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Introduction

Advances in the application information and communication technologies (ICTs) have changed the perception, management, and dissemination of information. According to Omina and Ikoja-Odango (2006), ICT has the potential to improve the quality of life by providing new tools for access to information and knowledge management. The widespread availability and convergence of ICTs have led to an unprecedented capacity for dissemination of knowledge and information. The impact is felt in many fields and environments worldwide (Arunachalam, 2002). According to Brun and Mangst (2001), however, the benefits have reached only five percent of the world's population.

In most sub-Saharan Africa countries, research and development activities are scattered. In addition, ICT infrastructure remains inadequate. Issues of connectivity, bandwidth, and non-availability of research materials in electronic form remain paramount in most African countries. According to Okeke (2005), it is practically impossible to expect significant economic and social development without sound research in the field of science and technology.

The Federal Institute of Industrial Research, Oshodi (FIIRO), a parastatal organization under the supervision of the Federal Ministry of Science and Technology, was established in 1956 with the mandate to help accelerate the industrialization of Nigerian economy using the country's raw materials and upgrading indigenous production techniques. The establishment of FIIRO in 1956 was based on the recommendation of the economic mission of the World Bank. Its mission is to promote technological activities and industrialization of the national economy through research and development. Its mandates are to conduct research and development up to pilot plant stages on local food stuffs, textiles, pulp and paper, mineral resources, to design and fabricate machinery and equipment required for food processing, and to engage in technological transfer and dissemination of scientific and technological information to users. The Institute operates through six departments: Administration & Supplies, Biotechnology, Chemical, Fiber and Environmental Technology (CFT), Project Design and Development (PDD), Planning, Technology Transfer & Information Management (PTTIM), and Food & Analytical Services.

In 2007, FIIRO, under the aegis of the Computer for All Nigerian's Initiative (CANI), procured computers for staff at affordable rates. This was intended to improve computing skills among researchers, technologists, and administrative and supporting staff in the Institute. FIIRO has broadband Internet access. There are about 100 computers distributed among the various departments. Peripherals such as printers, photocopiers, and scanners complement the categories of ICTs available in the Institute.

Objectives

The main objective of study is to determine the impact of the use of ICTs on research and development activities at the Institute.

Methodology

The study used a structured questionnaire to elicit information from staff. A total of 120 staff were sampled from a workforce of about 400, and 99 responded.

Findings

Results showed that a total of 99 (82.5 percent) questionnaires were found to be valid for analyses. A breakdown of respondents revealed that Administration and Supplies had 35 (36.8 percent) respondents, Biotechnology six (6.35), and PTTIM 21 (22.1 percent). Others are Chemical Fibre and Environmental Technology (CFT) with seven (7.4 percent) respondents, Food & Analytical Services with 14 (14.7 percent), and for Project Design and Development there are 12 (12.6 percent) respondents.

Detailed analysis also revealed that 94 percent of those sampled were computer literate, while 5 percent indicated that they were not. The most frequently used software application was found to be word processing with 38.4 percent user.

Also, 65 members of staff (65.7 percent) claimed ownership of the computer they use, while the Institute owned 24 (24.2 percent). Through the Computers for All Nigerians Initiative (CANI), 13 respondents were able to acquire computers, while nine relied on initiatives by banks for acquisition of computers. About 35 respondents directly purchased the computers they use, while others rely on computers owned by their spouse, friends, and colleagues.

Out of a total of 99 respondents, 63 have laptops, while 32 make use of desktop computer systems. A majority of respondents (64.6 percent) use their computers for official duties, personal duties (23.2 percent) and business (one percent). Problems and difficulties encountered most often include unfamiliar software (15.2 percent), irregular power supply (32.3 percent), and low speed Internet connectivity (6.1 percent).

More than half of respondents (53.5 percent) are ignorant of the authentication of software applications they use, while 23.2 percent claimed that application software on their computers is licensed, 13.1 percent responded in the negative.

Table 1

Job Designation/Rank	Frequency	Percent (percent)
Director	4	4.1
Deputy Director	1	10
Chief Research Officer (CRO)	8	8.2
Principal Research Officer (PRO)	6	6.1
Senior Research Officer (SRO)	7	7.1
Research Officer (RO)	7	7.1
Chief Technical Officer (CTO)	5	5.1
Principal Technical Officer (PTO)	7	7.1
Senior Technical Officer (STO)	4	4.1
Secretary	7	7.1
Others	42	42.9
Total	98	100

Table 1 gives a comprehensive overview of the rank and designation of respondents. The term “others” refers to the different cadres of junior staff that forms the bulk of support staff in the institute. A total of 93 (93.9 percent) respondents indicated that they are computer literate, five (5.1 percent) indicated otherwise.

Table 2 indicates the length of time respondents have been interacting with computers

Years	Frequency	Percent (percent)
Less than a year	14	15.1
Less than 2 years	8	8.6
Between 2 and 4 years	21	22.6
Between 5 and 7 years	22	23.7
Between 8 and 10 years	9	9.7
More than 10 years	18	19.4
Total	93	100

Table 3 describes departmental attitudes towards specific tasks and duties for which computers are used.

Department	Word processing	Graphics	Spreadsheet	Payroll	Data Analysis	Design	Other (presentation & programs)
Admin & Supplies	14	3	7	3	3	1	-
Biotechnology	2	1	2	-	-	-	-
PTTIM	11	-	6	-	1	-	3
CFT	2	-	1	2	1	1	-
Food & Analytical	5	1	2	2	2	-	2
PDD	4	-	1	1	-	4	1
Rank/Designation							
Director	2	-	-	-	-	-	1
Deputy Director	-	-	1	-	-	-	-
CRO	4	-	1	-	1	1	1
PRO	1	1	2	2	-	-	-
SRO	1	-	2	2	-	2	-
RO	2	2	2	-	1	-	-
CTO	3	-	-	-	-	1	1
PTO	3	-	1	-	-	1	-
STO	3	-	-	-	1	-	-
Secretary	1	-	4	-	1	-	-
Others	17	2	8	4	3	1	5

Table 3 is a summary of activities, duties, and tasks to which computers are subjected in the departments and by members of staff of the institute.

More than 70 percent of respondents have Internet connectivity in their offices, while about 21.2 percent do not, mainly respondents in engineering workshop. About 33 percent use the Internet to access electronic mail, while 54.4 percent use it for information and research materials.

A m ajority of respondents (60.6 percent) claimed to have attended training course in computer appreciation, while 35.4 percent had not. Research officers are the most literate, with 16 having attended training.

About 38.4 percent of respondents complained that the training received is not adequate for the work they do, while 27.3 percent found it adequate, and 32.3 percent remained undecided. An overwhelming majority of respondents (90.9 percent) agreed that they require further training to keep up with rapid changes in ICT. Not surprisingly, 98 percent of respondents recognized the importance of computers and Internet facilities to research and development activities.

Discussion

This study has assessed the effects of ICT on research and development activities at FIIRO. A number of challenges have been indentified, if the full benefit of ICT is to be realized.

The bandwidth available to the Institute is inadequate compared to the number of users, which accounts for the very low speed connectivity often encountered by users.

The inability to monitor the network from a central location underscores the underdevelopment of ICT infrastructure.

Virus, malware, and worm attacks are prevalent. Analyses of collected data show that while a majority of staff are conversant with basic operations of computers, the vast majority require further training.

Other factors militating against use of ICT include irregular power supply, failure and high cost of local Internet service providers (ISPs), unfavorable regulatory, licensing, and taxation regimes, insufficient grants sustainability, poor organizational design, and user dissatisfaction with low bandwidth.

Conclusion

FIIRO has yet to benefit fully from ICT, especially in its application to research and development activities. Infrastructural challenges constitute a major barrier to the accessibility of online resources which supports research and development.

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