The Effects of Information Communication Technology on Administrative Efficiency of Tamale Technical University

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Abstract

The aim of the study was to assess the effect of Information Communication Technology (ICT) on administrative efficiency using the Tamale Technical University (TaTU) as a study area. A descriptive quantitative design was adopted. The total population was stratified into teaching and non-teaching and samples were drawn from each stratum by the method of purposive sampling and a total of 214 respondents were arrived and used for this study. Structured questionnaire was used in collecting data. The study found that TaTU has deployed ICT in administrative functions to some extent even though the ICT logistics are still not available in offices for the administrative functions. The deployment of ICT at the administrative functions improves efficiency and effectiveness. The study however revealed: the lack of human resource management software as well as antivirus software; the lack of proper maintenance; inadequate budget allocations; lack of in-service trainings; using different brands of ICT logistics; and unstable internet connections are the challenges bedeviling the ICT deployment in the University. Standardized brands of modern ICT facilities need to be provided together with reliable internet facilities at all times to avoid unnecessary interruptions which affect efficiency. The maintenance culture of the ICT logistics should also be improved and training of in-service personnel on the usage of the ICT facilities to help ensure their efficient utilization in the University.

Keywords

Information Communication Technology, Administrative, Efficiency,

Organisation, Tamale Technical University

1. Introduction

The use of ICT in organizations has seen rapid development in recent times. Organizations rely heavily on ICT to develop and grow their businesses since it plays a crucial role in the present knowledge-based economy (Asgarkhani & Young, 2010). There is widespread use of ICT and its impact on socioeconomic development, information sharing and dissemination in all aspects of human life endeavors and organisations has been positive (Shanker, 2008; Schware, 2003; Spanos et al., 2002). The adoption of ICT has resulted in the decrease in the degree of inefficiencies and uncertainty because businesses are able to interact more efficiently (Buhalis, 2003; Krishnaveni & Meenakumari, 2013; Alam & Noor, 2009; Melville et al., 2004). ICT acts as the foundation stone of the contemporary world; thus, understanding this technology and its fundamental concepts is considered as part of the core of education (UNESCO, 2002). More transparency in organizations is enabled since networking and sharing of information can lead to demand for greater openness and transparency (Shanker, 2008; Jiménez-Zarco et al., 2006; Kollberg & Dreyer, 2006).

To Hanna (2003) and Olugbenga (2006), there is a positive correlation between the greater use of ICT tools in organization and their efficiency. Similarly, to Ugwoke et al. (2015) the discovery of ICT has proven to be a powerful tool in education reform; and that, in the present world, it increases school effectiveness and reduce unnecessary bottleneck in school administration. ICT adoption enables organization to reduce administrative costs (Legris et al., 2003; Hengst & Sol, 2001; Ramsey et al., 2003; Shanker, 2008). The quest for greater productivity, quality, and morale is heightening in Africa and ICT has been the drive and companies are pushing employees a step further in the area (Balcer & Lai, 2004; Choi, 2004). Information and Communication technology provides several facilities and possibilities for educational administrators to do their tasks, Zainally (2008). Suri (2005) reported that Spanish and Indian universities have been changing fast due to the development of new Information and Communication Technologies (ICT). The integration of ICT into this process enhances the overall admission activities of higher education institutions by making it more accessible to many (Obeng, 2004). ICT into general administration has brought increased employee and management efficiency, optimal resource utilization and task facilitation (Dauda & Akingbade, 2011; Hasan et al., 2007).

Of particular interest is the digitization drive in Ghana and there is the need to explore the benefits that are realised in diverse areas of application of ICT (Osei-Wusu, 2013). Enock (2015) assessed the implementation of e-government in Ghana's public sector. Yalley (2022) studied the challenges affecting the use of ICT in pre-tertiary school administration in Ghana. This paper examines the ef-

fects of ICT deployment on administrative efficiency in of a public tertiary institution (TaTU) in Ghana.

2. Literature Review

2.1. Concept of Administration

Administration is the organization and direction of people in order to accomplish a specified objective. To this end organizations attain its mission, and objectives by combining human and capital resources with other logistics (Adebayo, 2011). To Amadi (2008), to achieve the goals of educational system Educational administration arrange and coordinate resources available. Notwithstanding this, planning, organizing, programming, staffing, budgeting, coordinating, reporting, and assessing are all parts of administration, though on a lesser scale than management (Amadi, 2008; Adekunle, 2013).

2.2. Information Communication Technology (ICT)

Information may take many different forms such as text, numbers, pictures, sound, video and multimedia. To transfer information, Information Technology (IT) systems use computers, telecommunication networks and other electronic devices. Thus, the addition of the word "communication" is inevitable. Hence, we have the concept of "Information and Communication Technology (ICT)". When information and communication move away from the orthodox verbal and print media toward the more recent electronic media, the concept is termed "Information and Communication Technology" (ICT). Thus, the combination of networks comprising hardware and software, and communication, collaboration and engagement to enable the ability to process, manage and exchange data, information as well as knowledge, is what ICT is all about (Voogt & Knezek, 2008). It can also be viewed as an electronic technology that is used for accessing, processing, gathering, manipulating, presenting and communicating information. ICT comprises a combination of data careers for example pen drive, video, CD-ROM, floppy disc, cell phones, Internet and software in which the possibility for an interactive approach is offered. The World Bank (2010) cited in Ofojebe and Olibe (2010) defined information and communication as a generic term referring to technologies which are being used for rapidly collecting, storing, editing and passing on information in various forms.

According to Onuma (2007), Information and Communication Technology (ICT) is a comprehensive term that refers to methods, management systems, and applications used in the creation, storage, manipulation, and communication of data. Maki (2008) defines ICT as "technologies used to communicate in order to create, manage and distribute information. She added that a broad definition of ICT includes computers, internet, telephone, television, radio and audio-visual equipment. She further explains that ICT is any device and application used to access, manage, integrate, evaluate, create and communicate information and knowledge. Digital technology is included in this definition as services and ap-

plications used for communication and information processing functions are associated with these devices" (Ekpe, 2009). According to the Education Testing Service (Panel, 2002), the International Literacy Panel (ILP) considers ICT as the combination of Information Technology (IT) and telecommunication. According to the International Literacy Panel (ILP), IT is the electronic display, processing and storage of information, but not necessarily the transmission of the information.

Makewa et al. (2013) submitted that digital technology reflects hardware and software products, communication tools and products with services used to transmit information. The term is meant to be as inclusive as possible to reflect the breadth of hardware, software and infrastructure that make up ICT. They added that hardware includes electricity infrastructure, computers, laptops, CD ROMs, printers, scanners, telephones (mobile/landline) and projectors. Makewa et al. (2013) defined software as a set of detailed instructions known as programs and data that allow hardware to accomplish activities at a rapid rate. They further classify computer software as system and application software.

2.3. Efficiency

Adams (1963) defines efficiency as the dexterity with which one can plan, organize, and manage diverse and frequently opposing social impulses inside a single organization. Besong (2001) noted that efficiency is part of the function assumed by someone, assuming some set of responsibilities by a professional in an organizational setting. Adegun (2009) identified efficiency in a series of his studies related to efficiency, that it is a symbol of good administration of the incumbent namely: team work, morale or motivation of staff, good teaching, conducive social climate and counseling as well as rules and regulations. The principal's ability to control and maintain school facilities, initiate projects and completes both the new ones and also those abandoned by his predecessors is exemplary of efficiency. Equally, monitoring performance, regular staff meeting, interaction, encouraging staff participation in decision-making are evidence of efficiency.

2.4. Administrative Efficiency

Administrative efficiency refers to an organization's capacity to produce the desired results with a minimum expenditure in terms of time and money, personnel, material, energy, etc. Adegun (2009) identified efficiency in a series of his studies related to efficiency, that it is a symbol of good administration of the incumbent namely: team work, morale or motivation of staff, good teaching, conducive social climate and counseling as well as rules and regulations. The principal's ability to control and maintain school facilities, initiate projects and completes both the new ones and also those abandoned by his predecessors is exemplary of efficiency. Equally, monitoring performance, regular staff meeting, interaction, encouraging staff participation in decision-making are evidence of efficiency.

2.5. Conceptual Framework

A conceptual framework is a graphical representation (diagram) of a research topic or thesis (Mouly, 1970). This helps the researcher to find the link between the existing literature and his/her own research objectives. Thus, for this study, the relationship that exists among the variables is represented in Figure 1.

2.6. Theoretical Review

2.6.1. Theory on Administrative Efficiency

Efficiency in administration has long been a source of contention among scholars since the beginning of the 20th century. Owing to this, a number of theories have been propounded in an attempt to explain how we can achieve efficiency in administration. Notable among them is organizational theory.

2.6.2. Organizational Theory

Organizational theory came into being in the early 20th Century when production shifted from the individual and family level during the era of industrial revolution. As population increased and new technologies emerged, the idea of organizations also emerged in order to meet the high demand of goods and services. Owing to this, various scholars at that time started looking to find ways by which organizations could maximize productivity and efficiency. Consequently, the scholars at that era came out with different ideas that later came to be known as "Organizational Theory". Notable among the founding fathers of organizational theory are Max Weber, Henri Fayol, Elton Mayo, E. Wight Bakke, Chris Argyris, James G. March, Rensis Likert, Jacob Marschak, Anatol Rapoport, and William Foote Whyte (Posey, 1961). The types of organizational theory include classical organization theory, neo-classical organization theory, bureaucratic organization theory, modern organization theory, administrative organization theory and scientific management organization theory.
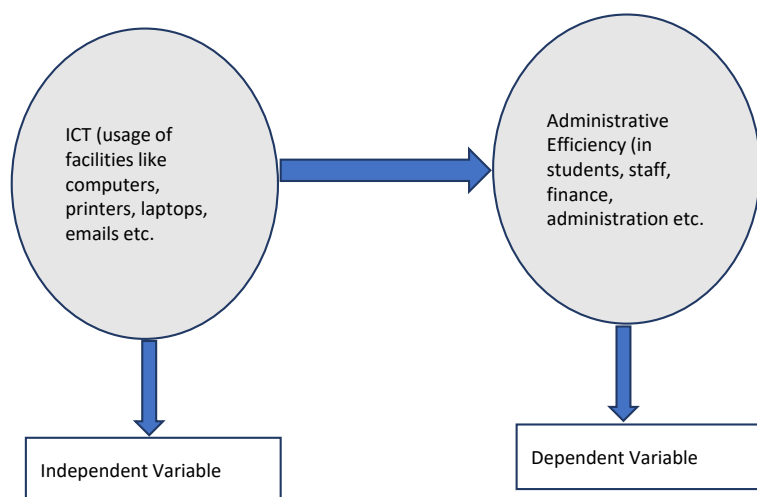

Figure 1. Effect of ICT on administrative efficiency. Source: Culled from Adegun (2009).

Organizational theory simply deals with workers within an organization and how they can accomplish set goals efficiently. Organizational theory, though started with industries, was later applied in public administration because there also was the need to improve upon services in the public sector. In the field of administration, organizational theory therefore looks at how administrators can accomplish set targets efficiently. Pugh et al. (1963) identifies a number of assumptions or principles under which administrative efficiency can be achieved according to organizational theory. These include: specialization, standardization, formalization, centralization, configuration and flexibility. Pugh et al. (1963) identified two aspects of standardization; standardization of procedures and standardization of roles. Procedures are standardized when all circumstances are covered by rules or definitions that apply consistently. Standardization of roles is defined as "the degree to which the organization prescribes the standardization of 1) role definition and qualifications for office, 2) measurement of role-performance, 3) status of titles for offices and symbols of the roles 4) role performance rewards" (Pugh et al., 1963: p. 303). Consistent with this view, Child (1972) defines standardization as "the extent to which activities are subject to standard procedures and rules" (pp. 3).

The degree to which an organization's communications and processes are written down and filed is known as formalization (Pugh et al., 1963; Child, 1972). Thus, Formalization is the extent to which communications and procedures are written down and standardization refers to how one has to follow these rules. It can be observed that standardization and formalization are closely related.

Without a minimum level of formalization and or standardization, role ambiguity may occur, which will affect performance. Notwithstanding this, when there is too much formalization and standardization, boredom, job dissatisfaction, alienation, absenteeism, and low output can set in hence less administrative efficiency (Pugh et al., 1963).

Payne and Pheysey (1971) showed in their empirical research that an organization which has more standardization and formalization, scores higher on its measurement of administrative efficiency. Also, Hage (1965) states that a high formalization of jobs result in developing expertise in a limited area and therefore greater efficiency in performance with fewer errors being made. However, according to Hardwin (2012), formalization and standardization can also have disadvantages. Individuals that are profiting from the current status-quo have interest in keeping the status-quo the way they are at that moment which will have negative consequences for adaptation of the company. Secondly, those that are being punished by the rules will want to change the rules to their benefit, which will not always be in the best interest of the company. Furthermore, the most dangerous consequence is that rules will be over used. Individuals will be striving for rewards and in their quest for them they will strictly follow the rules even if this is not always in the best interest of the company at all times. Fur-

thermore, in order for administrative efficiency to be achieved, there needs to be specialization. Specialization refers to the division of labor within the organization. According to Reimann (1973), administrative efficiency is increased by assigning specialized tasks to people. However, Argyris (1957) contends this by saying that specialization has downsides; people will tend to feel frustrated because their self-actualization will be blocked, they will tend to experience failure, they will tend to have a short-time perspective and as a result they will experience conflict because they will not like these characteristics of their present jobs and thus less administrative efficiency will set in.

Again, centralization of authority and decision-making increases administrative efficiency according to the organizational theory. The extent to which the locus of authority for making choices that influence the organization is confined to the top levels of the hierarchy is referred to as centralization (Child, 1972; Pugh et al., 1963). Contrary to this assertion of organizational theory, Aiken & Hage (1971) found in their research that highly centralized organizations with little autonomy over assigned tasks tend to have high rates of work alienation and loss of perceived authority and hence less administrative efficiency. A number of criticisms have been leveled against organizational theory. Notable amongst them is that it is too rigid and focuses only on the organization to the detriment of externalities such as the environment, technologies etc. The environment for instance plays a role in an organization and thus affects its efficiency. The adoption and usage of new technologies also do affect efficiency of an organization. Owing to the gaps left by the organizational theory in trying to explain how we can achieve administrative efficiency, other theories emerged. Notable amongst them are Systems theory and Technology Acceptance Model. These theories will be looked at in the ensuing sections.

2.6.3. Systems Theory

Systems theory was propounded in 1920 by Bertalanffy. It is also a useful theory to our study. The organization is viewed as a system made up of interconnected and interdependent pieces in which the interaction of any portion of the system impacts the entire system, according to systems theory. As a result, in order for one portion of the system to work well, it must interact with and rely on the other elements in the system. Because the concept of interaction and interdependence of pieces within the education system, like all other social systems, has same qualities, systems theory can be said to be applicable to education. A system must be viewed as a whole (Adekunle, 2013). A system can either be closed or open. A closed system has the tendency to run down whiles an open system does not. If an open system has to survive, it must be able to use up enough input from the environment to offset its output, as well as the energy and the material used in running the system. For a dynamic equilibrium to be achieved there has to be a feedback system—the systems theory flow chart is represented in Figure 2 below.
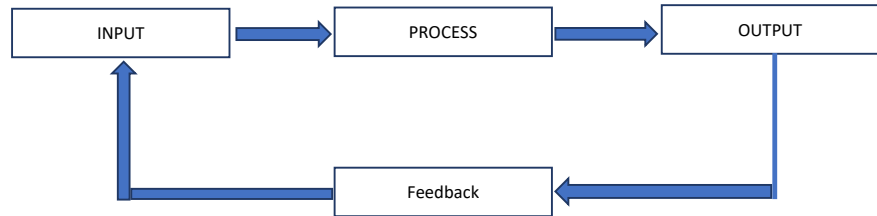
Figure 2. Systems flow chart.

People, materials, money, and information are all inputs that an organization receives from society. It then translates these inputs into products and services as outputs. Money and the market provide a way for groups to recycle resources. The system reveals critical variables and other interaction with one another in any problem. The system makes us conscious of the fact that a single problem should not be treated with regard to consequences or other relating systems. Researchers have been grappling with systems and components in terms of their contents and relative dynamics since Aristotle's contention that knowledge is gained from understanding of the whole rather than individual parts (Aristotle's Holism). During the last century, this historic endeavor evolved into what is now known as "systems theory" (Meadows, 2008).

Systems theory is an interdisciplinary theory that applies to all systems in nature, society, and many scientific areas, as well as a framework for investigating events from a holistic perspective. The shift of attention from the part to the whole is systems thinking (Mele & Polese, 2010), considering observed reality as an integrated and interacting unicum of occurrences, in which the particular qualities of the separate components become obscure. The relationships between the parts themselves and the events they cause as a result of their interaction, on the other hand, become considerably more essential, resulting in "system elements being rationally coupled" towards a common goal (Golinelli, 2010). The systemic perspective argues that we are not able to fully comprehend a phenomenon simply by breaking it up into elementary parts and then reforming it; we instead need to apply a global vision to underline its functioning. In the educational sector, the school is considered as an open system consisting of different parts among which are: Administrative staff (e.g., Pro-Vice Chancellor, Vice Chancellor, Faculty Deans, Head of Departments (HOD), Registrars, etc.), Administrative tools (e.g., ICT facilities like computers, printers, projectors, fax machines etc.), School Plant (e.g., classrooms), Instructional Facilities (e.g., visual materials), Academic staff, Students, Internal Examinations, Parents-teachers' Association, School-Based Management Committees. One of the criticisms against systems theory is that it regards an organization as having been made of several different units or parts that interact to achieve set goals but does not specify the roles of each unit or part. Also, according to Wallerstein (1979), systems theory is too prone to generalizations and reduces the organization to a mechanical work. Thus, the theory works on the assumption that the organization is me-

chanical. It sees also the organization more of an economic entity to the detriment of other aspects such as social and cultural. So, for instance, the cultural dispensation of an organization can influence its adoption of certain changes and hence affect its efficiency.

3. Technology Acceptance Model (TAM)

Davis first introduced the Technology Acceptance Model (TAM) in 1986 (Davis, 1989). If potential consumers do not adopt and employ emerging information technology, it will not offer the necessary organizational efficiency. One of the most important models of technology acceptance is the Technology Acceptance Model (TAM; Davis, 1989), which states that two key elements influence an individual's intention to utilize new technology: perceived ease of use and perceived usefulness. An adult who believes that digital games are too difficult to play or a waste of time, on the other hand, will be less likely to adopt this technology, whereas an older adult who believes that digital games provide needed mental stimulation and are simple to learn will be more likely to want to learn how to use them. Likewise, in the case of administrative staff in TaTU, an administrator who perceives ICT gadgets such as printers, fax machines, projectors etc. as difficult to use or does not add significant benefit to him/her will unlikely want to adopt this technology, whiles the administrator who perceives these gadgets as providing significant benefit or are easy to use will be more likely to want to use these gadgets. The Technology Acceptance Model works on the assumption of binary classification of the essence of new technology; either good or bad (useful or not useful). That is, technology is either good or bad as perceived by the end user. Although the model has been criticized for providing too little predictive power for novice online learners, the model is still by far the most well-established and most widely used model for predicting user acceptance of technology (Venkatesh & Davis, 1996).

TAM is in line with Rogers' (1983) diffusion of innovation theory, which states that technology adoption is influenced by a number of factors such as relative advantage and ease of use. TAM addresses two specific beliefs: perceived usefulness and perceived ease of use. The degree to which a person believes that using a system will improve his performance is characterized as perceived usefulness. The degree to which a person believes that using a system will be simple is referred to as perceived ease of use. TAM aims not just for prediction, but also for explanation, in order to assist academics and practitioners in determining why a system might be unsatisfactory and taking relevant action.

3.1. Empirical Review

3.1.1. Usag e of ICT Facilities for School Administration

Surveys have revealed that in Africa, both teachers and school administrators viewed as worthwhile the use of computers in the classrooms, but of less importance in administration (Makewa et al., 2013; Etudor-Eyo et al., 2012). They

found out that the problems in obtaining proper software, computer viruses, hardware damage, insufficient number of computers and printers, and intermittent power supply were just a few of the issues faced in employing computers in school administrative processes can be streamlining in communication through the help of ICT. ICT is effective, in eradicating distortion and duplication of information, thus enhancing effective communication (Oyedemi, 2015). Computers are but tools and do not serve as a total replacement for workers (Etudor-Eyo, Etuk, & Azewena, 2009). Etudor-Eyo et al. (2009) found a high level of utilization of ICT by some school administrators in Akwa Ibom State, Nigeria. However, innovative use of ICT in administrative process in most secondary schools in that state seems not to be widespread. A number of researches suggest that the use of computers in administrative work made it easier for school administrators and teachers to store information and improve quality of documentation (Amenyedzi et al., 2011; Singoro et al., 2012). Makhanu and Kamper (2010) revealed that ICT use positively impacted registration and confirmation of SSCE candidates, record keeping of various students' records, stores and library supplies, and minutes of meetings in schools. The result of this is enhanced efficiency in storage of information and retrieval, time management and enhanced quality work. In schools with high population, usage of ICT is a big relief with regard to financial costs (Kukali, 2013).

Makewa et al. (2013) opined that for effective administration, school administrators should adopt ICT not only for teaching and learning but also for administrative transactions. Saiti and Prokopiadou (2009) showed that ICT in the school environment may be considered as a synonym for modernization of schools. The ICT use in schools is part of the extensive modernization in the technology of education and administration.

In addition to the usage of ICT, school administrators need to have vision and leadership skills in order to attain administrative efficiency. Afshari et al. (2010) asserted that school administrators need to be familiar with the gains of new technologies.

3.1.2. Effects of Usage of ICT on Administrative Efficiency

Humanity now lives in an electronic age characterized by a bridge of gap between distance and time, giving way to information revolution built around information and communication. Etudor-Eyo et al. (2012) and Okon et al. (2015) found that there is a significant positive relationship between administrators' use of ICT and communication efficiency; and school administrators' communication efficiency is significantly predicted by their use of ICT. Adeyemi and Otileye (2010) recommended that the State Government should supply the necessary ICT equipment to all secondary schools in the State. Makewa et al. (2013) revealed that Teachers and administrators viewed the use of ICT in supervision of instruction and student administration as equally important, thereby highly rating it. Merireng and Koringura (2013) asserted that the use of computers in administrative work made it easier for both. For instance, it made students' records

safe in terms of storage and documentation. The use of ICT in management improved effectiveness and efficiency, decision-making, accountability, communication and record keeping making these functions cost-effective and easier schools (Manduku et al., 2012). Working in the Kesses Zone in Kenya, the researchers found that in spite of the benefits associated with adoption and use of ICT in management, school management had not fully realized full potential of ICT in carrying out managerial activities.

Afshari et al. (2010) established that ICT usage improved school administrators' ability on school budgeting, monitoring, reporting and management skills relevant to current information age. Further, Amenyedzi et al. (2011) revealed that at least 30% of teachers used computers and internet for research and data base to retrieve students' academic performance records easily and faster.

4. Methodology

This study employs two research designs; descriptive and explanatory research design. Quantitative approach was used for this study. The population of 214 was both teaching and administrative workers in TaTU.

Stratified simple sample was used for the study. The total population was divided into teaching and non-teaching staff (strata). Samples were then drawn from each stratum (teaching and non-teaching staff) by the method of purposive sampling for the sake of convenience. Once the population size was definite, the Yamane's (1967) formula: $n = \dfrac{N}{1 + Ne^2}$, was used.

Where, n = the sample size, N = the size of the population (460), e = the error of 5 percentage point (.05). $\Rightarrow n = \dfrac{460}{1 + 640(.05^2)} = \dfrac{460}{2.15} = 213.953 \approx 214$. With an error of 5% error rate and a 95% confidence coefficient, a sample size of 214 out of the population 460 was drawn (Table 1).

4.1. Data Collection Procedure

The data for this study was gathered utilizing a standardized questionnaire. This was done to collect data that was related to the study's goals and research concerns. Both closed and open-ended questions formed this structured questionnaire which was used to solicit responses. The questionnaires allowed the researcher to collect information that was well-structured to capture expected responses and provide extensive information about the study's aims.

Table 1. Sample size population.

No. Strata	Sample Size
Teaching Staff	60
Non-teaching Staff	154
Total	214

Source: TaTU Human Resource Department, 2022.

4.2. Data Analysis

All completed questionnaires were reviewed to guarantee completeness before evaluating the data acquired in the field. Quantitative data was analyzed using SPSS (version 20). Prior to the analysis phase, data cleaning and processing were performed to identify errors in data recording. A simple linear regression was used to measure the effects of the dependent variable on the independent variables. Regression analysis was the most appropriate analysis tool to measure the effect of the independent variable on the dependent variable.

4.3. Reliability

The Cronbach's Alpha was used to measure the internal consistency, i.e., how closely related the individual variables are related/correlated in the data. Table 2 shows the case processing summary of the analysis with a total number of 214 responses in each variable representing 100% with a valid count of 76.2% in the entire data.

The Cronbach's Alpha for internal consistency was found in Table 3 with a total number of 45 variables and a responding alpha value of (.888) which shows a very good consistency of the data used in this research work. It implies that, 88.8% was consistent and reliable with regards to the data used in this research.

4.4. Validity

To ascertain the instrument validity, the questionnaire was well structured and a total number of 214 respondents from TaTU, teaching and non-teaching members responded to it. There were clear instructions in each section of the instrument to enable respondents correctly answer the questions as expected. Also, the answered questions were sorted one after the other before they were carefully coded into the SPSS Software for analysis. Above all, subject matter experts perused and validated the instrument.

5. Results and Discussions

Table 4 shows the gender distribution of the respondents. Majority (68%) of the total 214 respondents were found to be males whilst the remaining (32%) of the total respondents were females.

Also, age groups of the respondents were solicited. Table 4 indicates some respondents recording between the ages of 30 - 39 years (56.67%), 40 - 49 years age group representing (23.81%), 50 and above years representing (11.43%) and the least age group (8.10%) representing those between the ages of 18 - 29 years.

In Addition, the academic qualifications of the respondents were sought. From Table 4, majority (59.81%) representing 128 out of 214 total respondents have Master's Degree, 70 respondents representing (32.71%) have HND/First Degree, 8 respondents representing (3.74%) have Diploma, both certificate and PhD holders have 4 respondents each representing (1.87%). The result indicates that only few (1.87%) have PhD Degree.

Table 2. Case processing summary.

		N	%
	Valid	163	76.2
Cases	Excluded	51	23.8
	Total	214	100.0

Source: Fieldwork, 2022.

Table 3. Reliability statistics.

Cronbach's Alpha	N of Items
.888	45

Source: Fieldwork, 2022.

Table 4. Demographic characteristics of respondents.

Gender of the Respondents	
Gender	**Number (%)**
Male	146 (68)
Female	68 (32)
Total	100
Age of Respondents	
AGE	**Number (%)**
18 - 29	17 (8.10)
30 - 39	119 (57.67)
40 - 49	50 (23.81)
50 and Above	24 (11.43)
Highest Academic Qualification	
Qualification	**Number (%)**
Certificate	4 (1.87)
Diploma	8 (3.74)
HND/First Degree	70 (32.71)
Masters	128 (59.81)
PhD	4 (1.87)
Work Experience of Respondents	
Years Worked	**Number (%)**
1 - 3	36 (17.14)
4 - 6	38 (18.10)
7 - 9	53 (25.24)
10 and above	83 (39.52)

Source: Fieldwork, 2022.

Finally, Table 4 shows the number of years the respondents have worked at the Tamale Technical University (TaTU) as 83 (39.52%) have worked for 10 and above years, 53 (25.24%) have worked for between 7 - 9 years, 38 (18.10%) having 4 - 6 years of work experience whilst the least, 36 (17.14%) have 1 - 3 years of work experience. The results indicate that most administrative staff in TaTU have been in the institution for 10 and more years.

Effects of ICT Deployment on Administrative Efficiency

In Table 5, regarding the relationship between ICT Deployment (independent variable) and administrative effectiveness it is noted that there is a positive relationship with ICT deployment and level of employee creativity (.828); level of work flexibility (.852); level of speed (.867); level of performance (.807); level of consistency (.883). The research meant that there is no linear relationship between ICT deployment and employee's creativity since the P-value (.00) in Table 8 is less than the Alpha value (.050) thus it was concluded based on the sample data that there is a linear relationship between ICT deployment and employee's creativity. Thus if ICT is deployed, all these indicators (dependent variables) will be enhanced thereby affecting administrative effectiveness

To adduce a reason for the ICT deployment influences on administrative effectiveness a Regression was run. Table 6 and Table 7 are the model summary, ANOVA table and coefficients table respectfully for the simple linear regression between employee's level of creativity (dependent variable) and level of ICT deployment (independent variable) Table 6, The correlation between the dependent and independent variable (.828), R-square shows the total variation for the dependent variable that could be explained by the independent variables (.685) and the value of the Adjusted R Square (.683) suggesting that the regression model is a very good one for predictions. ANOVA table showing a P-value of (.000) and F-Ratio of (460.939), hence significance result manifested

Table 7 A 95% level of confidence in the study with a significance level of .000 below (.050) shows there is a positive impact on employee level of creativity when ICT is deployed. Based on the regression model above, it was found that an employee's creativity is highly dependent on the level of ICT deployment. That is, the more the ICT deployment in an employee's office, the higher his/she creativity. This finding is in line with Siwale (2015) when majority (68%) of his respondents strongly agreed that IT usage increases employee's creativity in the study he conducted.

To further adduce a justification for the effect of ICT deployment on employee level of flexibility a regression analysis was done. Table 8 shows the correlation between the dependent (level of flexibility) and independent variable (ICT deployment) (.852), R-square shows the total variation for the dependent variable that could be explained by the independent variables (.726) and the value of the Adjusted R Square (.724) suggesting that the regression model is a very good one for predictions. Also, ANOVA Indicating a P-value of (.000) and F-Ratio of (560.878), therefore the result is significant.

Table 5. Correlation between ICT deployment and dependent variables.

	Level of Employee Creativity	Level of work flexibility	Level of Speed	Level of performance	Level of consistency
	.828	.852	.867	.807	.883
ICT Deployment	.000	.000	.000	.000	.000
	214	214	214	214	207

Source: Fieldwork, 2022.

Table 6. Model summary (level of creativity and ICT deployment) and ANOVA.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	
1	.828[a]	.685	.683	.568	
Model	Sum of Squares	Df	Mean Square	F	Sig.
1 Regression	148.532	1	148.532	460.939	.000b
Residual	68.314	212	.322		
Total	216.846	213			

Table 7. Coefficients (level of creativity and ICT deployment).

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.361	.076		4.760	.000
	ICT Deployment	.876	.041	.828	21.469	.000

Source: Fieldwork, 2022. a. Dependent Variable: Level of Employee Creativity.

Table 8. Model Summary m (level of flexibility and ICT deployment) and ANOVA.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	
1	.852[a]	.726	.724	.555	
Model	Sum of Squares	Df	Mean Square	F	Sig.
1 Regression	172.947	1		560.878	.000[b]
Residual	65.370	212			
Total	238.318	213			

Predictors: (Constant), ICT Deployment.

Table 9 A 95% level of confidence in the study with a significance level of (.000) below (.050) shows there is a positive impact on employee level of flexibility when ICT is deployed. Based on the regression model above, it was found that an employee's flexibility at tasks is highly dependent on the level of ICT deployment. That is, the more the ICT deployment in an employee's office, the higher the employee's flexibility at tasks in the office. This finding is similar to that of Kariuki (2015) when he undertook a study to find out the impact of ICT on population services in Kenya. His study revealed that the use of ICT improved employee's productivity and increased flexibility. This finding also is

similar to that of Pugh et al. (1963) who maintain that flexibility is an integral part of administrative efficiency.

Table 10 shows the correlation between the dependent (level of speed) and independent variable (ICT deployment) (.867), R-square shows the total variation for the dependent variable that could be explained by the independent variables (.751) and the value of the Adjusted R Square (.750) suggesting that the regression model is a very good one for predictions. Further, ANOVA Indicating a P-value of (.000) and F-Ratio of (639.549), hence significant result obtained.

Table 11 A 95% level of confidence in the study with a significance level of .000 shows there a positive impact on level of speed when ICT is deployed. Based on the regression model, it was found that an employee's speed in completing a given task is highly dependent on the level of ICT deployment. That is, the more the ICT deployment in an employee's office, the higher the speed of an employee in completing a given task in the office. This finding is similar to the finding of Dzomeku, 2010 who conducted research on the usage of computers and the internet as supplemental instructional materials in senior high schools in Ghana's Tema Metropolis.

Table 9. Coefficients (level of flexibility and ICT deployment).

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.255	.074		3.438	.001
	ICT Deployment	.946	.040	.852	23.683	.000

Source: Fieldwork, 2022. a. Dependent Variable: Level of flexibility.

Table 10. Model summary (level of speed and ICT deployment) and ANOVA.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	
1	.867[a]	.751	.750	.507	
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	164.292	1	164.292	639.549	.000[b]
1 Residual	54.460	212	.257		
Total	218.752	213			

Predictors: (Constant), ICT Deployment.

Table 11. Coefficients (level of speed and ICT deployment) and ANOVA.

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.205	.068		3.022	.003
	ICT Deployments	.922	.036	.867	25.289	.000

Source: Fieldwork, 2022. a. Dependent Variable: Level of Speed.

For want of additional justification of ICT deployment and level of performance of employee's regression was adopted. Table 12 indicates the correlation between the dependent (level of performance) and independent variable (ICT deployment) (.807), R-square shows the total variation for the dependent variable that could be explained by the independent variables (.651) and the value of the Adjusted R Square (.650) suggesting that ICT deployment which justifies that the regression model is a very good one for predictions. Indicating a P-value of (.000) and F-Ratio of (395.799), hence significant result attained.

Table 13 A 95% level of confidence in the study with a significance level (.000) shows there a positive impact on level of performance when ICT is deployed. This suggests that the regression model is very good for predicting employee's level of performance using ICT deployment as an independent variable. Based on the regression model above, it was found that an employee's performance is highly dependent on the level of ICT deployment. That is the more the ICT deployment in an employee's office, the higher his/her performance. This findings is in line with Merireng and Koringura (2013) who studied the utilization of computers in managing schools in West Pokot County, Kenya among school administrators and teachers.

To further provide a justification for ICT deployment on employee level of consistency a regression analysis was done. Table 14 the correlation between the dependent (level of consistency) and independent variable (ICT deployment) (.883), R-square shows the total variation for the dependent variable that could be explained by the independent variables (.780) and the value of the Adjusted R Square (.779). Also the data Indicating a P-value of (.000) and F-Ratio of (725.763), hence significant result manifested

Table 12. Model Summary (performance and ICT deployment) and ANOVA.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	
1	.807[a]	.651	.650	.647	
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	165.846	1	165.846	395.799	.000[b]
1 Residual	88.831	212	.419		
Total	254.678	213			

Predictors: (Constant), ICT Deployment.

Table 13. Coefficients (performance and ICT deployment).

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.301	.087		3.473	.001
	ICT Deployment	.926	.047	.807	19.895	.000

Source: Fieldwork, 2022. Dependent Variable: Level of performance.

Table 14. Model Summary (consistency and ICT deployment) and ANOVA.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	
1	.883[a]	.780	.779	.475	
Model	Sum of Squares	df	Mean Square	F	Sig
Regression	164.049	1	164.049	725.763	000[b]
1 Residual	46.338	205	.226		
Total	210.386	206			

Predictors: (Constant), ICT Deployment.

Table 15. Coefficients (consistency and ICT deployment).

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.252	.064		3.934	.000
	ICT Deployments	.938	.035	.883	26.940	.000

Source: Fieldwork, 2022. a. Dependent Variable: Level of consistency.

Table 15 a 95% level of confidence in the study with a P-value of (.000) less than the Alpha-value (.050) shows there would be an enhancement in the level of consistency when ICT is deployed. This also implies that the regression model is very good for prediction and ICT deployment influences the staff's level of consistency of work done in the office. This suggests that the regression model is very good for predicting an employee's level of consistency of work done using ICT deployment as an independent variable. Based on the regression model above, it was found that an employee's level of consistency is highly dependent on the level of ICT deployment. That is, the more the ICT deployment in an employee's office, the higher his/her level of consistency of works done. This finding is in line with Kariuki (2015) when he studied the impact of ICT on population services in Kenya and found that workers who adopted ICT produced constant work output and also attracted more donor funds.

6. Summary of Findings

The study's goal was to see how ICT deployment affected administrative efficiency at TaTU. The majority of the respondents were males, and the majority of the respondents were between the ages of 30 and 39, according to the study's findings. In addition, the majority of them had earned a Master's degree. The data also revealed that the majority of those who took part in the survey had worked at TaTU for at least ten years.

Majority of respondents believed that ICT deployment has a good and significant impact on administrative efficiency, according to the study's findings. That is, the more the deployment of ICT in offices, the more efficient administrative

staff are. And regarding the effects of ICT, the staff agreed to the following as the positive effects of ICT on administrative efficiency: Use of ICT enhances employee's overall performance; ICT increases employee creativity, ICT makes work easier, ICT increases the speed for completing a given task and ICT ensures consistency of work output.

And lastly, regarding the third objective, i.e., to explore challenges associated with ICT adoption in administrative functions in TaTU, the study found a myriad of challenges that ICT adoption is bedeviled with at TaTU. These challenges include: lack of proper maintenance; inadequate budget allocations; lack of in-service trainings; using different brands of ICT logistics; and unstable internet connections. The study found a positive and significant relationship between information and communication technology (ICT) adoption and administrative efficiency using bivariate correlation. As a result, the study shows that the use of ICT improves administrative efficiency significantly.

6.1. Conclusion

The study found that administrative staff at TaTU adopted ICT in delivering their administrative duties to some extent. However, the rate of use and the availability of ICT in performing administrative functions in TaTU is still low (particularly the needed logistics to work with) and therefore more needs to be done. This conclusion comes after the study revealed that a significant number of ICT logistics such as scanners, projectors, and fax machines, are not available for use in some offices. The study also revealed a number of effects of ICT deployment on administrative efficiency in TaTU. It was established that ICT usage has positive effects on administrative functions. These effects as revealed in the study include: use of ICT enhances employee's overall performance; ICT increases employee creativity, ICT makes work easier, ICT increases the speed for completing a given task and ICT ensures consistency of work output. Thus, there exists a positive and significant relationship between ICT usage and employee's overall performance. That is, the more the ICT deployment, the more efficient an employee is. This was evident in the responses provided by the respondents in the questionnaires.

Lastly, notwithstanding the fact that the administrative staff at TaTU have adopted the use of ICT, there still exist a number of challenges. These challenges as revealed by the study include: lack of proper maintenance; inadequate budget allocations; insufficient in-service trainings; different brands of ICT logistics and unstable internet connections. In effect, if the ICT deployment challenges are surmounted the TaTU would grow from strength to strength to be a masterpiece of Technical Universities in Ghana.

6.2. Recommendations

The study found that the availability and use of ICT in performing administrative duties are still bedeviled with a number of challenges. In dealing with these challenges, the study makes the following recommendations to the management

of TaTU:

Adequate funds should be allocated to procure modern ICT logistics that are currently not available in the institution. Even though the institution has currently procured some ICT logistics like printers, they are still not enough; a significant number of ICT logistics is still missing in offices. Absence of certain ICT logistics makes the staff inefficient and therefore the missing ICT logistics should be acquired to complement existing ones. This, when done, would enable the staff to be efficient in the delivery of their administrative duties;

Fast and reliable internet connections should be provided at all times to avoid unnecessary interruptions during work. With this, management should acquire for the university a server on its own in order to ensure connection reliability; there should be a routine maintenance of ICT logistics. University authority should institute a maintenance schedule in consultation with technicians so that all available ICT logistics would undergo a thorough service from time to time. This practice would not only prevent unnecessary breakdown of ICT logistics but also increase the lifespan of these ICT logistics thereby ensuring staff efficiency.

There should be standardization or uniformity of brands of ICT logistics to ensure compatibility. For example, an HP printer may have challenges receiving print commands from say a dell machine. When this happens, it slows down the work of staff and thereby making them inefficient. Technology advances day-in and day-out and so are software packages. There is therefore the need for staff to be trained frequently on how to use latest ICT logistics and newer versions of software packages. The study also found that ICT usage enhances the overall performance of employees hence the university should adopt ICT tools and services for competitive advantage.

6.3. Areas for Further Research

This study mainly sought to examine the effect of ICT usage on administrative efficiency at the Tamale Technical University. The study therefore solely focused on TaTU, hence there is the need for similar studies to be replicated in other institutions in the country in order to ascertain the relationship between ICT usage and work performance if any and other factors regarding the effects and challenges of the availability and use of ICT.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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