved in the implementation of new technologies at NARO	69	3.5362	1.1451
I am consulted before new Technology is introduced in the organization	67	2.4478	1.1843
I am always oriented in the use of new technologies introduced in the organization	66	3.2879	2.5466
The nature of staff motivation at NARO allows straightforward acceptance of MIS	68	2.9412	1.1047
ICT is high ranking among the priorities of NARO	66	3.3485	1.1831
The nature of data at NARO allows effective use of MIS	67	3.3433	1.1877
There is regular feedback from top management about the implementation progress	68	2.9265	1.2616
Valid N (list wise)	58		

Source: Primary Data

On measuring the average mean values (m) for the responses of the eleven items that were used to investigate the effect of organizational factors on the performance of MIS at NARO against the five point Likert Scale, four items translated into agreement that the organizational strategy facilitates effective adoption of MIS in NARO (m=3.69), the organizational objectives incorporate effective adoption of MIS in NARO (m=3.73), organizational culture promotes positive attitude among staffs towards the adoption use of MIS (m=3.53) and that top management are directly involved in the implementation of new technologies at NARO (m=3.53).

The average means of six of the rest of the seven items translate into indecisiveness on whether Organizational leadership style facilitates fast diffusion of MIS among staffs at NARO ($m=3.37$), whether staffs are always oriented in the use of new technologies introduced in the organization ($m=3.28$), whether the nature of staff motivation at NARO allows straightforward acceptance of MIS ($m=2.94$), whether ICT is high ranking among the priorities of NARO ($m=3.34$), whether the Nature of Data at NARO allows effective use of MIS ($m=3.34$) and whether there is regular feedback from top management about the implementation progress ($m=2.92$).

The one item for which the average mean value ($m=2.44$) translated into general disagreement was whether employees are consulted before new technology is introduced in the Organization. Decision on introduction of new technology in NARO therefore seems to be a major concern for the top-most management alone. The other staffs mostly act as implementation agents.

Hypotheses Testing

Hypothesis 1: Organizational related factors greatly affect the performance of management information system of National Agricultural Research Organization.

Chi-Square to test whether organizational related factors significantly affect the performance of management information system of National Agricultural Research Organization. Under this, two items were cross-tabulated that is; the direct involvement of top management in the implementation of new technologies in NARO and the resultant improvement in the accuracy of reporting in the organization. The SPSS software was used to calculate the Pearson Chi-Square and the results are presented as follows:

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	31.932	16	.010
Likelihood Ratio	34.598	16	.005
Linear-by-Linear Association	5.666	1	.017
N of Valid Cases	68		

a. 22 cells (88.0%) have expected count less than 5. The minimum expected count is .18.

Given a Chi-square value of 31.932 with $p=0.01$ which is less than 0.05, it can be concluded that the relationship between organizational related factors and the performance of MIS is statistically significant. In other words, organizational factors have a significant influence on the performance of MIS at NARO.

4.4 The Effect of Employee-Related Factors on the Performance of Management Information System of National Agricultural Research Organization

This formed the second objective of the study. As with the previous objective, eleven items were used to test for the effect of employee related factors on the performance of MIS at NARO. The table below presents findings regarding employee-related factors affecting the performance of MIS at NARO:

Table 6: Employee-related factors and the Performance of MIS at NARO

Statements/Items	SD	D	UD	A	SA
	Results in %				
I have unlimited access to ICT facilities	13	39.1	2.9	31.9	13
My accessibility to ICT facilities allows me to effectively utilize MIS at NARO	5.8	18.8	8.7	47.8	17.4
I am committed to improving my productivity at work	5.8	7.2	1.4	39.1	44.9
I like my job and would go an extra mile to protect it (satisfied with my job)	10.1	8.7	7.2	39.1	33.3
I usually give my suggestions for ICT requirements for my office	4.3	21.7	7.2	44.9	20.3
I am competent in using variety of computer applications	4.3	17.4	2.9	56.5	17.4
I can easily adapt to changes in my environment	2.9	11.6	0	47.8	34.8
I am open-minded to innovation	7.2	4.3	2.9	40.6	43.5
I find it easy to use computers (I am computer literate)	8.7	5.8	0	39.1	46.4
I receive training in the use of new computer applications at NARO	14.5	30.4	5.8	33.3	15.9
I regularly store my job related information in the computer	7.2	7.2	1.4	47.8	34.8

Source: Primary Data

Key: SD = Strongly disagree, D = Disagree, UD = Undecided, A = Agree and SA = Strongly agree

There was strong agreement (46.4%, n=32) that employees are computer literate. That was followed by 44.9% (n=31) of the respondents who indicated strong agreement that they are committed to improving their productivity at work. In the same way, 43.5% (n=30) indicated strong agreement to being open-minded regarding innovation. However, the key informant interviews indicated that poor attitude of employees towards MIS such as Microsoft Dynamics System SL (Solomon) is among the main factors limiting the successful implementation of computerized innovations at NARO. In support of this, it was mentioned that few modules of the Microsoft Dynamics System SL are being used yet the needs assessment exercise revealed that all the eight components/modules of the software are vital for improved overall organizational performance. In essence, this suggests that if what the key informants mentioned is true, then performance of the MIS at NARO has been limited by employees' reluctance to utilize the MIS facilities.

A proportion of 34.8% (n=24) indicated strong agreement that they are versatile to changes in their work environments; likewise 34.8% (n=24) indicated strong agreement that they store their job-related information in the computer. A section of 33.3% (n=23) strongly agreed that they are satisfied with their jobs and could work extra to protect their jobs.

While 31.9% (n=22) indicated agreement to having unlimited access to NARO's to ICT facilities, 39.1% (n=22) disagreed to the same. Similarly, as 33.3% (n=23) agreed that they receive training in the use of new computer applications at NARO, 30.4% (n=21) disagreed to the same. In the same way, while 44.9% (n=31) agreed that they usually give their suggestions for ICT requirements for their offices, a proportion of 21.7% (n=15) disagreed to the same.

Drawing a conclusion basing on such uneven statistics can only be done by use of average means for the different items. Table 7 gives the average mean values which are measured against the five point Likert scale to guide conclusions on the employee-related factors affecting performance of MIS at NARO:

Table 7: Descriptive Statistics for Employee-related factors and the Performance of MIS at NARO

Statements/Items	N	Mean	Std. Deviation
I have unlimited access to ICT facilities	69	2.9275	1.3319
My accessibility to ICT facilities allows me to effectively utilize MIS at NARO	68	3.5294	1.1650
I am committed to improving my productivity at work	68	4.1176	1.1399
I like my Job and would go an extra mile to protect it (satisfied with my job)	68	3.7794	1.2911
I usually give my suggestions for ICT requirements for my office	68	3.5588	1.1767
I am competent in using variety of computer applications	68	3.6618	1.1010
I can easily adapt to changes in my environment	67	4.0299	1.0584
I am open-minded to innovation	68	4.1029	1.1479
I find it easier to use computers (I am computer literate)	69	4.0870	1.2216
I receive training in the use of new computer applications at NARO	69	3.0580	1.3707
I regularly store my job related information in the computer	68	3.9706	1.1586
Valid N (list wise)	66		

Source: Primary Data

The item with the highest average mean value was committed to improving my productivity at work commitment to improving productivity at work ($m=4.11$). This translates to agreement when measured against the five point Likert scale. This was followed by open-minded to innovation with $m=4.1$, translating into agreement as well. Other items to which the respondents agreed as indicated by their average means included; employees are computer literate ($m=4.08$),

employees can easily adapt to changes (m=4) and regular storage of work-related information by employees in the computer (m=3.97).

Some items ranked between indecision such as; employees are satisfied with their jobs (m=3.77), employees are competent in using variety of computer applications (m=3.66), employees' accessibility to ICT facilities allows them to effectively utilize MIS at NARO (m=3.52), employees receive training in the use of new computer applications at NARO (m=3). One item ranked under disagreement and that was: employees have unlimited access to ICT facilities (m=2.92). These average mean values disqualify the meaning in the corresponding statements.

Hypothesis 2 testing: Employee-related factors significantly affect the performance of management information system of National Agricultural Research Organization.

Chi-Square to test whether employee-related factors greatly affect the performance of management information system of National Agricultural Research Organization. Under this, the following items were cross-tabulated; commitment of the employees towards improving work productivity and improvement in decision making by management in the organization. The SPSS software was used to calculate the Pearson Chi-Square and the results are presented as follows:

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	19.377	16	.250
Likelihood Ratio	18.686	16	.285
Linear-by-Linear Association	1.650	1	.199
N of Valid Cases	68		

a. 20 cells (80.0%) have expected count less than 5. The minimum expected count is .07.

The Chi-square statistic for this test is 19.377 with a probability (p value) = 0.25, which is greater than 0.05. It can therefore be concluded that the relationship between employee related factors and MIS performance is not statistically significant. Therefore, employee related factors do not have significant influence on the performance of MIS at NARO.

4.5 The Effect of Technical Related Factors on the Performance of Management Information System of National Agricultural Research Organization

This formed the third and last objective of the study. It considered capturing both hardware and software related factors that could be having influence on the performance of MIS at NARO. The table below presents findings regarding technical-related factors affecting the performance of MIS at NARO:

Table 8: Technical Related Factors and the Performance of Management Information System at NARO

Statements/Items	SD	D	UD	A	SA
	Results in %				
Hardware Factors					
The organization acquires latest ICT equipment to facilitate my productivity	5.8	21.7	21.7	37.7	11.6
The organization conducts regular repairs and upgrades the ICT equipment I use	4.3	39.1	7.2	42	5.8
The ICT equipment that I use in the organization are easy to use	2.9	14.5	7.2	58	16.2
The ICT facilities I use at the organization are fast processors	4.3	33.3	10.1	42	8.7
The ICT facilities I use at NARO are effective	2.9	20.3	7.2	62.3	5.8
The ICT equipment I use at NARO are cost effective	2.9	15.9	18.8	47.8	11.6
Software Factors					
NARO buys/uses genuine software	10.1	11.6	18.8	47.8	11.6
The software applications I use at NARO are easy to use	1.4	13	5.8	65.2	13
The software applications I use at NARO are latest	4.3	20.3	26.1	39.1	10.1
The software applications I use at NARO are regularly updated	5.8	24.6	18.8	40.6	10.1
The computers I use at NARO are installed with functional antivirus software	7.2	17.4	2.9	49.3	23.2

Source: Primary Data

Key: SD = Strongly disagree, D = Disagree, UD = Undecided, A = Agree and SA = Strongly agree

Under hardware related factors, 62.3% (n=43) agreed that the ICT facilities used at NARO are effective, followed by 58% (n=40) who agreed that equipment used in the organization are user friendly. That was followed by 47.8% (n=33) who agreed that the ICT equipment used at NARO are not only effective but also cost effective. Two equal proportions of 42% (n=29) each agreed that NARO conducts regular repairs and upgrades of the ICT equipment used and that the ICT facilities used by employees at NARO are fast processors. Similarly, 37.7% (n=26) agreed that the organization ensures to acquire latest ICT equipment to facilitate employees' productivity. However, key informant interviews revealed that there is a big challenge posed by the obsolete computer sets and servers that were bought at the time of the purchase of Microsoft Dynamics System SL. These have had negative influence on the progress of MIS implementation at NARO.

Under software related factors, 65.2% (n=45) agreed the software applications used at NARO are user friendly. This was followed by 49.3% (n=34) and 47.8% (n=33) who indicated that the Computers used at NARO are installed with functional antivirus software and that NARO buys and uses genuine software applications respectively. Other items included; regular updates of the software applications used at NARO (40.6%, n=28) and that the software applications used at NARO are latest with 39.1% (n=27) of the respondents. In support, the key informant interviews revealed that NARO endeavor to procure the right software and hardware to ensure maximum performance of the MIS to boost overall productivity of the employees in the organization.

The table that follows gives a summary of the descriptive statistics on the technical factors affecting performance of MIS at NARO:

Table 9: Descriptive Statistics for Technical Related Factors and the Performance of Management Information System at NARO

Statements/Items	N	Mean	Std. Deviation
Hardware Factors			
The organization ensures to acquire latest ICT equipment to facilitate my productivity	68	3.2794	1.1176
The organization conducts regular repairs and upgrades the ICT equipment I use	68	3.0588	1.1181
The ICT equipment that I use in the organization are easy to use	68	3.7059	1.0083
The ICT facilities I use at the organization are fast processors	68	3.1765	1.1322
The ICT facilities I use at NARO are effective	68	3.4853	.9849
The ICT equipment I use at NARO are cost effective	67	3.5075	1.0056
Software Factors			
NARO buys/uses genuine software	69	3.3913	1.1532
The software applications I use at NARO are easy to use	68	3.7647	.8997
The software applications I use at NARO are latest	69	3.3043	1.0475
The software applications I use at NARO are regularly updated	69	3.2464	1.1168
The computers I use at NARO are installed with functional antivirus software	69	3.6377	1.2244
Valid N (list wise)	66		

Source: Primary Data

In order to make conclusions on the objective, average mean values were generated. Among the rest, the user friendly nature of both the hardware and software applications used at NARO ranked higher with $m=3.7$ and $m=3.76$ respectively which, however, translates to indecision on the item. Similarly, the rest of the items scored within the same range for instance; the hardware of the ICT equipment used at NARO are cost effective ($m=3.5$), NARO buys/uses genuine software ($m=3.3$) and the organization ensures to acquire latest ICT equipment to facilitate

employees' productivity ($m=3.2$) among others as indicated in the table. All the average mean values of the listed items translate into indecision when measured against the five point Likert scale meaning that the content in the tested items is not absolute truth.

Hypothesis 3 testing: Technical related factors greatly affect the performance of management information system of National Agricultural Research Organization.

Chi-Square to test whether technical related factors greatly affect the performance of management information system of National Agricultural Research Organization. Under this, two items were cross-tabulated that is; the procurement of genuine software by NARO and improvement in decision making in the organization. The SPSS software was used to calculate the Pearson Chi-Square and the results are presented as follows:

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	16.113	16	.445
Likelihood Ratio	18.754	16	.282
Linear-by-Linear Association	5.516	1	.019
N of Valid Cases	69		

a. 21 cells (84.0%) have expected count less than 5. The minimum expected count is .51.

Given a Chi-square result of 16.113 with a corresponding p value = 0.445, which is greater than 0.05, it can be concluded that the relationship between technical factors and performance of MIS at NARO is not statistically significant. Therefore, technical related factors do not have significant influence on the performance of MIS at NARO.

Table 10 presents findings regarding the effectiveness of MIS at NARO:

Table 10: Effectiveness of MIS at NARO

Statements/Items	SD	D	UD	A	SA
	Results in %				
The information produced by the MIS is usually relevant	5.8	7.2	11.6	56.5	17.4
The information produced by the MIS is usually complete	8.7	11.6	34.8	40.6	2.9
The information produced by the MIS is usually accurate	5.8	18.8	31.9	39.1	4.3
The information produced by the MIS is usually current/up-to-date	7.2	14.5	33.3	31.9	10.1
The information produced by the MIS is usually reliable	7.2	11.6	20.3	50.7	8.7
Information is readily available for use at any time needed	5.8	26.1	20.3	34.8	13
There has been improvement in the accuracy of reports	5.8	11.6	15.9	53.6	11.6
Reporting has been done on timely schedule	8.7	34.8	21.7	23.2	8.7
There has been improved decision making by management	8.7	15.9	24.6	43.5	7.2
There has been improved inter and intra-departmental networking	13	17.4	15.9	36.2	15.9
There have been timely releases in funding for activities	24.6	37.7	14.5	17.4	5.8
There has been improved networking with NARO's stakeholders	14.5	21.7	17.4	40.6	5.8

Source: Primary Data

Key: SD = Strongly disagree, D = Disagree, UD = Undecided, A = Agree and SA = Strongly agree

The findings indicate that MIS at NARO is most effective in terms of production of relevant information as agreed by 56.5% (n=39) of the respondents. This was followed by improvement in the accuracy of reporting as agreed by 53.6% (n=37) of the respondents. In the same way, a proportion of 50.7% (n=35) agreed that the information produced by the MIS is usually reliable. Other factors in the order of their effectiveness include; there has been improved decision

making by management (43.5%, n=30), MIS at NARO usually produces complete information (40.6%, n=28), there has been improved networking with NARO's stakeholders (40.6%, n=28), the information produced by the MIS is usually accurate (39.1%, n=27), there has been improved inter and intra-departmental networking (36.2%, n=25), information is readily available for use at any time needed (34.8%, n=24), the information produced by the MIS is usually current/up-to-date (31.9%, n=27) and reporting has been done on timely schedule as agreed by 23.2% (n=16) of the respondents.

Relating to MIS effectiveness, the key informants mentioned that a number of factors affect the performance of the system among which are outdated antivirus applications which when not updated frequently may slow down after running out of date. In addition, they mentioned that at most times, the firewall system is down and could allow hacking into the organization's systems.

The table that follows (next page) gives a summary of the descriptive statistics on the effectiveness of MIS at NARO:

Table 11: Descriptive Statistics for Effectiveness of MIS at NARO

Statements/Items measuring Effectiveness of MIS at NARO	N	Mean	Std. Deviation
The information produced by the MIS is usually relevant	68	3.7353	1.0311
The information produced by the MIS is usually complete	68	3.1765	.9916
The information produced by the MIS is usually accurate	69	3.1739	.9845
The information produced by the MIS is usually current/up-to-date	68	3.6912	3.8797
The information produced by the MIS is usually reliable	68	3.4265	1.0554
Information is readily available for use at any time needed	69	3.2319	1.1523
There has been improvement in the accuracy of reports	68	3.5441	1.0429
Reporting has been done on timely schedule	67	2.8806	1.1484
There has been improved decision making by management	69	3.2464	1.0901
There has been improved inter and intra-departmental networking	68	3.2500	1.2972
There have been timely releases in funding for activities	69	2.4203	1.2055
There has been improved networking with NARO's stakeholders	69	3.0145	1.2065
Valid N (list wise)	64		

Source: Primary Data

Basing on the twelve items tested for MIS effectiveness (Table 11), the average means suggest a range between disagreement and indecision regarding the effectiveness of MIS at NARO. However, there is a relationship between the mean values for the high ranking items in terms of MIS effectiveness and the individual percentage frequency values. A combination of both has therefore been used to support the process of making conclusions regarding the effectiveness of MIS at NARO under each item.

In chronological order, starting with the one with the highest average mean, MIS at NARO usually produces relevant information ($m=3.73$), MIS at NARO usually produces current and up-to-date information ($m=3.69$), MIS at NARO has led to improvement in accuracy of reports produced ($m=3.54$), MIS at NARO produces reliable information ($m=3.42$), MIS has led to

improved inter and intra-departmental networking at NARO ($m=3.25$), MIS has improved decision making by management at NARO ($m=3.24$) and information is readily available for use at any time needed ($m=3.23$). The listed seven items have mean values slightly above the indecision point on the Likert scale and can be used to qualify the content in the seven items as truth.

On the other hand, three items rank right within the indecision mark on the Likert scale for instance; the information produced by the MIS is usually complete ($m=3.17$), the information produced by the MIS is usually accurate ($m=3.17$) and that there has been improved networking with NARO's stakeholders ($m=3.01$). These statistics are of neutral ranking on the Likert scale and thus the content in the corresponding statements. In other words, a certain proportion of the respondents were not sure of whether the information produced by the MIS is usually complete ($m=3.17$), whether the information produced by the MIS is usually accurate ($m=3.17$) and whether there has been improved networking with NARO's stakeholders ($m=3.01$).

However, two items completely rank within the disagreement point on the Likert scale. These include; reporting has been done on timely schedule ($m=2.88$) and there have been timely releases in funding for activities ($m=2.42$). Summative, it is therefore considered that the content in the two statements is not truth.

CHAPTER FIVE

SUMMARY, DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of the major findings in relation to the study objectives. Conclusions are then made under each study objective from which recommendations are developed so as to address the gaps existing. Depending on the nature of conclusions from the findings, suggestions for further researcher have been made.

5.2 Summary

With a sample of 75 respondents including 69 departmental employees and 6 key management staffs, the study found that majority of the staffs at NARO are male thus giving way to majority respondents being male (64%, n=44) with a considerable proportion of the total sample (44.9%, n=31) of the respondents lying between 31 – 40 years of age. A substantial proportion of the respondents (37.7%, n=26) had spent 11 years and beyond working for NARO by the time of the study. By occupation, 24.6% (n=17) were administrators and these were the most popular group among the respondents. NARO has been computerized for not less than 10years as was indicated by the majority of respondents (76.8%, n=53). The major use of computers at NARO involves a combination of two or more uses with word processing as the constant (55.1%, n=38). Furthermore, each one of the departments at NARO uses a combination of two or more types of software (42.1%, n=29).

5.2.1 The Effect of Organizational factors on the performance of MIS at NARO

The organizational strategy facilitates effective adoption of MIS in NARO (59.4%, n=41) while 62.3% (n=43) indicated agreement that the organizational objectives incorporate effective adoption of MIS in NARO. The key informants supported this by asserting that the organizational culture at NARO incorporates change from manual to computerized procedures in the execution of its operations where appropriate. Organizational leadership style facilitates fast diffusion of MIS among staffs at NARO (52.2%, n=36) and the organizational Culture promotes positive attitude among staffs towards the adoption use of MIS (52.2%, n=36). The item with the highest average mean value ($m=3.73$) was that the organizational objectives incorporate effective adoption of MIS in NARO, followed by agreement that the organizational strategy facilitates effective adoption of MIS in NARO with an average mean value of 3.69.

5.2.2 The Effect of Employee-Related Factors on the Performance of MIS at NARO

The employees are computer literate as was indicated by strong agreement among 46.4% (n=32) followed by 44.9% (n=31) of the respondents who indicated strong agreement that employees are committed to improving their productivity at work. The key informants supported by mentioning that few modules of the Microsoft Dynamics System SL are being used yet the needs assessment exercise revealed that all the eight components/modules of the software are vital for improved overall organizational performance. The item with the highest average mean value was employees' commitment to improving productivity at work ($m=4.11$) which was followed by employees being open-minded to innovation with $m=4.1$.

5.2.3 The Effect of Technical Related Factors on the Performance of MIS at NARO

With regard to hardware factors, the ICT facilities used at NARO are effective as indicated by agreement among 62.3% (n=43) of the respondents followed by 58% (n=40) who agreed that equipment used in the organization are user friendly. In an exceptional case, 47.8% (n=33) of the respondents indicated agreement that the ICT equipment used at NARO are not only effective but also cost effective. In addition to 42% (n=29) of the respondents who indicated agreement that NARO conducts regular repairs and upgrades of the ICT equipment used in the organization. Conversely, some of the key informants revealed that there are obsolete computer sets and servers that were bought at the time of the purchase of Microsoft Dynamics System SL, a situation which has posed negative influence on the progress of MIS implementation at NARO. On the other hand, 65.2% (n=45) of the respondents agreed that the software applications used at NARO are user friendly, followed by 49.3% (n=34) and 47.8% (n=33) who indicated that the computers used at NARO are installed with functional antivirus software and that NARO buys and uses genuine software applications respectively. The user friendly nature of both the hardware and software applications used at NARO ranked higher with average mean values of $m=3.7$ and $m=3.76$ respectively. These were the lowest average mean values among the highest ranking average means for each of the factors affecting performance of MIS at NARO that is; organizational, employee and technical related factors.

5.3 Discussion of the findings

By the fact that 59.4% (n=41) agreed that NARO's organizational strategy facilitates effective adoption of MIS coupled with a proportion of 62.3% (n=43) of the respondents agreeing that the organizational objectives incorporate effective adoption of MIS in NARO, organizational factors should be exerting considerable influence on the performance of MIS at NARO. Moreover,

through in-depth interviews, the key management staffs supported that the organizational culture of NARO incorporates change from manual to computerized procedures in the execution of its operations where appropriate. With regard to the link between business objectives and the effectiveness of MIS, Connolly and Begg (2001) stated that a management information system with a clear link of business objectives is bound to have high performance levels as it involves the entire organization, attracts executive sponsors and acceptance which positively affect the system performance in a public sector organization. Systems that don't support business objectives score limited support from the stakeholders and sponsors hence leading to poor performance in public sector organizations. The 59.4% (n=41) who agreed that organizational strategy facilitates effective adoption of MIS in NARO paint a picture that MIS performance in the organization is high-ranking. More to that, majority of the respondents (52.2%, n=36) held that the organizational leadership style facilitates fast diffusion of MIS among staffs at NARO while an equal proportion (52.2%, n=36) agreed that the organizational culture promotes positive attitude among staffs towards the adoption use of MIS. These findings reflect that there has been credible performance of MIS as they relate well with some studies as reviewed in the literature for instance, Gomez, Caceres and Lopez (2002) stated that when the management information system is successfully spread well within an organization, its performance is bound to be high as it is seen to be for the entire organization and not for the executives or its sponsors. These findings, regardless of the minority respondents that indicated the contrary provide substantial evidence that organizational factors have significant influence on the performance of MIS at NARO.

With strong agreement by 46.4% (n=32) that employees are computer literate followed by 44.9% (n=31) of the respondents indicating strong agreement that employees are committed to

improving their productivity at work, it appears most unlikely that employees could limit the effectiveness of MIS at NARO. Besides, 43.5% (n=30) indicated strong agreement to being open-minded regarding innovation. Conversely, the key informant interviews pointed at poor attitude of employees towards Microsoft Dynamics System SL (Solomon) being among the main factors limiting the successful implementation of computerized innovations at NARO. With a vivid example that few modules of the Microsoft Dynamics System SL are being used yet the needs assessment exercise revealed that all the eight components/modules of the software are vital for improved overall organizational performance, employees could be practically jeopardizing the performance of the MIS. With regard to these findings, Darkoh, Haidari, and Mothatego (2004) placed the onus on the users by stating that when the system is used by the intended users or employees, it is bound to produce high performance results in an organization. Darkoh et al held that it is always the users to determine the requirements of a successful system design. In essence, this suggests then that, performance of the MIS at NARO has been limited by employees' reluctance to utilize the MIS facilities basing on the practical reference made to the under utilization of the capacity of Microsoft Dynamics System SL by the employees.

Under technical related factors, the hardware facilities used at NARO were said to be effective (62.3%, n=43) and the equipment used in the organization were described as user friendly (58%, n=40). In addition, 65.2% indicated agreement that the software applications used at NARO are user friendly. These findings together with literature drawn from the works of Stair and Reynolds (2007) suggest that performance of MIS at NARO is satisfactory. Specifically, Stair et al hold that software that is user friendly is bound to result into increased user motivation which positively affect the general performance of the management information system through improving their working environment, while on the other hand software that is not user friendly

creates unfavorable environment to the users which negatively affect the performance of management information system in an organization. However, key informant interviews revealed that there is a big challenge posed by the obsolete computer sets and servers that were bought at the time of the purchase of Microsoft Dynamics System SL. These have technically had negative influence on the progress of MIS implementation at NARO.

5.4 Conclusions

Practically, organizational related factors are the leading factors affecting the performance of Management Information System at NARO. The organization forms the bigger entity where both the employee-related and technical related factors are part. The organization as a whole therefore has more capacity of determining the nature of outcome of any undertaking through setting up working policies, appointing the appropriate employees and acquiring the appropriate technology to ensure successful execution of operations.

Employees are an active important part of the organization through which the organization fulfills its mandate. They receive their powers and capacity to function from the organization. They may slow down the rate of performance and achievement in the organization if not placed in the rightful positions and if not sufficiently facilitated to perform. However, employees also have the potential to catalyze the rate of performance if well positioned and facilitated. Importantly, employees need to be regulated so as to perform.

The functionality of technical factors is subject to both organizational-related and employee-related factors. The organizational strategy determines whether to promote or sideline

technological innovation. Likewise, employees may limit functionality of technology in an organization especially if not properly regulated.

5.5 Recommendations

Organizational related factors have a very influential position in determining the type and direction of change in an institution and they need undivided attention from the organization's leadership and management. Management at NARO ought to ensure that all aspects that have bearing on the implementation of the organization's vision, mission and objectives are kept in good shape. Such factors may include but not limited to organizational leadership style, organizational culture, direct involvement of top management in the implementation of new technologies, employee involvement in decision making, staff motivation, communication and feedback mechanisms. Staff orientation regarding new technology introduced to the organization is equally crucial as prior knowledge about the subject determines the level of preparedness to participate in the execution. It is important to consider that organizational factors have considerable potential to influence response to change in any organization especially where the organization vision and mission are rigorously cherished.

The level of influence of the several employee related factors that affect response to and performance of an innovation can be traced from the way and emphasis with which the organization manages the overall change process. For instance, management in the organization should facilitate acceptance and fast diffusion of new technology by involving their employees in the decision as to whether and the reasons to adopt a certain type of technology and source of the technology instead of simply enforcing the innovation on to the employees without their prior involvement. This may reverse the unfavorable attitude that employees may have towards

adoption of certain technology. Additionally, management should ensure to train employees regarding change management in preparation for a planned innovation such that employees find reason with knowledge from the training why to adopt certain innovation than reject it. The organization should also develop relevant ICT policy to facilitate effective utilization of MIS facilities for the organization's productivity.

Technical related factors have an important position in determining the performance MIS in the organization. However, these are mostly subject to both organizational and employee related factors. For instance, the procurement of certain types of hardware and software in an organization is highly determined by the organizational policy on ICT and organizational leadership, while the utilization of the procured technology is subject to employees' willingness to adopt and use the technology on purpose without bias. Being that both employee and technical related factors are subject to decisions made by leadership and top management, the organization ought to properly consider (through their decisions) that the types of hardware and software acquired for use match well with the organization's ICT requirements and infrastructure. If this is not put into consideration, poor performance of MIS in the organization may result.

5.6 Limitation of the study

Divergent statements and views were given by the administrators and the employees regarding the influence of the organizational and employee related factors on the performance of Microsoft Dynamics System SL at NARO. The decision makers at the top seemed mostly to blame the underperformance on the employees' behavior while the employees indicated willingness and commitment to using the MIS in their work-related operations. This made it virtually difficult to draw conclusions on which factors have a greater influence on the problem under investigation.

However, with use of the Chi-square calculations, the researcher managed to establish that although both organizational and employee related factors have more influence on the performance of the MOS at NARO than the technical related factors, organizational related factors statistically have greater bearing on the nature of performance of MIS at NARO.

The different institutes under NARO which were considered for the study are geographically located far from each other and this negatively impacted timely collection of data from the different departments and categories of respondents working within the distinct NARO affiliated institutes. The geographical location challenge also made the study very expensive.

5.7 Contribution of the study

There are two main contributions by this study. The first being availing a body of information that adds to the already existing literature regarding MIS in public institutions. Many of the previous studies on MIS had been done mostly in the private sector and this is one of the gaps that the current study sought to fill. Moreover, such studies had been conducted in developed economies and not in developing economies like Uganda.

Secondly, the study provides tailor-made recommendations to support NARO identify and mitigate factors which could have contributed to the lag in the performance of their Microsoft Dynamics System SL which was initially acquired to improve reporting and decision making in the organization. Organizational, employee and technical related factors which had been suspected to be contributors to the underperformance of the MIS have been thoroughly studied through information gathered from the administrators and end users of the system. The areas of

weakness have been pointed out to guide management at NARO improve utilization of the MIS and influence performance in a positive way.

5.5 Suggestion for further research

Given the findings as discussed, there is need to conduct research into other factors affecting performance of MIS in a public and private institution other than organizational, employee and technical related factors. For instance, a comparative study should be conducted to establish the influence of globalization on the performance of MIS in government related institutions and private corporate companies. This would be an interesting undertaking since government related institutions are duty oriented while the private corporate companies are profit driven.

APPENDICES

QUESTIONNAIRE

FACTORS AFFECTING PERFORMANCE OF MANAGEMENT INFORMATION SYSTEM IN NATIONAL AGRICULTURAL RESEARCH ORGANISATION

Dear Sir/Madam,

The Researcher is a student at Uganda Management Institute carrying out research on factors affecting the performance of management information system in NARO in partial fulfillment for the Award of Masters Degree in Business Administration of Uganda Management Institute.

You are kindly requested to spare a few minutes and help in filling the questionnaire. All information provided is purely for academic purposes and will be kept confidential.

Thank you for your time and cooperation.

Geoffrey Ngerejaho
MBA Student-UMI

A. PERSONAL DATA

Please tick the appropriate alternatives

1. Sex

a) Male

☐

b) Female

☐

2. Age

a) 20 - 30

☐

b) 31 - 40

☐

b) 41 - 50

☐

c) 51 - 60

☐

3. For how long have you worked with this organization?

a) Less than 1 year

☐

b) 1 - 4 years

☐

c) 5 - 7 years

☐

d) 8 - 10 years

☐

e) 11 years and above

☐

4. What is your current position in this organization?

a) Scientist

☐

b) Researcher

☐

c) Administrator

☐

d) Technician

☐

e) Any other specify.....

B. ORGANISATION DATA

5. For how long has the organization been in existence?

a) Less than a year

☐

b) Below 5 years

☐

c) 6 - 10 years

☐

d) 11 - 15 years

☐

e) 15 - 20 years

☐

f) 21 years and above

☐

6. What is the total number of employees in NARO?

a) Below 50

☐

b) 51 - 100

☐

c) 100 - 150

☐

d) 151 and above

☐

C. INFORMATION TECHNOLOGY INVESTMENT

This section mainly refers to the level of information technology in your organization

7. For how long has your organization been computerized?

a) Below 2 years

☐

b) 2 - 5 years

☐

b) 5 - 10 years

☐

c) 10 years and above

☐

8. What is the major use of computers in your department?

a) Word processing

☐

b) Information gathering

☐☐

c) Communicating
forecasting

d) Statistical analysis and or ☐

d) Document production ☐
specify.....

f) Others, please

9. What kind of software does your organization use?

a) Statistical ☐

c) Internet ☐

b) Financial packages ☐

d) Others, please specify
.....

**Please Use the Scale below to respond to the issues in the tables in
Sections D, E and F that follow:**

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
5	4	3	2	1

Section D. ORGANIZATIONAL FACTORS

No.	Factors	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
D.1	The organizational strategy facilitates effective adoption of MIS in NARO	1	2	3	4	5
D.2	The organizational objectives incorporate effective adoption of MIS in NARO	1	2	3	4	5
D.3	Organizational leadership style facilitates fast diffusion of MIS among staffs at NARO	1	2	3	4	5
D.4	Organizational Culture promotes positive attitude among staffs towards the adoption use of MIS	1	2	3	4	5
D.5	Top Management are directly involved in the implementation of new	1	2	3	4	5

	technologies at NARO					
D.6	I am consulted before new Technology is introduced in the Organization	1	2	3	4	5
D.7	I am always Oriented in the use of new technologies introduced in the organization	1	2	3	4	5
D.8	The nature of staff motivation at NARO allows straightforward acceptance of MIS	1	2	3	4	5
D.9	ICT is high ranking among the priorities of NARO	1	2	3	4	5
D.10	The Nature of Data at NARO allows effective use of MIS	1	2	3	4	5
D.11	There is regular feedback from top management about the implementation progress	1	2	3	4	5

Section E: EMPLOYEE RELATED FACTORS

No.	Factors	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
E.1	I have unlimited access to ICT facilities	1	2	3	4	5
E.2	My accessibility to ICT facilities allows me to effectively utilize MIS at NARO	1	2	3	4	5
E.3	I am committed to improving my productivity at work	1	2	3	4	5
E.4	I like my Job and would go an extra mile to protect it (satisfied with my job)	1	2	3	4	5
E.5	I usually give my suggestions for ICT requirements for my office	1	2	3	4	5
E.6	I am competent in using variety of computer applications	1	2	3	4	5

E.7	I can easily adapt to changes in my environment	1	2	3	4	5
E.8	I am open-minded to innovation	1	2	3	4	5
E.9	I find it easier to use computers (I am computer literate)	1	2	3	4	5
E.10	I receive training in the use of new computer applications at NARO	1	2	3	4	5
E.11	I regularly store my job related information in the computer	1	2	3	4	5

Section F: TECHNICAL FACTORS

No.	Hardware Factors	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
F.1	The organization ensures to acquire latest ICT equipment to facilitate my productivity	1	2	3	4	5
F.2	The organization conducts regular repairs and upgrades the ICT equipment I use	1	2	3	4	5
F.3	The ICT equipment that I use in the organization are easy to use	1	2	3	4	5
F.4	The ICT facilities I use at the organization are fast processors	1	2	3	4	5
F.5	The ICT facilities I use at NARO are effective	1	2	3	4	5
F.6	The ICT equipment I use at NARO are cost effective	1	2	3	4	5

	Software Factors	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
F.7	NARO buys/uses genuine software	1	2	3	4	5
F.8	The software applications I use at NARO are easy to use	1	2	3	4	5
F.9	The software applications I use at NARO are latest	1	2	3	4	5
F.10	The software applications I use at NARO are regularly updated	1	2	3	4	5
F.11	The Computers I use at NARO are installed with functional antivirus software	1	2	3	4	5

Section G: EFFECTIVENESS OF MIS

No.	Factors	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
G.1	The information produced by the MIS is usually relevant	1	2	3	4	5
G.2	The information produced by the MIS is usually complete	1	2	3	4	5
G.3	The information produced by the MIS is usually accurate	1	2	3	4	5
G.4	The information produced by the MIS is usually current/up-to-date	1	2	3	4	5
G.5	The information produced by the MIS is usually reliable	1	2	3	4	5
G.6	Information is readily available for use at any time needed	1	2	3	4	5

G.7	There has been improvement in the accuracy of reports	1	2	3	4	5
G.8	Reporting has been done on timely schedule	1	2	3	4	5
G.9	There has been improved decision making by management	1	2	3	4	5
G.10	There has been improved inter and intra-departmental networking	1	2	3	4	5
G.11	There have been timely releases in funding for activities	1	2	3	4	5
G.12	There has been improved networking with NARO's stakeholders	1	2	3	4	5

Thanks for your contribution

INTERVIEW GUIDE FOR KEY INFORMANTS

SECTION 1: Demographic Data

Gender _____

Academic qualification _____

To which NARO Institute are you associated? _____

Department _____

Position of responsibility _____

Length of service _____

SECTION 2: The Influence of Organizational factors on MIS performance

1. Under what circumstances (expected benefits) did NARO acquire
Microsoft Dynamics System SL
(Solomon)?.....

.....
.....
.....

2. Are the expected benefits being enjoyed?

.....
.....

3. How do the above affect adoption and use of new Technology in NARO?

.....
.....

4. How does organizational culture in NARO affect performance of MIS in
the organization?

.....
.....
.....

5. What leadership style does NARO embrace?

.....
.....

6. How does NARO's Leadership style affect performance of MIS in the organization?

.....

.....

.....

7. What is the management structure of NARO?

.....

.....

8. How does NARO's management structure affect performance of MIS in the organization?

.....

.....

.....

9. What is the main internal communication system used by NARO?

.....

.....

10. How does NARO's communication system affect performance of MIS in the organization?

.....

.....

11. What demonstrated emphasis does NARO put in acquisition of new technology?

.....

.....

12. How does that emphasis affect performance of MIS in the organization?

.....

.....

.....

13. How does the Overall Organisational environment in NARO affect performance of MIS in the organization?

.....

.....

.....

14. If NARO has an ICT department, what is the role of the department and does it fulfill its role?

.....

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15. In light of light of the organizational factors, what would you suggest to be done so as to improve performance of MIS in NARO?

.....

.....

.....

.....

SECTION 3: The Influence of Employee related factors on MIS performance

1. What methods does the organization use to introduce and promote the use of new technology among the employees?

.....

.....

.....

2. Were these methods considered after the purchase of Microsoft Dynamics System SL (Solomon)?

.....

.....

3. What has the organization done to ensure that Microsoft Dynamics System SL (Solomon) is put to effective utilization?

.....

.....

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.....

4. Which specific employee related factors would you say affect the performance of Microsoft Dynamics System SL (Solomon)?

.....

.....

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5. In light of light of the employee related factors, what would you suggest to be done so as to improve performance of MIS in NARO?

.....

.....

.....

.....

SECTION 4: The Influence of Technical factors on MIS performance

1. How would you describe the effectiveness of the MIS in NARO?

.....

.....

.....

.....

2. Which specific Software factors do you think affect the performance of MIS at NARO?

.....

.....

.....

.....

3. Which specific Hardware factors do you think affect the performance of MIS at NARO?

.....

.....

.....

.....

4. What technical (*software & hardware*) related plans have the organization considered to improve performance of MIS in NARO?

.....

.....

.....

.....

5. Among the three factors; organization, employee and technical factors, which one would you say affects most the performance of Microsoft Dynamics System SL (Solomon) at NARO?

.....

.....

Thank You for Your Contribution

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22 November 2011

TO WHOM IT MAY CONCERN

05 DEC 2011

MASTERS IN BUSINESS ADMINISTRATION DEGREE RESEARCH

Mr Geoffrey Ngerejaho is a student of the Masters in Business Administration
Uganda Management Institute 2nd intake, Reg. Number 09/MBA/2/012.

The purpose of this letter is to formally request you to allow this participant to
access any information in your custody/organisation, which is relevant to his
search.

His Research Topic is: "Factors Affecting the Performance of Management
Information System in National Agricultural Research Organisation
(NARO) in Uganda"

Benon C. Basheka

Benon C. Basheka (PhD)

HEAD, HIGHER DEGREES DEPARTMENT

II All heads of units - NARO
Secretariat - Please
accord appropriate
cooperation to Mr G.
Ngerejaho

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27 November 2011

Mr. Geoffrey Ngerajaho
MBA/2012

Dear Mr. Ngerajaho,

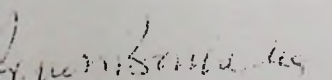
FIELD RESEARCH

Following a successful defense of your proposal before a panel of Masters Defense Committee and the inclusion of suggested comments, I wish to recommend you to proceed for fieldwork.

Please note that the previous chapters 1, 2 and 3 will need to be continuously improved and updated as you progress in your research work.

Wishing you the best in the field.

Yours sincerely,


Benson C. Basheka (PhD)

HEAD, HIGHER DEGREES DEPARTMENT