

**EXTERNAL FACTORS AND ADOPTION OF NEW TECHNOLOGY IN
EDUCATION SUPPORT ORGANISATIONS IN KENYA: A CASE OF
CEMASTEА**

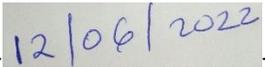
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**An applied research project submitted in partial fulfilment of the requirements
for the Award of Master of Business Administration Degree in the Business School
of Africa Nazarene University**

JUNE 2022

DECLARATION

I declare that this research project is my original work and that it has not been presented in any other University for academic credit

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DEDICATION

I dedicate this research project to my dear husband Martin, my beloved children Abigail and Ethan and to my loving parents Mr & Mrs. Kisaumbi for their unfailing love and support.

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ABSTRACT

Information technology is being used in each and every organisation. It plays a very crucial part in the day-to-day operations of businesses. It is therefore important for organisations to introduce new technologies to their organisation once in a while to cope with technological changes. The main objective of this study was to establish the relationship external factors and the adoption of new technology in education support organisations in Kenya as a case studied at CEMASTE A. The literature review examined other researches that may have been conducted on this subject. It also gives us a broad review of the conceptual framework. The study was carried out using descriptive research. The researcher used a 30% sample size that was collected by a stratified method. Open and closed questionnaires were used to collect data from the respondents. Piloting of the questionnaires was done prior to administering them so as to make sure that they were acceptable, reliable, and valid. A Likert scale of 5 was used where a mean score of 5 indicated that the respondents strongly agreed, a score of 4 indicated agreement, a score of 3 indicated don't know, a score of 2 indicated disagreed, and a score of 1 indicated strongly disagreed. The data collected was then analysed using descriptive statistical procedures and regression analysis. Descriptive analysis for the objectives gave an average mean of 4.0 for organisational factors; personal factors with an average mean of 3.9; and technological factors with an average mean of 4.0 Findings from the combined effect indicate an R-square of 0.93 with a standard error of 0.127. This implies that the three objectives considered in this study (that is technological factors, organizational factors, personal factors) explain 93 percent of changes in adoption of new technology. The formula for adoption of New technology in CEMASTE A = $0.872 + 0.310 \text{ Organisation Factors} + 0.554 \text{ Personal Factors} + 0.598 \text{ technological Factors} + e$ was used. The organisations will also have a clear view of external factors that need to be managed during the adoption of new technology. From the findings, it can be concluded that, indeed there is joint effects of external factors on the adoption of new technology at CEMASTE A. In this respect, it has highly enhanced the effectiveness and efficiency of organisation. Comparatively, these objectives (organisational factors and technological factors) have exerted the greatest influence as compared to personal factors. Therefore, organisations should be keen in communicating, good leadership, and employee participation in the process of new technology adoption and manage cost of technology. Government and all relevant authorities should also formulate and implement policies that will assist organisations adopt and adapt to new technologies in favourable and user-friendly environment.

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OPERATIONAL DEFINITION OF TERMS

Organisational Factors:	Internal operations factors of an organisations including, communication, leadership and user participation
Personal Factors	These are individual factors on an employee including, age and personal beliefs
Technological	Factors outside the organisation that are beyond its control. These include, infrastructure and law
Technology:	Application of knowledge that is scientific for purposes that are practical in any industry (Ahmad, 2014)
New Technology	A technology that changes how something is produced or performed (Kaushik, Kumar, Luthra, Haleem, 2014)

ABBREVIATIONS/ACRONYMS

CEMASTE	:	Centre for Mathematics, Science and Technology Education in Africa
ICT	:	Information Communication Technology
IT	:	Information Technology
NACOSTI	:	National Commission for Science, Technology and Innovation
SPSS	:	Statistical Package for Social Sciences
TCDT	:	Teacher, Capacity, Development of Teachers
TCP/IP	:	Transmission Control Protocol/Internet Protocol
TVE	:	Technical & Vocational Establishments

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CHAPTER ONE

INTRODUCTION AND BACKGROUND OF THE STUDY

1.1 Introduction

This research examined the relationship between external factors and the adoption of new technology in education support organisations represented by CEMASTEIA. This chapter is structured as follows: the background of the study; statement of the problem; purpose of the study; objectives of the study; research questions; hypothesis; significance of the study; scope of the study; delimitations of the study; limitations of the study; assumptions of the study; theoretical framework; and finally, the conceptual framework.

1.2 Background of the Study

To be successful in a dynamic business world, organisations need to change over and over to make sure that they are still relevant (Okembo, 2018). Organisations also need to make sure that they gain competitive advantages by changing the way they do business and transforming themselves (Macharia, 2015). The changes that organisations undertake can be anything from slow to abrupt changes. The introduction of new technologies is part of these changes that organisations have to undergo so that they can remain relevant in the business world (Sérgio, 2013). Although organisations know the importance of change, particularly technological change, research indicates that most organisations fail because they do not understand the organisational, personal, and technological factors influencing the adoption of new technology (Nispen, 2016). Therefore, this research is aimed at establishing the relationship between external factors and the adoption of new technology in education support organisations in Kenya. This research used the Centre for Mathematics, Science and Technology Education in Africa (CEMASTEIA) as a case study.

Education is a fundamental human right according to the constitution of Kenya (2010). The government always ensures that the education system has competent and qualified teachers. CEMASTEIA's aim is to do capacity building for teachers and educational managers in mathematics, science, and technology education in Kenya and other African countries to ensure effective and efficient curriculum delivery. The organisation therefore

plays a very vital role in making sure that the teachers are well trained (CEMASTEA, 2012). The research is expected to not only assist in future technology adaptation in CEMASTEIA but also across different learning institutions in Kenya. Successful adoption of technology in CEMESTEIA will mean competent and qualified teachers. This will also translate to quality education for the children in Kenya (Nyarumba, 2017).

CEMASTEA is a public institution that was established in the year 2003 to provide and coordinate In-Service Education and Training for practicing teachers of Mathematics and Science in Kenya. In their research, Opfer, Darleen & Pedder (2010) noted that, a continuous teacher education is important because it leads to successful changes in teachers' practice, school improvement and improvements in pupils' achievement. The centre therefore, has grown in physical facilities as well as quality of training programmes to provide an all-round Teachers, Capacity Development of Teachers (TCDDT) in Kenya and other African countries. Towards realization of its mandate, the centre over time grew and established programmes in four main areas, namely: training programmes, which include secondary and primary programmes, customized courses and workshops, research and development programmes, ICT integration in education programmes and external linkages and partnerships.

1.2.1 Adoption of new technology in education support organizations

Information technology has been concluded as one of the key providers of opportunities for businesses both at the strategic and organizational levels. Moreover, technology has been proven as one of the keys for organizational survival in the business world. It brings a lot of benefits to the organization including, improved products and services, reduced cost of production, increased avenue, innovation of ideas, efficiency and effectiveness.

Investing in new technologies can enable organization to change their scope of operation (e.g. to offer better products or services), while at the same time, investing in new process technologies such as computer applications or automated machines can help organizations to give an output at lower costs. Therefore, the adoption of new technologies in an organization is very critical for its competitive advantages. The emergence of new technologies may bring about many changes, including adoption of various complementary

technologies, accompanied by organizational changes, product and services offered, prices of the products, production processes, quality levels and change in supplier relationships, (Schumpeter, 2008); Milgrom and Roberts, 2002). ICT improves the speed at which work is done in the organization. When routine tasks are automated, they create time for more strategic tasks within the organization.

1.2.2 External factors

1.2.2 .1 organizational factors and adoption of new technology in education support organizations

Organisational factors can easily prevent an organisation from recognizing the need for change and properly putting these changes into action. Organisations must provide facilitating conditions to allow the adoption of technology (Talukder, 2012). The organisational factors include leadership, communication, employee involvement, training and development, and the cost of technology.

For example, South Korea's teacher training objectives are all directed towards developing the skills of teachers to use ICT in teaching Korean, English, Social Studies and Science in 2002-2003 and Ethics, Mathematics, Music, Art, Gymnastics, and Technical/Home economics in 2003-2004 (UNESCO, 2003).

In Africa, we find multidimensional use of ICT, from primary schools to higher education. ICTs are increasingly used in primary schools including the pre-school and elementary levels (Mwencha, 2012). Besides entertainment value, the greatest benefit of ICTs at this level is the liberation of the student's ideas and aspirations. ICT also provide valuable and varying support for child learning as it fosters emotional and social development, language acquisition, general knowledge and cognitive skills. ICT utilization appears to be more widespread in African secondary schools where teachers and students use it to teach and learn subjects. According to Molaodi (2017) ICT integration into learning activities in secondary schools would seem to be more important since it goes beyond interpersonal communication and integrates several dimensions such as interactive learning, collaborative learning and problem solving.

1.2.2.2 Personal factors and adoption of new technology in education support organizations

Many positive and useful changes have taken place in the work place including competency and effectiveness in regards to invention of new technologies (Davis, 2011). Despite all these, introduction of new technology still creates many challenges to organizations. One of these challenges is user acceptance and usage of technology to improve organizational productivity. Levy, Powell and Yetton (2001) in their research indicated that many businesses are susceptible to customer pressure and therefore, these organizations have to adopt new technologies because of the pressure from these customers.

1.2.2. 3. Technical factors and adoption of new technology in education support organizations

Nairobi County is the technology hub where majority of the firms have adopted technological innovations. According to Moraa and Mwangi (2012), the rapid development and commercialization of Information and Communication Technologies (ICTs) in Kenya has prompted organizations to increasingly adopt these technologies. The researchers noted that, technological factors have also contributed to this rapid growth in technology. Technological factors are important in influencing new technology. There is therefore the need to have these technological factors investigated further.

1.2.3 Brief background of CEMASTE A

CEMAMSTE A is a public institution that was established in the year 2003 to provide and coordinate in-service education and training for practicing teachers of Mathematics and Science in Kenya (CEMASTE A, 2010). The centre has grown in physical facilities as well as the quality of training programmes to provide an all-round teacher. The institution also does capacity building for teachers in Kenya and other African countries. Towards realization of its mandate, the centre over time grew and established programmes in four main areas, namely: training programmes, which include secondary and primary schools, customized courses and workshops, research and development programmes, ICT integration in education programmes; and external partnerships. Recently, CEMASTE A offered the Primary INSET programme, Secondary INSET programme, SMASE-Africa

programme, Effective and Innovative Pedagogy, and INSET Consultancy (CEMASTEA, 2012).

1.3 Statement of the Problem

Research shows that ICT plays a key role in promoting a country's economy (Roztocki, Soja, & Weistroffer, 2019). ICT has also played a major role in the development of Kenya's economy. Mwangangi, Ombuki and Odote (2014) carried out research on the role of information and communication technology solutions on the growth of small and medium enterprises in Nairobi County and observed that, indeed, ICT played a major role in organisational performance and the improvement of the economy of the country

Humans are unable to comprehend their future due to the rapid developments in technology. Technological progress is accelerating at an unprecedented rate, threatening to produce a world we can only speculate about (Butler, 2016). As a result, it is critical to conduct ongoing studies in the field of ICT to avoid being caught off guard.

Skoumpopoulou, Wong, Ng, & Lo (2018) in their research on factors that affect acceptance of new technologies in the workplace noted that the introduction of a new IT application within an organisation represented change, and the acceptance of such change started with individual end users because they were the owners of the technology.

The recognition of the essence of ICT in the growth of the economy is captured in Kenya's vision 2030. The aim of Vision 2030 is to make Kenya a middle level economy by making sure that the cost of doing business is lowered, security is improved, and Kenyans are provided with a friendly working environment. For the government to achieve this, vision 2030 put the implementation of ICT in schools and colleges as a priority (GOK, 2007). Despite the government's vision of increased implementation of ICT in schools, research shows that while other countries have achieved over 41% implementation of ICT in colleges (Laaria, 2013), Kenya lags behind in implementation of ICT in colleges and Universities.

Andiema (2015) carried out research on the challenges of adoption of information communication technology on teaching and learning in public pre-schools in the North Rift region of Kenya and observed that, schools lacked funds and other facilities needed for the

adoption of information technology. Kilpimaa (2006) did a research on factors influencing successful change management in IT outsourcing from a transferred personnel point of view and noted that poor leadership contributed to failure in organisational change. Omariba (2013) studied challenges facing teachers and students in the use of instructional technologies in Kisii County, Kenya and reported that a lack of training made the use of new technology hard.

Many studies have not quite given detailed recent insights and analysis of the factors influencing the adoption of these technologies locally, therefore leaving a knowledge gap on the factors influencing the adoption of new technology in organisations in Kenya. The purpose of this study was to determine the factors influencing the adoption of new technology in education support organisations in Kenya. In particular, the following research question was addressed; how are the organisational, personal, and technological influencing the adoption of new technology in education support organisations in Kenya, a case of CEMASTEIA was used for this study.

1.4 Purpose of the study

The purpose of this study was to establish relationships between external factors influencing the adoption of new technology in education support organisations in Kenya. The findings of this study were intended to give a better understanding of these factors and its combined effect on adoption of new technology

1.5 Objectives of the Study

The objectives of this study were as follows;

1.5.1 General Objective

The general objective of this research was to establish the relationship between external factors and the adoption of new technology in education support organisations in Kenya as case studied at CEMASTEIA.

1.5.2 Specific Objectives

- i. To establish how organisational factors influence the adoption of new technology at CEMASTEА.
- ii. To assess how Personal factors influence the adoption of new technology at CEMASTEА.
- iii. To examine how technological factors influence the adoption of new technology at CEMASTEА.

1.7 Hypothesis

This study sought to test the following hypothesis;

1.7.1 Hypothesis test for organisational factors

H0: There is no statistically significant relationship between organisational factors and adoption of new technology at CEMASTEА

1.7.2 Hypothesis test for Personal factors

H0: There is no statistically significant relationship between personal factors and adoption of new technology at CEMASTEА

1.7.3 Hypothesis test for Technological factors

H0: There is no statistically significant relationship between technological factors and adoption of new technology at CEMASTEА

1.8 Significance of the Study

This research will help organisations identify the challenges that they experience in strategic changes and, in this case, external factors influencing the adoption of new technologies. As they prepare the introduction of new technology, managers must be aware of the various factors influencing the adoption.

Notably, technology keeps changing daily, and many employees find it hard to adopt new technologies. This research will help organisations with future changes, and the

organisations will take the necessary measures such as staff training, good communication, etc. to ensure that the adoption of new technology is implemented smoothly.

1.9 Scope of the Study

The focus of this study was CEMASTEAM. This was because CEMASTEAM is an organisation that plays a big role in the country. It is a public institution under the Ministry of Education, Science and Technology. Its mandate is to build the capacity of mathematics and science teachers for effective classroom practices not only in Kenya but also in other countries in Sub-Saharan Africa. This is achieved through the strengthening of Mathematics and Science Education, In-service Education and Training programmes. The success of the adoption of new technology in the organisation will not only be beneficial to it but to other learning institutions.

1.10 De-limitations of the Study

This study did not investigate the capital investments made in procuring new technologies, given that it looked at the factors influencing adoption of new technologies. It did not look at students at CEMESTEAM, but rather at the staff who run the institution on a daily basis.

1.11 Limitations of the Study

When first approached, employees were not willing to give full information about the challenges that they were encountering during the introduction of new technology. To counteract this limitation, the researcher explained to the respondents that, the information collected from them would be treated in confidence. Also, the questionnaires were formulated taking into account the anonymity of the respondents.

1.12 Assumptions of the study

For this study to be successful, the respondents were expected to give truthful and unexaggerated information about the factors influencing the adoption of new technology in CEMASTEAM. It is observed that some staff, due to the nature of their jobs, may not have given the correct information.

To overcome this, the respondents were encouraged to give honest opinions as part of their support to their organisation, as this research would really help them grow. Another

assumption was that the respondents would spare time to fill out the questionnaires and return them. This was mitigated by ensuring that the questionnaires were short.

1.13 Theoretical Framework

Theoretical review is an interconnection of ideas that are based on theories and models. Two theoretical reviews have been discussed including; diffusion theory and activity theory.

1.13.1 Diffusion Theory

This study adopted the Diffusion of Innovation (DOI). According to Rogers (2003), diffusion is the process through which an innovation is communicated through certain means of communication over a period of time amongst the members of a social system. The theory has four stages, which include: awareness, interest, evaluation, and the adoption stage. In the first stage, which is the awareness stage, the employees are exposed to the new technology but they lack complete information about it.

The following stage, which is the interest or information stage, the employees become interested in this new idea of technology introduction and therefore seek more information about it in terms of skill development and its use. At the evaluation stage, the employees mentally apply the new innovation to their current working environment and anticipate forthcoming situations. At the last stage of the trial, the employees make full use of the innovation; finally, at the adoption stage, the employees decide if the new innovation is good or not, or if it should be fully adopted or not (Dearing & Cox, 2018).

In this regard, the DOI theory was used to explain the external factors that influence the adoption of a new technology. From the theory, the research was able to know that the employees needed to be well-informed about the new technology, the benefits they would be getting from it, as well as the implications that new technology would bring if successfully implemented, Straub (2009).

1.13.2 Activity Theory

Activity theory concentrates on understanding work practices and human activity. An activity theory is believed to present us with the design and introduction of new technology in an organisation. An activity theory can effectively be used in the study of external factors influencing the adoption of new technology in an organisation. Several benefits are experienced when an activity theory is used in the introduction of a new technology. A new technology will present its users with a better way of improving their productivity and making work easier; users will also be presented with an opportunity to access relevant applications and content.

New technology will help in improving the products that the user is offering, thus improving customer satisfaction. The activity theory offers an approach to conceptualizing the connection between communities, individuals, activities, and technologies. Tatnall (2011) stated that the theory aided the study in mastering the development process by viewing the content as dynamic systems in mediation with cultural artefacts. This theory was appropriate for my study as it effectively helped in analysing the diffusion of adoption of new technology in CEMASTE.A.

1.14 Conceptual Framework

The conceptual framework gives a sketch of the perfect approach to a thought or idea. It helps in making conceptual distinctions and in the organisation of ideas by showing the connection between independent and dependent variables. The independent variables that were investigated were as follows:

Organisational factors that were considered included communication, leadership, user participation, training and development, and cost of technology. The second independent variable that was investigated was personal factors, which included age, personal beliefs, and perceived usefulness. Technological included the third independent variable that was investigated during this research, which included infrastructure law and location.

The dependent variable that was investigated was new technology which was measured through; Admissions, Satisfaction, External Ratings and Building Collaborations and Partnerships.

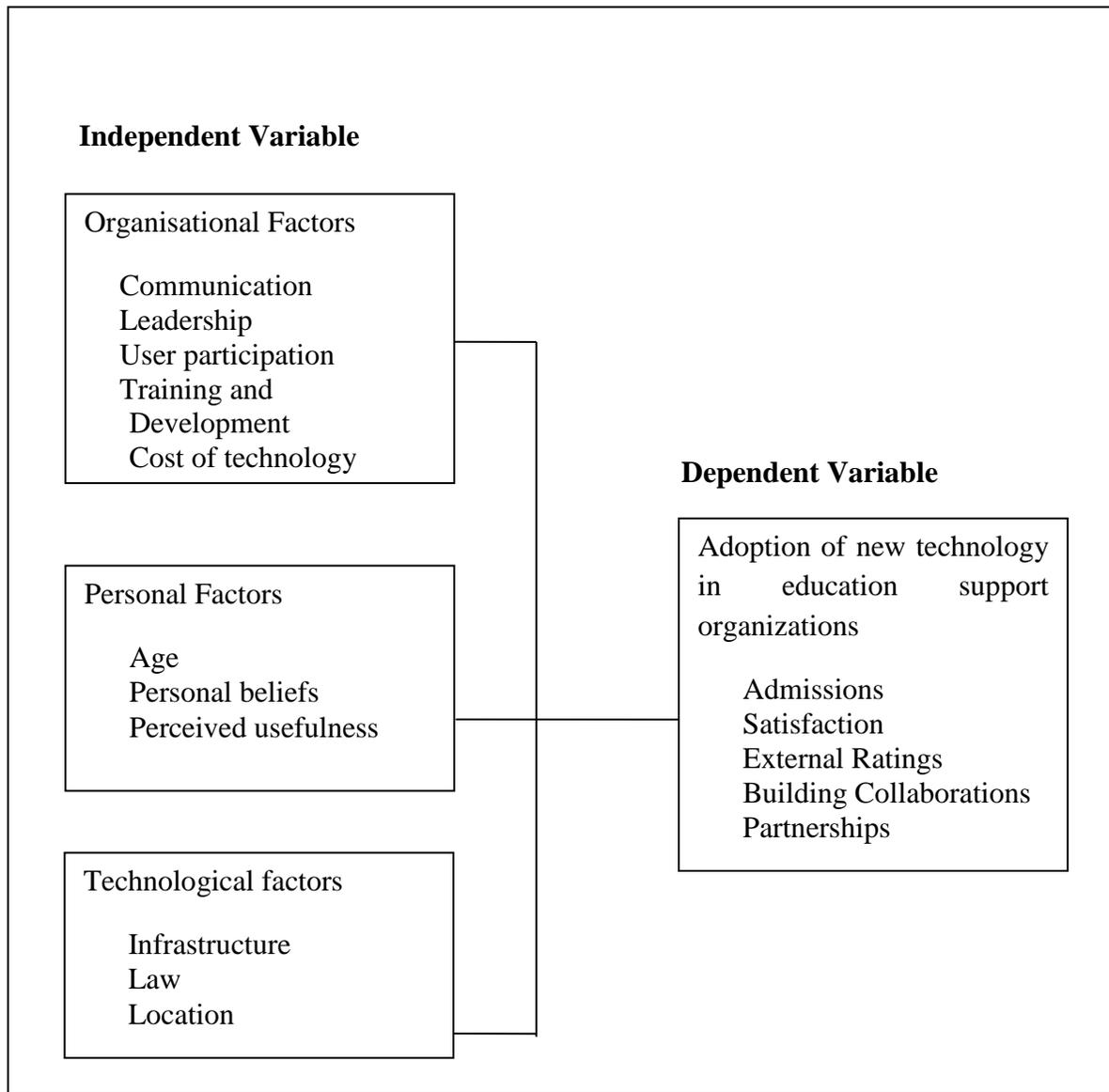


Figure 1.1 Conceptual Framework

Source Author (2017)

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter gives a summary of other research carried out in closely related fields. The chapter covers literature on dependent variable, independent variables, the objectives, a summary of the chapter, and the research gap for this topic.

2.1 Adoption of new technology in education support organizations

In their study on The Impact of Technology Selection on Innovation Success and Organisational Performance, Hao and Yu (2011) explained that there are many factors that contribute to an organisation's successful growth and performance. Adoption of new technology would help in improving students admissions such that there will be an increase in the percentage of students admitted to the college, the number of applicants, and the percentage of students from the top high schools.

Three other researchers, Shaukat, Zafarullah, and Wajid, (2009), did research on the impact of information technology on organisations and noted that the introduction of new technology is very important for an organisation as it brings customer satisfaction.

Satisfaction here is put into three groups: students, employers/employees, and faculty

Employer-employee satisfaction metrics and faculty satisfaction metrics are also used to check on satisfaction. These include measures of employee satisfaction with specific phases of the work environment. The institutions concerned with faculty satisfaction elected to include measures that reflect faculty satisfaction with a variety of issues: salary and benefits; the quality of the students (both graduate and undergraduate); the institution as a place to work; and both clerical and technical support.

External ratings were another variable used to measure new technology. External ratings show how the college is ranked amongst the other colleges in Kenya. External ratings help

the institution to know how many students prefer to study at their institution and what their market share is as compared with other institutions. The introduction of a new technology would boost the ratings of the college because students want new things and want to experience new technology. A majority will therefore be attracted to this college because of the introduction of a new technology.

According to Khashman (2019), ICT leads to process improvement. In order to improve the quality of administrative work and services to the customers, there is a need to improve efficiency and effectiveness. In achieving this, the change in business processes can be radical or incremental. Sudkar (2010) states that the introduction of ICT facilitates Business Process Re-engineering (BPR). Using this approach, it leads to fundamental rethinking and a radical redesign of business processes, achieving dramatic improvements in areas such as quality, service, and speed. The implementation of ICT and improvement of organisational performance are thus not dependent on only the physical aspects. Instead, it involves a rethinking of the whole business process and its influence on the organisation.

Another measure of new technology in colleges is the collaborations and partnerships that the colleges have managed to achieve. Saltiel (1998) explains that collaborations and partnerships are agreements and actions that organisations make to share resources and accomplish a common goal. Good technology would give CEMASTEIA a good chance of getting good collaborations from other colleges within and outside Kenya. Take the example of an e-learning system as a new technology introduced to the organisation. This will bring new collaborations because many other organisations will want to be associated with an organisation that is technology savvy. Collaborations are essential in sharing information among organisations to create a competitive advantage by satisfying the needs of customers. Organisations may use web technologies to disseminate corporate or commercial information to customers and business partners, according to Migdadi, Abu Zaid, and Al Hujran (2012). In this sense, within the organisation, the intranet can be used as a corporate channel for disseminating information and data access across different levels within the organisation (Migdadi, Abu Zaid & Al Hujran, 2012). The use of such technologies can ensure that the information received is the most recent and that it is on demand. Many organisations have recognized that the use of technology for

communication can empower employees, improve their morale, and allow them to communicate quickly and freely within the organisation.

Recent advances in ICT have enormous implications for organisational operations, structure, and strategy. Evans and Wurster (2007) state that the competitiveness of organisations in the future will be dependent on the manner in which these technologies are applied. The proliferation of the internet has forced organisations to rethink the manner in which they do business, and they can reengineer their businesses to align them with the business functionalities.

Bocij (2003) states that technology has been instrumental in revolutionizing a wide range of business functions, such as ensuring clear strategic goals and improving the pace at which some of the basic tasks, such as accessing information, are conducted. Gretton (2002) performed research using firm-level data acquired from the Australian Business Longitudinal Survey and found that there was a positive and significant link between technology use and the growth of organisations in both the manufacturing and service industries. Gretton (2002) further indicated that ICT applications improve the level of efficiency of administrative functions within the organisation and enhance the effectiveness of managerial activities. The applications are also necessary for better task organisation and providing better information to the organisation's managers.

The studies above highlighted the general benefits of adoption of new technology but did not highlight the impacts the adoption of new technology brings on education support organizations.

2.2 External Factors

2.2.1 Organizational factors and adoption of new technology in education support organizations

Organisational factors can easily prevent an organisation from recognizing the need for change and properly putting these changes into action. Organisations must provide facilitating conditions to allow the adoption of technology (Talukder, 2012). The

organisational factors include leadership, communication, employee involvement, training and development, and the cost of technology.

Several authors have highlighted the necessity of good communication between the employees and the management during the process of change. Applebaum (1999) noted that, an open communication policy works best during any organisational change. The employees are able to air their concerns, dislikes, and likes. The management also gets feedback through this mode of communication. Peckham (2003) in her research on organisational factors that can affect employee acceptance of new information technology that communication during the process of change should be regular and different channels should be used to ensure effectiveness.

Gaylor (2001) in his study on the factors affecting resistance to change noted that, organisational leadership is very important for the success of any organisational change process. Betz (2000) found that, ICT can only be implemented in schools if the leaders of those schools are actively supportive and learn the new technology as well. He noted that, good leadership would provide adequate professional development and support for his/her employees in the process of radical change in technology for teaching/learning from the traditional pedagogical approach. Anderson and Dexter, (2005) carried out a study on the technology leadership behaviors of school principals and found that although technology infrastructure is important, technology leadership is even more necessary for effective utilization of technology in schools. Tong and Trinidad (2005) also did an investigation on the investment in ICT for enhancing formal and non-formal education systems and found that it is essential for school improvement. We can safely conclude that effective leadership is critical to the successful implementation of technology in an organisation.

One of the essential leadership traits required for an organisation to adopt technology is sensitivity towards the development of current technology. Raman and Shariff (2017) state that among the indicators that show an organisation's willingness to adopt technology is approval of the improvement of the ICT facilities, including the provision of ICT equipment (Raman & Shariff, 2017). The leadership must also be willing to train its employees on the use of technology.

Seyal (2015) examined the Role of Transformational Leadership in Technology Adoption: Evidence from Bruneian Technical & Vocational Establishments (TVE), which looked at only one value of organisational factors. The research showed that, transformational leadership is very important in the adoption of a new technology. Rosnah, Megat, and Osman (2005) did a paper on Barriers to Advanced Manufacturing Technologies Implementation in the Small and Medium Scale Industries of a Developing Country. Their findings were; organisation as a whole plays a key factor in the success of a new technology. On the other hand, Talukder (2012) did research on the determinants of the adoption of technological innovation by individual employees within an organisational context in Australia. Training, managerial support, incentive, perceived usefulness, personal innovativeness, image, and prior experience were found to be factors influencing new technology adoption. Kinyangi (2014) did research on factors influencing the adoption of agricultural technology among smallholder farmers in Kakamega north sub-county, Kenya. The findings from his research were; education level, age and working experience influenced the way the farmers adopted new technology.

Al-Gahtani and Wang (2007) gave advice that, one can never expect one hundred percent support from another person who was never involved in formulating a change, which had an impact to his/her work. Individuals do not mind change so long as they get used to the idea of a new technology and have the opportunity to have an impact on the direction the change is taking. It is important to involve the users that will use the new technology in its implementation right from the first step so that they can fully embrace it without resistance.

During ICT implementation, there is a possibility that the employees are not well versed in the new ways of doing things. The result is that some of the employees may not have the competence to work with the new ICT systems. Such employees are likely to be anxious about the new work methods and are likely to resist changes (Amoah-Mensah & Darkwa, 2016). Training and development make employees familiar with the working methods and they are more likely to accept the new system.

The cost of technology comprises the hardware, personnel, software, and space. The hardware entails all equipment that is used for data input, processing, communication, and

archiving. Other equipment that comprises hardware are those that are used in ensuring system reliability, such as battery backup systems (Nyagar, Korir, & Nyangweso, 2017). Software includes all the programs the organisation will require. The personnel include all the individuals required to keep the system working, while space reflects the cost of purchasing and maintaining real estate to house the personnel and equipment.

The above studies sought to establish organizational factors and adoption of new technology in other sectors and did not look at the education support organization. This study sought to establish the relationship between how organisational factors influence the adoption of new technology at CEMASTEVA.

2.2.2 Personal factors and adoption of new technology in education support organizations

Research based on America and done by Smith (2014) showed that age determines how people adopt technology in their homes and work places. The research showed that the elderly in the country have always been the late adopters of new technology compared to their younger compatriots. The report further reviewed that one age group (which leans more towards the young, more educated, and more affluent seniors) has a very positive attitude towards technology changes and knows about their benefits. The second group (which leans more towards the older and less affluent and most of the time with significant challenges with health or disability) is so much more disconnected from the world of technology (Berkowsky, Sharit, & Czaja, 2018).

Warr and Fay (2001) sought to investigate the personal initiatives of individuals in relation to age. Research showed that the salient aspects of the overall characteristics of an individual were lower at older ages (Warr & Fay, 2001). The older individuals were less likely to engage in such behavior, demonstrating the likelihood of taking personal initiative compared to younger people. In the study, the participants, drawn from Dresden, Germany, were subjected to interviews concerning taking personal initiative in the workplace. Personal initiative was identified as having some overlap with orienting to change. The research thus identified that for older people to become receptive to change, they must be

active learners (Warr & Fay, 2001). Their reduced propensity to take personal initiative is a predictor of resistance to change and adaptation to technology.

When an employee believes that a new technology will help in improving their work, they are likelier to research about it. Myers and Sadaghiani (2010) noted that, the way employees perceived a new technology mattered and influenced how they embraced it. Employees will find themselves asking questions like, what does this new technology mean to my future. Where is this organisation going and am I going to still part of it? How will this new technology affect my job description, responsibilities and compensation? These and many more questions will flash through the employee's minds as the new technology gets introduced to them. Many times, these questions are focused on the individual as they try to adapt to the busting of their personal work bubble. Based on the above studies, personal factors influencing adoption of new technology were looked at instead, the researched focused more on how new technology brought changes in the organization. Further studies are needed to establish the personal factors influencing adoption of new technology.

2.2.3 Technological factors and adoption of new technology in education support organizations

Technology policymakers have been attempting to identify principles that can guide the regulatory initiatives within the ICT field. The most quoted principle is that of technology neutrality. Essential technological infrastructure is very important for the success of a new technology. In his research, Ross (2016) noted that, in the process of introducing a new technology, the organisation has to invest in infrastructure such as computers, software, good communication facilities, etc. to ensure that the implementation is successful.

As a result, CEMASTEAM must guarantee that they have the greatest infrastructure in place to ensure that technology adoption is successful. Studies show that in an environment where there are constrained ICT resources, support infrastructure is critical for organisations to determine the technology to use and sustain usage. In a study by Putman and Kolko (2010) determining the differences in internet use in the USA and Central Asia, they identified differences such as speeds and integration into national systems that

affected the perceived usefulness of the technologies (Putman & Kolko, 2010). Many developing countries have poor ICT infrastructure, and they do not consider the upgrade of the infrastructure as a major priority. However, the United Nations Millennium Development Goals (MDGs) for 2013 and 2014 show that there have been major improvements in infrastructure development. The report noted that in Africa, there is a rapid increase in internet penetration (UN, 2013).

In Kenya, ICT infrastructure improvements in the last ten years include the arrival of the undersea internet cable and the continued introduction of the internet to users (Muriithi, Horner, & Pemberton, 2013). There have also been changes in internet experience at the institutional level, where most universities are connected to the internet. Muriithi, Horner and Pemberton (2013) explain that such widespread infrastructure development leads to organisations finding the usefulness of ICT, hence increasing the likelihood of adopting ICT.

Compelled by the principle of neutrality, the World Summit on the Information Society (WSIS) states that there is a need for policymakers to promote a pro-competitive environment where the government only intervenes when there is a need (United Nations, 2007).

There have been a range of other principles that have been proposed, albeit with varying levels of support. Open-source software is one example that is seen not only as an alternative to the major proprietary software packages in the market but as a part of a broader movement against using copyright as a means of restricting the free exchange of information (Leveque & Meniere, 2007). In an environment where creations are done under the "all rights reserved" concept, the push to promote the public good of information is viewed as a major factor in improving creative works (Leveque & Meniere, 2007). The recasting of intellectual property in an information economy environment on the basis of open systems and open code is viewed as being beneficial to developing nations that cannot afford to police intellectual property regimes in a similar fashion to the policing conducted by developed nations.

Monzavi, Zarei, and Ghapanchi (2013) discovered that new technological laws can have a small impact on the adoption of new technology in their study. The organisation has to make sure that the new technology they are putting in place is legal. CEMASTEIA, being an educational institution, should make sure that the new technology aligns with the Ministry of Education and does not violate any Kenyan law. If the new technology does not align with the requirements of the Ministry of Education and Kenyan law, the users may resist because of the consequences that the introduction of this new technology might come with.

In a developing economy like Kenya, the location of a business is vital in determining the infrastructure. In a study conducted by Oluoch (2016), in Kenya, the effective implementation of computer technology in secondary schools is dependent on the ability to provide infrastructure within the schools. The research showed that despite significant investment in public secondary schools, there remains problems with the level of use of the tool for effective management and research in education. Salamink et.al (2015) state that rural areas have continued to struggle to keep up with development in the age of digital connectivity. The research shows that in the rural areas, accessing the Internet is on selective basis.

2.3 Summary of the Reviewed Literature and Knowledge Gap

2.3.1 Summary of the Reviewed Literature

According to Ahmad (2014), technological changes bring about big opportunities to an organisation as well as many challenges to the managers involved in it as well as the other users. He further argued that, it is important for organisations to adapt to new technologies lest they find themselves lagging behind in terms of productivity. Change is natural and even the organisations need to adapt to changes when they come. Abrahamson (2000) corporate mantra states that “change or perish.” Organisations including CEMASTEIA have only two options, to change or to perish. Burgess (2002) highlighted some of the barriers that employers may experience while introducing a new technology. Some of these barriers included lack of time for the team to devote itself on the project, poor management services, etc.

2.3.2 Knowledge Gap

Several researchers have carried out researches on different areas of technology. The table below shows the summary of findings highlighting the research gaps left by the researchers.

Table 2.1: *Summary of findings*

Author(s)	Study focus	Key findings	Knowledge gaps identified	Focus of the current study
Mwangangi, Ombuki and Odote	Assesses the role of Information and Communication Technology (ICT) Solutions on growth of Small and Medium Enterprises (SMEs) in Kenya.	Studies showed that, indeed ICT plays a big role in an organisation. 96% Confirmed increased the sales inquiries, 91% indicated improved efficiency in the payment of orders and 75% acknowledged improved response to customer enquiries.	Most researches seem to be pushed towards ICT use, management is often at the centre of the drive to have ICT systems in place	Role of Information Technology is discussed, but the factors that influence adoption of these new technologies is not discussed.
Andiema	To explore the challenges that hindered sustainable implementation of	The findings showed that, only 23% of the schools interviewed	Most of the researchers dwelled on the advantages of	The researcher focused mainly on Schools. Organisation, personal,

	Information Communication Technology (ICT) in public secondary schools in Meru County, Kenya.	had introduced technology and were using it.	introducing ICT in schools but not the challenges of introducing it.	and technological are not discussed.
Jaana Kilpimaa	factors influencing successful change management in IT outsourcing from transferred personnel point of view	Poor leadership, lack of direction contributed to the failure of a change in an organisation	Previous studies emphasized on the importance of establishing the sense of urgency for change.	The researcher dwelled mostly on leadership factors and did not investigate the users and adoption of a new technology.
Omoriba Alice	Challenges facing teachers and students in the use of Instructional technologies: a case of selected secondary Schools in Kisii county, Kenya	The teachers interviewed stated that, their major challenges was on lack of training on use of new technologies. Where good training was done, the teachers were ok.	Emphasized on the instructional technologies and not all technologies as a whole	Challenges on use of instructional technologies are discussed but nothing on the introduction of these technologies
Afzaal H. Seyal	Examining the Role of Transformational Leadership in Technology Adoption: Evidence from Bruneian	Transformational leadership plays a big role in technology adoption.	Only one organisational factor is discussed i.e. leadership. Nothing	The researcher looked at the Role of Transformational Leadership in

	Technical & Vocational Establishments (TVE)		was discussed on communication and user participation	Technology Adoption and no other organisational factor.
M.Y. Rosnah, M.M.H. Megat Ahmad and M. R. Osman	Barriers to advanced manufacturing technologies Implementation in the small and medium scales industries of a Developing country	For a technology to succeed, organisational factors are important	Focused only on the production machinery	Nothing mentioned on the factors influencing adoption of technology
Majharul Talukder.	Factors affecting the adoption of technological innovation by individual employees: An Australian study	53.1% of the variance in usage or the individual acceptance can be explained by training, managerial support, incentive, perceived usefulness, personal innovativeness, image, prior experience, enjoyment with innovation, peers and social network variables.	Emphasis on individual factors affecting adoption of new technology	The research did not look at the organisational factors affecting the introduction of a new technology

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

The research design is essential in providing a connection between theories and arguments that inform the research and the empirical data collected. According to Al Zefeiti and Mohamad (2015), research design is an important guideline when collecting and analysing data in a study. Further, Saunders, Lewis, and Thornhill (2016) state that research is a process that has several layers consistent with the areas covered in the research.

This chapter generally looks at the approaches and methods that were used in the collection, analysis, and interpretation of data. The chapter includes the research design, the target population, sampling procedures that were used, the sample size, data collection procedures, and the instruments that were used, as well as how the data was analysed and presented.

3.2 Research Design

The descriptive cross-sectional research design was used in this study. According to Kothari (2006), research design allows the research to establish the status of the phenomena under study. It helps to describe the characteristics of particular individuals or groups. The advantage of using this method is that it allows effective data collection from a large sample size in a cheap and faster way (Mugenda & Mugenda, 2007).

3.3 Research Site

The research site of this study was the CEMASTEVA. The main office is situated in Karen. The organisation was appropriate for this study because of its nature of business. The researcher viewed the various technologies that have been introduced in this organisation and the factors influencing the adoption of these technologies in this organisation. Different departments were scrutinized; the ages of the employees in the organisation were also investigated.

3.4 Target Population

In accordance with Ngechu (2004), a population is a set of people, services, events, and elements, a group of things or households that is well defined and being investigated. In statistics, a target population is a specific population whose information is desired. The study targeted the entire population of CEMASTEIA, comprising 214 employees. The respondents came from the different departments in that institution. The distribution of the employees according to their departments is shown below.

Table 3.1: Target Population

Department	Population Size
Catering and accommodation Department	50
Finance & Administration Department	49
Science Department	115
Total	214

Source: Human Resource Records (2017)

3.5 Study Sample

3.5.1 Sampling Procedure

According to Trochim (2006), sampling procedures are the methods that researchers used to identify the sample size to be used in a study. The researcher used a stratified random sampling technique to make a selection of the respondents within the strata (Department). According to Frey (2018), a stratified random sampling technique results in the selection of a sample that has high precision and that ensures that the sample is representative in the case of a homogeneous population. Mugenda and Mugenda (2003) raised the same sentiments by pointing out that, stratified random sampling is adopted to guarantee just representation of the strata subgroups. By using the stratified random sampling method, the researcher made sure that the respondents were justly represented across all the departments. The respondents were selected within each department by simple random

sampling so as to ensure that every respondent had a fair chance of being selected for this study.

3.5.2 Study Sample Size

In their book, Copper and Schindler (2008), define sample size as a measure representative of the total target population. They further describe the sample size as the subset of the population that is used by the research to perform a research investigation, and this subset represents the total population in question. Further, Copper and Schindler (2011) argued that, random sampling frequently reduces the sampling error in the population. This increases the accuracy of any estimation method used. This research used 30% of the total population, which is justified by Babbie (2010) with her affirmations that, if 30% of the target population is well selected, it gives very reliable results to the researcher. Mugenda and Mugenda (2003) also recommend a 30% sampling of the population. The researcher therefore sampled 64 people out of the 214 total population. Table 3.2 shows the sample size.

Table 3.2: *Sample Size*

Department	Population Size	Percentage	Sample Size
Catering and accommodation Department	50	30	15
Finance & Administration Department	49	30	15
Science Department	115	30	34
Total	214	30	64

Source: Researcher (2017)

3.6. Data collection

3.6.1 Data collection Instruments

After requesting and receiving permission to conduct the research from CEMASTEVA, the researcher formulated and used questionnaires to collect information from the employees.

There were also informal telephone discussions with respondents who called in for further explanations of terms. Roopa and Satya (2012) note that a researcher should design a questionnaire using the objectives as a guide.

The questionnaire was structured to exhaustively collect information on external factors influencing the adoption of new technology in education support systems in Kenya. The first few questions were designed to be simple and factual to allow the respondent to be at ease with the process and to reduce anxiety on the part of the respondent. These questions were used in section one of the questionnaire, through which demographic and other contextual factor data was collected, and section two collected data with regard to external factors influencing the adoption of new technology.

On a Likert scale of 1 to 5, respondents indicated their perception of a factor's impact in influencing the adoption of new technology at CEMASTEIA. A score of 5 indicated strongly agree, a score of 4 indicated agree, a score of 3 indicated don't know, a score of 2 indicated disagree, and a score of 1 indicated strongly disagree.

3.6.2 Piloting Testing of Research Instruments

According to Copper and Schindler (2011), piloting is the process of testing the questionnaires to establish any weaknesses that may be there. The researcher first piloted the questionnaires that were administered to the respondents. This helped in making sure that the questionnaires were acceptable, reliable, and valid. In their book, Mugenda and Mugenda (2003) argue that results from a pilot study help the researchers know if they should redo their questionnaires or not. The researcher used the test-retest method of piloting to make sure that the questionnaires were of acceptable reliability. Phelan and Wren (2005) indicated that the test-retest method is a test for testing for reliability. The researcher issued the research instruments to the same people on two different occasions, and the correlated results were collected. The researcher used five respondents to pilot this study. The researcher did not involve these respondents in the research. The pilot test showed that the instructions given to the respondents were clear and that the questionnaire was neither ambiguous nor confusing.

3.6.3 Instrument reliability

A researcher can enhance reliability by adding many related items to a measure and by using standardized testing procedures. In this study, the researchers used the piloting method to test the reliability of the instruments. Internal consistency techniques using Cronbach's Alpha were used in order to test the reliability of the instruments. In accordance with Copper and Schindler (2011), Cronbach's alpha measures how closely a set of a group are connected together, i.e., internal consistency. The alpha value has a range of 0 to 1, in which reliability increases with an increase in value.

Most of the time, the coefficient of 0.6-0.7 is usually accepted as a rule of thumb that shows acceptable reliability, and 0.8 or higher shows good reliability. For this study, the Cronbach's alpha was used to measure the above and found to be 0.832, which indicated that research tools were reliable for the purpose of this study.

3.6.4 Instruments Validity

Somekh and Cathy (2005) argued that the validity of a research instrument is the extent to which the sample of the items that are being tested represents the total value of the content that the test is made to measure. On the other hand, Mugenda and Mugenda (2012) stated that the validity of research instruments is enhanced by looking at experts' opinions and comments in regard to the research instruments.

To find out the validity of the research instrument, the researcher undertook a pre-test and a post-test, after which he compared the responses for consistency. The researcher further looked for opinions from the experts in the field of study, mostly the lecturers. This helped the researcher in improving the validity of the questionnaires. The opinions of the experts helped the researcher in making the necessary adjustments to the research instruments, thus making it more valid.

3.6.5 Data Collection Procedures

Questionnaires were dropped off at the respondent's workplace and picked up after they had been filled in. This method helped in making sure that the respondents had enough time to answer them. The researcher got an authorization letter from the Africa Nazarene University before the collection of data. In addition, the researcher sought approval from

the CEMASTEА administration to undertake the study in their organisation. The researcher also got a research permit from NACOSTI.

3.7 Data Processing and analysis

Walsh, Mark, Wogens, and Lynne (2003) argue that the data analysis technique to be used in any study is dependent on the type of data being collected for the particular study and if the data is qualitative or quantitative. In this study, quantitative data was collected. Descriptive statistical procedures were used in the analysis of this data. Kothari (2011) describes descriptive analysis as the process in which a mass of data is transformed into tables and charts with frequency distribution and percentages. After the researcher collected the data, cleaning of the data was done, and the questionnaires were arranged and coded. The researcher then analysed the data using descriptive statistics and regression analysis using the Statistical Package for Social Sciences version 26 (SPSS). Once the data was analysed, the results of descriptive statistics were presented using tables, bar graphs, histograms, and pie charts.

3.8 Legal and Ethical Consideration

The researcher considered the following ethical considerations as she undertook her study: The need to seek approval of the research by the Africa Nazarene University was mandatory. The need to give validity to the research and to prove that the research has been done to the research standards and practices is also essential. The researcher also sought informed consent from the participants so as to build trust and confidence with them. Confidentiality and anonymity were assured so that the participants could give their responses freely. Furthermore, CEMASTEА was approached for permission to conduct the research in their organisation. Finally, yet importantly, the researcher made sure that the research was not plagiarized. Proper citations were made for this research to avoid plagiarism.

CHAPTER FOUR

DATA ANALYSIS, FINDINGS AND INTERPRETATION

4.1 Introduction

This chapter presents the data analysis and results of the study. It begins by describing the response rate and the demographic information of the respondents. The chapter then presents the findings as guided by the items in the questionnaire, in line with the specific objectives of the study. The objectives included: establishing the relationship between organisational factors and the adoption of new technology at CEMASTEА; establishing the relationship between personal factors and the adoption of new technology at CEMASTEА; establishing the relationship between technological and the adoption of new technology at CEMASTEА; and establishing the joint effects of organisational, personal, and technological on the adoption of new technology at CEMASTEА.

4.2 Characteristics of the Respondents

Demographic characteristics were based on the distribution of respondents by their age, number of years working with CEMASTEА, and department, as well as whether respondents

It was established that 39.3% of all the respondents were less than 30 years of age, with 37.5% being 30–39 years old and 16.1% being aged between 40–49 years, while the remaining 7.2% were at least 50 years of age. This indicates that the majority of CEMASTEА employees are below 40 years of age. This could be interpreted to mean that, while the presence of aged employees in an organisation is quite essential for mentorship and guidance of the younger employees, age differences could make a difference in adaptability and user-friendliness in the adoption of new technology.

Regarding the number of years the respondent had worked with CEMASTEА, 32.1% had been in the company for less than 3 years, 25% for 3–5%, and only 7.1% had worked with CEMASTEА for over 15 years. This implies that the majority of employees at CEMASTEА had worked for the company for at least 3 years. This could further indicate

that respondents picked were experienced enough to give information regarding the adoption of new technology as well as address the research questions for this study.

The majority of the respondents (51.8%) were drawn from the science department, with Finance and Administration, as well as Catering and Accommodation Departments, being represented by 19.6% and 28.6% respectively.

The researcher also wanted to know whether the employees liked it when new technology was introduced in their organisation. The majority of the respondents (55%) answered affirmatively, with the remaining 45% admitting that they didn't like it when a new technology was introduced in their organisation.

As contended by Davis (2011), despite the many positive and useful changes that take place in a workplace, including things like competency and effectiveness with regard to the invention of new technology, there are challenges facing new technology with a significant number of employees not completely accepting the changes. Staff training, managerial support, incentives, perceived usefulness, personal innovativeness, image, prior experience, enjoyment with innovation, peers, and social network variables can all help to improve acceptance.

4.3 Presentation of Research Analysis, Findings, and Interpretation

4.3.1 Descriptive Statistics

4.3.1.1 Adoption of new technology in education support organizations

The diagram below illustrates combined effects of external factors on the adoption of new technology in CEMASTE A. On the left side of the figure (Y axis) label it as Likert Score, running vertically up, to the left of the scores. The X axis label has variables tested which were used to investigate the combined effects of the factors influencing adoption of new technology. These variables included; increased student admissions, customer satisfaction, and external ratings of the institution, building collaborations, and new partnerships.

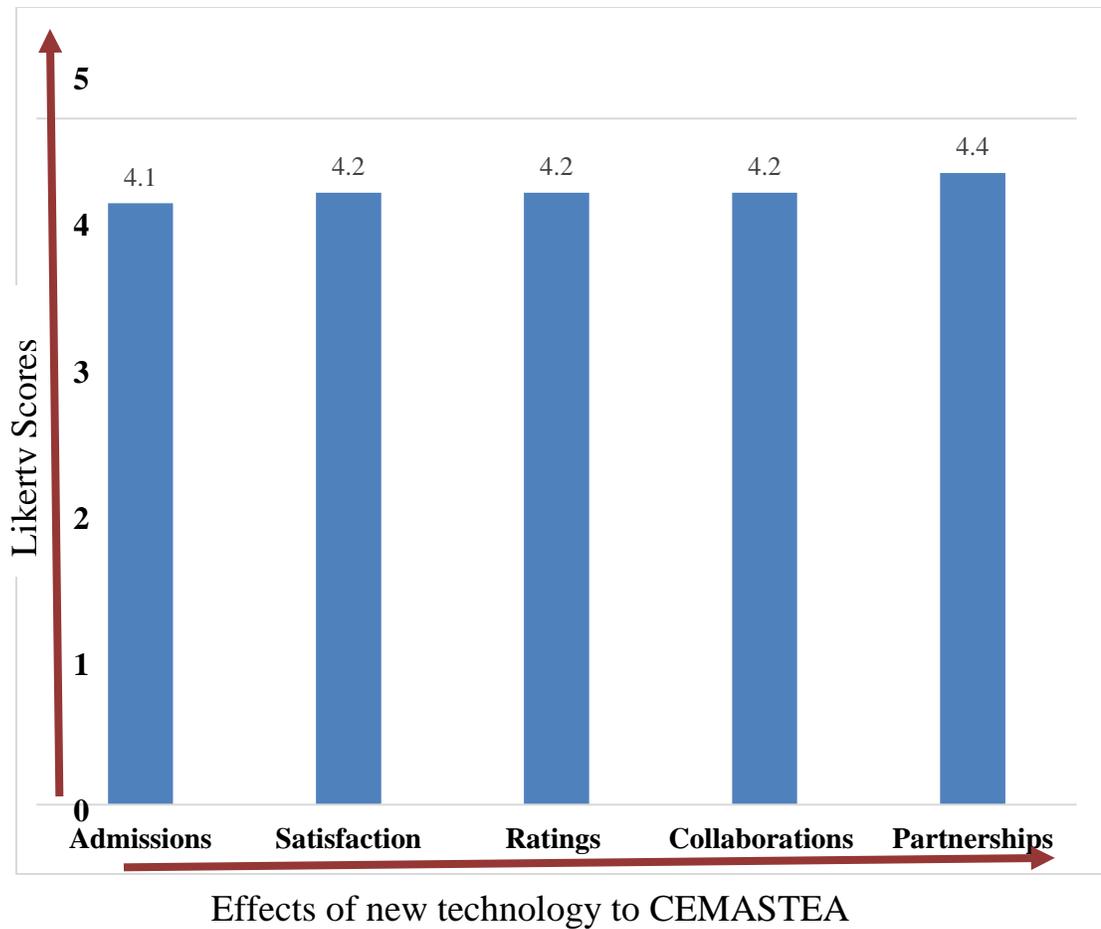


Figure 4.1: Joint effects of external factor on the adoption of new technology at CEMASTE A

A mean was used to indicate the prevalence of factors, with a mean close to 5 showing great adoption of new technology. The opposite was true for those factors closer to 1. With a mean of 4.4 and a standard deviation of 0.9, respondents agreed that new technology brought new partnerships to the institution. They also revealed that each time a new technology was introduced in the institution, it brought customer satisfaction with a mean of 4.2 and a standard deviation of 1.1, thus increasing the external ratings of the institution by a mean of 4.2 with a standard deviation of 0.9. Other important aspects of benefits as a result of new technology included building new collaborations with a mean of 4.2 with a standard deviation of 1.0. Respondents also asserted that new technology increased students' admissions by a mean of 4.1 with a standard deviation of 0.9. These findings enable us to safely conclude that adoption of new technology greatly increases positive effects in an organisation.

4.3.1.2 Organisational Factors Influencing adoption of technology

The diagram below illustrates the feedback from the interviewees on organizational factors influencing adoption of new technology. On the left side of the figure (Y axis) label it as Likert Score, running vertically up, to the left of the scores. The X axis label has variables tested which included training, employees' participation during implementation of new technology, good communication, leadership and management, as well as the cost of the new technology.

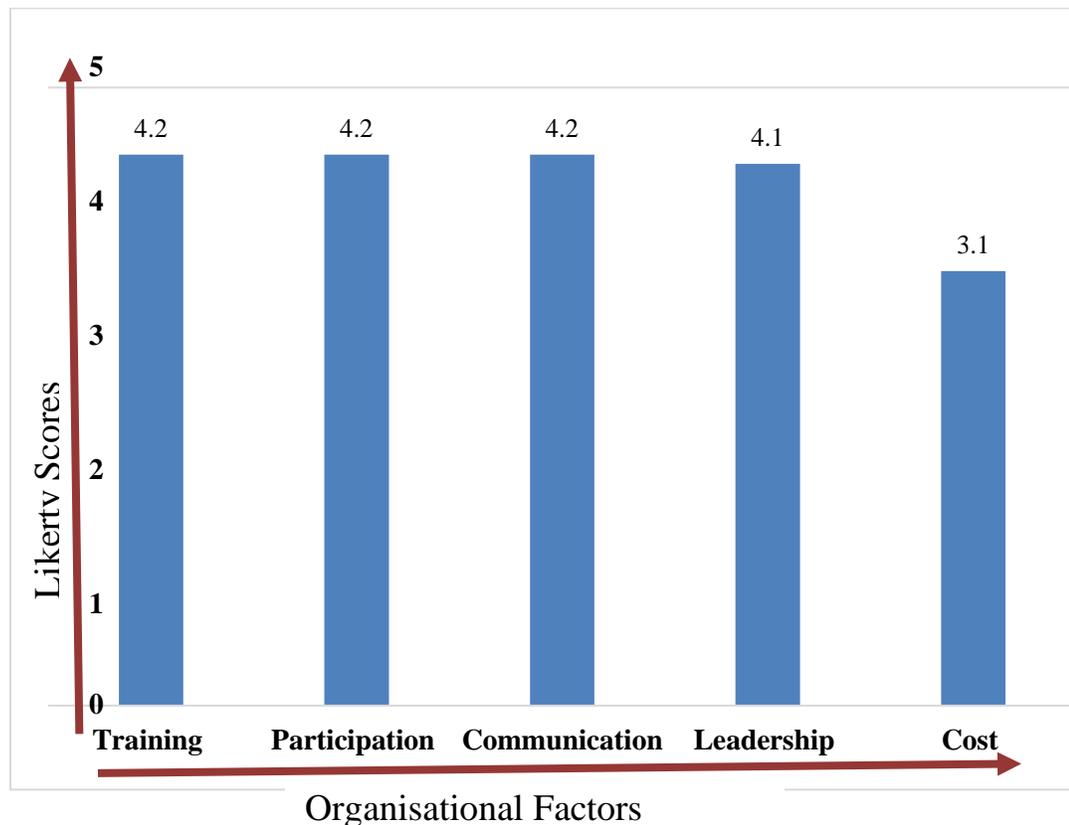


Figure 4.2: Influence of organisational factors on adoption of new technology

A mean was used to indicate the prevalence of factors, with a mean close to 5 showing great influence of the factor on adoption of new technology. The opposite was true for those factors closer to 1. According to the findings, good training allows employees to easily adapt to new technology, as indicated by the mean of 4.2 and standard deviation of 0.6. Other significant factors highly influencing the adaptation of new technology included participation of employees and good communication during the implementation of a new

technology, with both factors having a mean of 4.2 and standard deviation of 0.7. Interviewed employees also noted that good leadership influences adoption of new technology with a mean of 4.1 standard deviation 1.0, indicating that the cost of a new technology determines a mean of 3.1 with standard deviation of 0.8. These findings show that organisational factors play a vital role in the effective adoption of new technology.

4.3.1.3 Personal Factors Influencing adoption of technology

The diagram below illustrates the feedback from the interviewees on personal factors influencing adoption of new technology. On the left side of the figure (Y axis) label it as Likert Score, running vertically up, to the left of the scores. The X axis label has variables tested which included; age, Personal beliefs and perceived usefulness of the new technology.

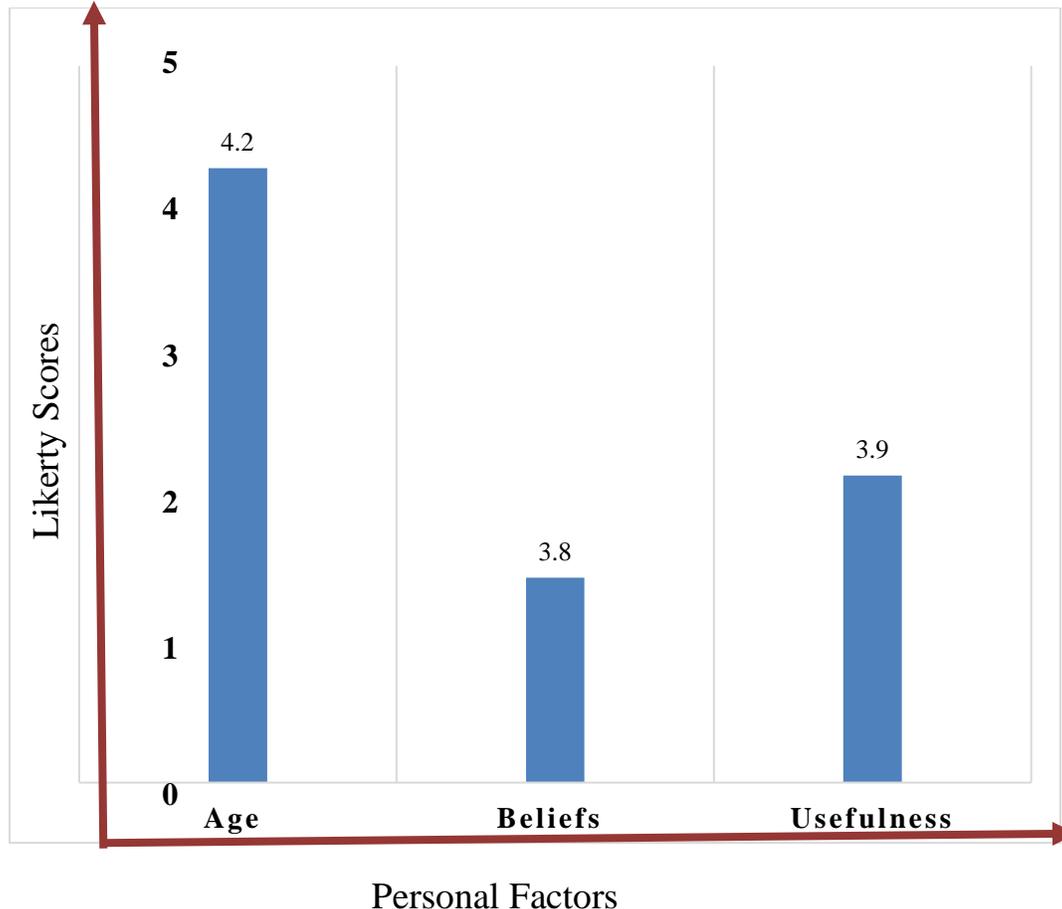


Figure 4.3: Influence of personal factors on adoption of new technology

A mean was used to indicate the prevalence of factors, with a mean close to 5 showing great influence of the factor on adoption of new technology. The opposite was true for those factors closer to 1. Respondents asserted that their respective ages influenced how

they perceived a new technology given by a mean of 4.2 and standard deviation of 0.9. Respondents also confessed that adaptability to a new technology was highly affected by their personal beliefs by a mean of 3.8 and a standard deviation of 1.1. They also emphasized that new technology made work easier for them and thus believed in the perceived usefulness of the new technology with a mean of 3.9 and standard deviation of 1.4.

4.3.1.3 Technological Factors Influencing adoption of new technology

The diagram below illustrates the feedback from the interviewees on technological influencing adoption of new technology. On the left side of the figure (Y axis) label it as Likert Score, running vertically up, to the left of the scores. The X axis label has variables tested which were based on the technological infrastructure, government laws and location of the offices

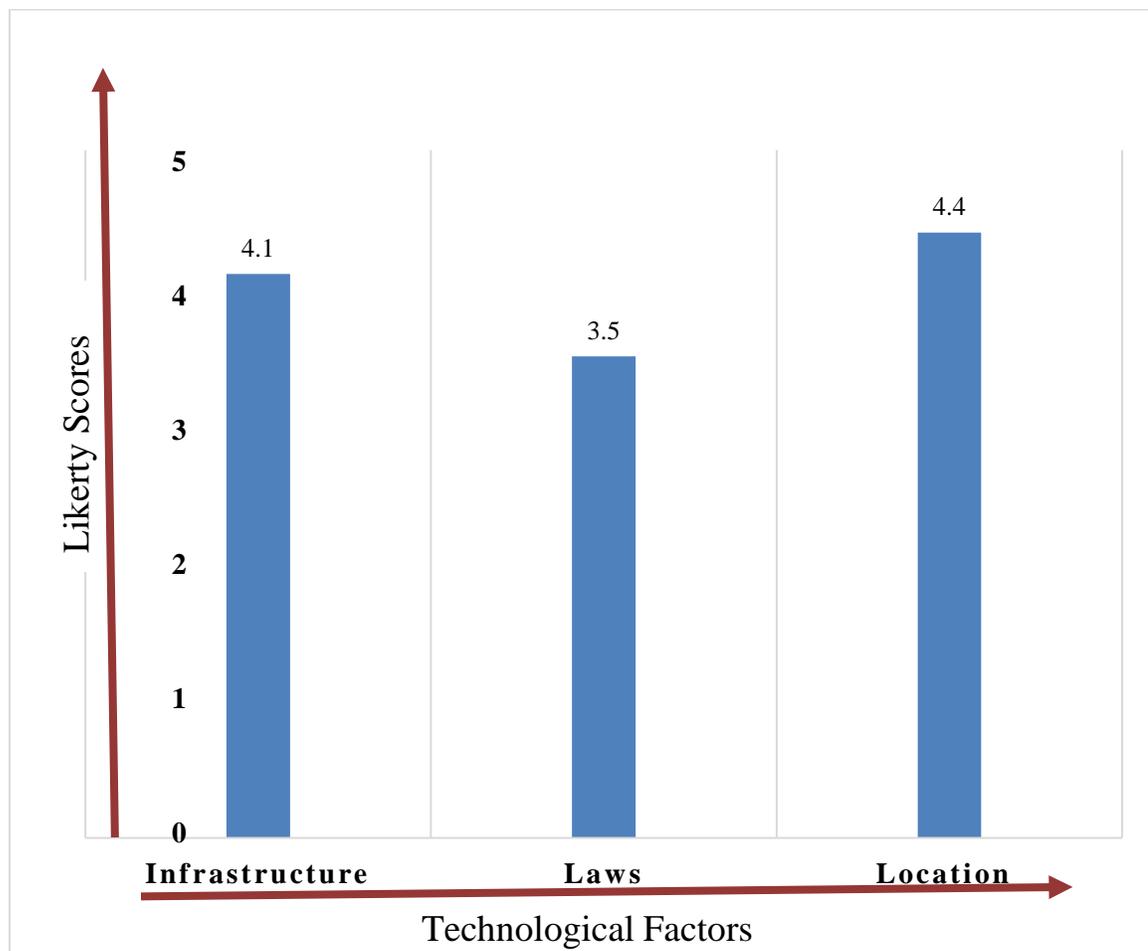


Figure 2.4: Influence of technological factors on adoption of new technology

A mean was used to indicate the prevalence of factors, with a mean close to 5 showing great influence of the factor on adoption of new technology. The opposite was true for those factors closer to 1. The findings place the current location of the offices as the most significant influence on adoption of new technology with a mean of 4.4 and a standard deviation of 0.7. Interviewed employees indicated that the presence of good technological infrastructure within the premises influenced the adoption of new technology with a mean of 4.1 and standard deviation of 1.0. Government laws were found to be having a moderate influence on the adoption of a new technology at CEMASTEAM, with a mean of 3.5 and standard deviation of 0.7. This implies that technological, just like organisational and personal factors, highly influence the adoption of new technology at CEMASTEAM.

4.3.2 Inferential Statistics

4.3.1.1 Adoption of new technology in education support organizations

Correlation coefficients

To examine the relationship between the variables in the study, Pearson correlation coefficient (r) was used. The coefficient indicated the the direction and extent of the relationship between all the variables included in the study.

Table 4.1: *Correlation coefficients*

	New technology	Organisational Factors	Personal Factors	Technological factors
New technology	1.000			
Organisational Factors	0.579	1.000		
Personal Factors	0.673	0.024	1.000	
Technological	0.679	- 0.074	0.187	1.000

The highest correlation was found between personal factors and new technology (0.679) and technological with new technology (0.673). The lowest correlation was between technological and organisational factors which was -0.074. This implies that, while all the

independent variables highly and positively correlate with performance of the dependent variable (new technology), there is a dimmed correlation between the independent variables. This shows that there was little or no co linearity problem and a healthy indication that the variables selected were quite independent of each other.

Combined Effects Model (ANOVA)

Analysis of variance (ANOVA) was used to generate the F value and hence F test was conducted. ANOVA helped to show the relationship in the variables between and within the measure of the dependent variable. The ANOVA table helped the researcher to test the general hypothesis at multivariate level to determine the suitability of the model to the data analysed. The decision criteria is, if $F_{\text{Critical}} > F_{\text{Calculated}}$ then accept the **H₀** and conclude that the independent variables jointly, have no significant relationship with the dependent variable.

Table 4.2: *Analysis of variance (composite score)*

	Sum of Squares	Df	Mean Square	F	Sig.
Regression	2.313	3.000	0.771	110.877	0.000
Residual	0.362	52.000	0.007		
Total	2.675	55.000			

Predictors: (Constant), Technological, Organisational Factors, Personal Factors
Dependent Variable: Adoption of New technology

According to the ANOVA results, the probability value for the regression model was 126.6. Given that F_{Critical} (1.692) is less than $F_{\text{Calculated}}$ (110.877) then the decision is to reject the null hypothesis (organisation factors, personal factors and technological do not significantly influence new technology in CEMASTE A) and accept the alternative hypothesis hence conclude that the objectives (organisation factors, personal factors and technological) are significant in influencing new technology in CEMASTE A. These results confirm the significance of the independent variables selected for this study in influencing the dependent variables. R^2 for the combined effects model was also tested as below.

Table 4.3: R2 for the combined effects of factors and adoption of new technology

Mode	R	Adjusted R	Std. Error of the	Durbin-
1	R	Square	Estimate	Watson
	.964			
1	a	0.93	0.12668	1.709

a Predictors: (Constant), Technological, Organizational Factors, Personal Factors
b Dependent Variable: Adoption of New Technology

Findings indicate an R-square of 0.93 with a standard error of 0.127. This implies that the three predictors considered in this study (that is technological, organizational factors, personal factors) explain 93 percent of changes in adoption of new technology. Test for autocorrelation revealed a statistical value of 1.709 which lies within the normal range of between 1.5 and 2.5 as recommended by Punya (2019).

In determining the relationship between independent variables (organisation factors, personal factors and technological) and dependent variable (technology implications in CEMASTEAs), Table 4.3 guided the development of the model for this relationship.

Table 4.4: *Model coefficients*

	Unstandardized		Standardized	T	Sig.
	Coefficients		Coefficients		
	B	Std. Error	Beta		
(Constant)	0.872	0.214		4.073	0.000
Organisational					
Factors	0.310	0.037	0.226	6.058	0.000
Personal Factors	0.554	0.024	0.251	10.656	0.000
Technological	0.598	0.027	0.313	11.485	0.000

Dependent Variable: New Technology in the Organisation

The model was therefore estimated as:

$$\text{New technology in CEMASTE A} = 0.872 + 0.310 \text{ Organisation Factors} + 0.554 \\ + \text{Personal Factors} + 0.598 \text{ Technological} + \varepsilon$$

In order to achieve unstandardized coefficients, the variables were analysed using regression tools. Findings indicated that an increase of a unit of organisation factors leads to a better adoption of new technology by 0.310 while an increase of a unit of personal factors led to a better adoption of new technology by 0.554. This was supported by Chi and Yamada (2002) carried out a study in Japan on the factors affecting farmers' adoption of technologies in farming system. The researcher noted that Farmers' changes of technology use are influenced by technical training, meeting, oral transmission, and trust on technician and belief level on technology.

An increase in technological by one unit was found to impact new technology by 0.598. This was supported by. (Scott, Plotnikoff, Karunamuni, Bize & Rodgers, 2008) who carried a research on factors influencing the adoption of an innovation: An examination of the uptake of the Canadian Heart Health Kit (HHK). The researchers noted that, technological influenced adoption of a new technology. The constant was 0.872 which means that if organisation factors, personal factors, and technological are held constant (at zero); new technology adoption was 0.872. This therefore concludes that, organisation, personal and technological affect adoption of new technology. The researcher therefore rejected the null hypothesis and accepted the alternative hypothesis.

In support to the current results, Tuluker (2012) in his research on factors affecting the adoption of technological innovation by individual employees: An Australian study, noted that, 53.1% of the variance in usage or the individual acceptance of new technology could be explained by training, managerial support, incentive, perceived usefulness, personal innovativeness, image, prior experience, enjoyment with innovation, peers and social network variables.

4.3.2.2 Organisational Factors influencing adoption of new technology

Inferential statistics on the relationship between organisational factors and adoption of new technology by CEMASTE A entailed coefficient of determination (R-Square), analysis of

variance (ANOVA) as well as the model coefficient matrix. Test for autocorrelation was also performed.

Table 4.5: R^2 for the relationship between organisational factors and adoption of new technology

R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
.865a	0.749	0.744	0.235	2.305

a Predictors: (Constant), Organisational factors

b Dependent Variable: Adoption of New Technology

Results in Table 4.5 show an R-Square of 0.749 with the standard error of estimate being 0.235. This implies that for any variation in the adoption of new technology by one unit, organisational factors explain 74.9% of such variation. The remaining 25.1% represents a composite score of other variables not considered in the current study and that do influence adoption of new technology. The researcher also tested for autocorrelation using the Durbin-Watson statistic, which is always between 0 and 4. A rule of thumb is that test statistic values in the range of 1.5 to 2.5 are relatively normal. Values outside of this range could be cause for concern. For the current study, the Durbin-Watson statistic was 2.305, which falls within the relatively normal range, and therefore there was no autocorrelation in the residuals from regression analysis.

Table 4.6: ANOVA for the relationship between organisational factors and adoption of new technology

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	8.889	1	8.889	160.714	.000b
Residual	2.987	54	0.055		
Total	11.876	55			

a Dependent Variable: Adoption of New Technology

b Predictors: (Constant), Organisational factors

As shown in Table 4.6, $F\text{-Calculated}(1, 54) = 160.714$, which is greater than $F\text{-Critical}(1, 54) = 4.019$ at the 2-tail test and 95% confidence level. The results also show that the p-value is $0.000 < 0.05$. This further confirms that organisational factors significantly influence the adoption of new technology. The researcher therefore rejected the null hypothesis and accepted the alternative hypothesis, thus concluding that there is a relationship between organisational factors and the adoption of new technology.

Table 4.7: *Model coefficients the relationship between organisational factors and adoption of new technology*

Model	Unstandardized		Standardized	T	Sig.
	Coefficients		Coefficients		
	B	Std. Error	Beta		
(Constant)	0.575	0.284		2.028	0.047
Organisational factors	0.866	0.068	0.865	12.677	0.000

a Dependent Variable: Adoption of New Technology

Increase in organisational factors by one unit leads to an increase in the adoption of new technology by 0.866 units with a p-value of $0.000 < 0.05$. This can be summarized by the following model:

$$Y = 0.575 + 0.866X + \epsilon$$

where Y represents change in adoption of technology with X representing organisational factors. The findings agree with those of Peckham (2003) who in her research on organisational factors that can affect employee acceptance of new information technology stated that, communication during the process of change should be regular and different channels should be used to ensure effectiveness. (Talukder, 2012) cited employees' participation as key during adoption of new technology and advised that one can never expect one hundred percent support from another person who was never involved in formulating a change, which had an impact of his/her work. Over and above, good leadership would provide adequate professional development and support for his/her

employees in the process of radical change in technology for teaching/learning from the traditional pedagogical approach. Betz (2000) emphasized this.

4.3.2.2 Personal Factor Influencing adoption of new technology

Inferential statistics on the relationship between personal factors and adoption of new technology by CEMASTEAs entailed coefficient of determination (R-Square), analysis of variance (ANOVA) as well as the model coefficient matrix. Test for autocorrelation was also performed.

Table 4.8: *R² for the relationship between personal factors and adoption of new technology*

R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
.858a	0.736	0.731	0.241	1.802

a Predictors: (Constant), Personal Factors

b Dependent Variable: Adoption of New Technology

Results in Table 4.8 show an R-Square of 0.736 with the standard error of estimate being 0.241. This implies that for any variation in adoption of new technology by one-unit, personal factors explain 73.6% of such variation. The remaining 26.4% represent a composite score of other variables not considered in the current study and that do influence adoption of new technology. The researcher therefore rejected the null hypothesis and accepted the alternative hypothesis. The researcher also tested for autocorrelation using Durbin Watson statistic which is always between 0 and 4. A *rule of thumb* is that test statistic values in the range of 1.5 to 2.5 are relatively normal. Values outside of this range could be cause for concern. For the current study, Durbin Watson statistic was 1.802 which falls within the relatively normal range and therefore there was no autocorrelation in the residuals from regression analysis.

Table 4.9: ANOVA for the relationship for the between personal factors and adoption of new technology

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	8.744	1	8.744	150.729	.000b
Residual	3.132	54	0.058		
Total	11.876	55			

a Dependent Variable: Adoption of New Technology

b Predictors: (Constant), Personal Factors

As shown in Table 4.9, F-Calculated (1, 54) = 150.729 which is greater than F-Critical (1, 54) = 4.019 at 2-tail test and 95% confidence level. Results also show that p-value = 0.000 < 0.05. Given the p value did not exceed 0.05, the researcher therefore rejected the null hypothesis and accepted the alternative hypothesis. This further confirms that personal factors significantly do influence adoption of new technology.

Table 4.10: Model coefficients the relationship between personal factors and adoption of new technology

Model	Unstandardized		Standardized	T	Sig.
	Coefficients		Coefficients		
	B	Std. Error	Beta		
(Constant)	0.426	0.305		1.397	0.168
Personal Factors	0.917	0.075	0.858	12.277	0.000

a Dependent Variable: Adoption of New Technology

Findings presented in Table 4.10 show that when personal factors are held constant, adoption of new technology will remain at 0.426. At the same time, an increase in personal factors by one unit leads to an increase in adoption of new technology by 0.917 units with a p-value of 0.000 < 0.05. This can be summarized by the following model:

$$Y = 0.426 + 0.917X + \epsilon$$

where Y represents change in adoption of technology with X representing personal factors. Both the descriptive and inferential results show a clear indication that employee's personal factors if not well management may affect their adoption and adaptability into new technologies. This is because the employees will start generating personal answers to questions like where the new technology is taking their organisation and whether they are going to still be part of it including effect on their job description, responsibilities and compensation.

Age was highly approved as a personal factor affecting adoption of new technology in a research based on America and done by Smith (2014) showing that, the age determines how people adopt technology in their homes and workplace. The research showed that the seniors in the country have always been the late adopters of new technology compared to the young compatriots. Myers and Sadaghiani (2010) noted that, the way employees perceived a new technology mattered and influenced how they embraced it. Employees will find themselves asking questions like, what does this new technology mean to my future.

4.3.2.3 Technological factors influencing adoption of new technology

Inferential statistics on the relationship between technological factors and adoption of new technology by CEMASTEVA entailed coefficient of determination (R-Square), analysis of variance (ANOVA) as well as the model coefficient matrix. Test for autocorrelation was also performed.

Table 4.11: R^2 for the relationship between technological factors and adoption of new technology

R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
.928a	0.861	0.858	0.175	2.058

a Predictors: (Constant), Technological
b Dependent Variable: Adoption of New Technology

Results in Table 4.11 show an R-Square of 0.861 with the standard error of estimate being 0.175. This implies that for any variation in adoption of new technology by one unit, technological factors explain 86.1% of such variation. The remaining 13.9% represent a composite score of other variables not considered in the current study and that do influence adoption of new technology. The researcher also tested for autocorrelation using Durbin Watson statistic which is always between 0 and 4. A *rule of thumb* is that, test statistic values in the range of 1.5 to 2.5 are relatively normal (Mishra, Pandey, Singh, Gupta, Sahu, & Keshri, 2019). Values outside of this range could be cause for concern. For the current study, Durbin Watson statistic was 2.058 which fall within the relatively-normal range and therefore there was no autocorrelation in the residuals from regression analysis.

Table 4.12: ANOVA for the relationship between technological and adoption of new technology

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	10.225	1	10.225	334.401	.000b
Residual	1.651	54	0.031		
Total	11.876	55			

a Dependent Variable: Adoption of New Technology

b Predictors: (Constant), Technological

As shown in Table 4.12, F-Calculated (1, 54) = 334.401 which is greater than F-Critical (1, 54) = 4.019 at 2-tail test and 95% confidence level. Results also show that p-value = 0.000 < 0.05. Given the p value did not exceed 0.05, the researcher therefore rejected the null hypothesis and accepted the alternative hypothesis. This further confirms that technological significantly do influence adoption of new technology.

Table 4.13: Model coefficients the relationship between technological and adoption of new technology

Model	Unstandardized		Standardized	T	Sig.
	Coefficients		Coefficients		
	B	Std. Error	Beta		
(Constant)	0.597	0.196		3.051	0.004
Technological	0.859	0.047	0.928	18.287	0.000

a Dependent Variable: Adoption of New Technology

Findings presented in Table 4.9 show that when technological are held constant, adoption of new technology will remain at 0.597. At the same time, an increase in technological by one unit leads to an increase in adoption of new technology by 0.859 units with a p-value of $0.000 < 0.05$. This can be summarized by the following model:

$$Y = 0.597 + 0.859X + \epsilon$$

Where Y represents change in adoption of technology with X representing technological. The findings are consistent with those of Ross (2016) who stated that in the process of introducing a new technology, the organisation will have to invest in good infrastructure such as computer hard and soft, good communication facilities, etc. to ensure that, the implementation is successful. Therefore it is therefore important for CEMASTE A to make sure that they have the best infrastructure to ensure the success of technology adoption.

CHAPTER FIVE

DISCUSSIONS, CONCLUSIONS, AND RECOMMENDATIONS

5.1 Introduction

This chapter provides a summary of the study findings and gives the conclusions and recommendations of the study based on the findings and in line with the objectives of the study. The general objective of this study was to establish relationship between external factors influencing adoption of new technology in education support organisations in Kenya. The study focused on the case of CEMASTEА.

5.2 Discussion

5.2.1 Adoption of new technology in education support organizations

Employees rated positive effects in the organisation as a result of the adoption of new technologies, as reflected by the increase in the number of admissions (mean of 4.1 and standard deviation of 0.9). The average mean was 4.2 while the average standard deviation was 0.9. These findings enable us to safely conclude that adoption of new technology greatly brought about new effects which were positive for CEMASTEА.

The results are in line with research by Hao and Yu (2011), who explain that ICT impacts the success of an organisation. The most important metric was customer satisfaction in the school, indicating that technology was being recognized and appreciated by CEMASTEА's clients. Customer satisfaction was identified by Shaukat, Zafarullah, and Wajid (2009) as one of the impacts of using ICT in an organisation. The research has identified students, employees, and faculty as being positively impacted by the application of technology in a school environment.

Other important aspects of new technologies include improving an organisation's external ratings (mean = 4.2, standard deviation = 0.9), building collaborations (mean = 4.2, standard deviation = 1.0), and creating new partnerships (mean = 4.4, standard deviation =

0.9). The results given by the respondents are in line with research by Evans and Wurster (2007), who show that the competitiveness of an organisation is dependent on the application of ICT. They explain that when ICT is employed in the organisation, it gives businesses the opportunity to reengineer themselves and be aligned with business functionalities.

The failure to ensure this alignment leads to the organisation failing to achieve its goals as ICT is not applied to improve efficiency. However, CEMASTEAM had applied its technology in critical areas such as building collaborations and partnerships, which showed a strong showing with a mean of 4.2. The results were in line with Saltiel (1998) findings showing that the use of technology improves collaborations and partnerships for colleges.

The application of good technology improves the efforts of the organisation in collaborating with other colleges. An example is using e-learning systems, as it brings together all the organisations that are techno-savvy. The results also confirm Mgdadi, Abu Zaid and Al Hujran (2012) findings that organisations may collaborate with their business partners using the same services. They explained that when using ICT, collaborations are based on the most recent and on-demand information. As a result, employees in CEMASTEAM are empowered to make critical decisions using current information, hence acquiring results that are beneficial to the organisation.

According to the ANOVA results, the probability value for the regression model was 126.6. Given that $F_{Critical}$ (1.692) is less than $F_{Calculated}$ (110.877), then the decision is to reject the null hypothesis (organisation factors, personal factors, and technological do not significantly influence new technology in CEMASTEAM) and accept the alternative hypothesis hence conclude that the three independent variables (organisation factors, personal factors, and technological) are significant in influencing new technology in CEMASTEAM. These results confirm the significance of the independent variables selected for this study in influencing the dependent variables.

5.2.2 Organizational factors and adoption of new technology in education support organizations

As indicated by the mean of 4.2 and standard deviation of 0.6, good training helps employees adapt easily to a new technology. When employees are trained well, they easily recognize the essence of the new technology. The findings complemented the findings by Gil et al. (2015), who identified strategic training and development as essential for organisational change. They explained that since training and development help employees acquire skills, the employees are comfortable with the resulting changes. The results are also in concurrence with those of Amoah-Mensah and Darkwa (2016), who explain that since employees resist change for lack of requisite skills, training and development increase their level of comfort with changes such as introducing new elements of ICT.

Other significant factors highly influencing adoption of new technology include participation of employees in the implementation of a new technology, which makes them adapt quickly (mean = 4.2, standard deviation = 0.7). The findings were in line with Al-Gahtani and Wang's (2007) findings that employees do not mind change if they are given the opportunity to interact with the new changes and impact the directions the changes are shaping. The authors warn that employers should not expect hundred percent support from employees who were not involved in making decisions about the proposed changes. Ahmer (2013) concurs with the results and adds that employee engagement is a predictor of accelerated adoption of new technology when considering the application of intelligence. When employees are involved, the findings show that it is easy to implement change.

Further, the findings show that communication of the new technology to the employees (mean = 4.2, and standard deviation = 0.9) influences ICT adaptation. The findings collaborate research by Buabeng-Andoh (2012) stating that open communication policy is essential in organisational change. Buabeng-Andoh (2012) explains that communication is essential since employees get the opportunity to communicate their likes and dislikes for the new change. At the end, the technologies are implemented in the manner the employees consider most favorable for them and they have a way of giving feedback.

The results also agree with Peckham (2003), who stated that regular communication using different channels ensures effective change management. Elving (2005) supports the results and further explains that communication during organisational change leads to a reduction of resistance to change. The 4.2 mean shows a high level of influence of communication, and as identified by Christensen (2014), organisational resistance can be reduced by communication because employees stop being insecure about the intended changes within the organisation. Instead, proper communication at CEMASTEVA resulted in the creation of a sense of community among the employees.

Good leadership was also indicated as one of the influencers of adoption of new technology (mean = 4.1, standard deviation = 0.9), which showed that it was a critical factor when determining the success of technology adaptation. This was in line with the research by Gaylor (2001) showing that the organisational change process and the leadership in the organisational change were vital for the organisation's likelihood of adopting ICT. The resistance of employees in this case is both for those in leadership positions and those in lower positions. The essence of leadership acceptability of the proposed changes was highlighted by Anderson and Dexter (2005), who showed that when school principals do not resist change, there is a higher level of utilization of technology in the schools. Further, the results are in line with Raman and Shariff (2017) findings on the traits of leadership that lead to effective adaptation of technology. Specific indicators of acceptability of technology as identified in their research include steps towards purchasing the equipment and placing it in the specific areas where it should be utilized in the organisation.

However, the cost of technology was not identified as a strong factor, with a mean of 3.1. The results differ from the conclusion by Mutula and Brakel (2006), who opined that the cost aspect of technology is a critical factor when determining the technologies to be adopted. In the ICT sector, Nyagar et al. (2017) state that the costs of elements such as software, hardware, personnel, and space should be considered.

However, the respondents in this case did not place cost as one of the major factors in their choice of adopting ICT. This is unlike research by Baldwin and Lin (2002) showing that

for Canadian manufacturers, cost was one of the barriers to implementing certain technologies. The lack of financial resources was also identified by Walczuch et al. (2010) as an impediment. However, the fact that the respondents did not consider cost as a major factor may mean that either they have the required financial resources or that they have not invested in expensive ICT equipment.

The regression results showed an R-Square of 0.749 with the standard error of estimate being 0.235. This implied that for any variation in adoption of new technology by one unit, organisational factors explain 74.9% of such variation. The remaining 25.1% represent a composite score of other variables not considered in the current study and that do influence adoption of new technology. Findings on the Relationship between Organisational factors and Adoption of New Technology showed that, when organisational factors are held constant, adoption of new technology remained at 0.575. At the same time, an increase in organisational factors by one unit led to an increase in adoption of new technology by 0.866 units with a p-value of $0.000 < 0.05$.

5.2.3 Personal factors and adoption of new technology in education support organizations

On personal factors, respondents asserted that, their respective age influences how they perceive a new technology, given a mean of 4.2 and a standard deviation of 0.9. The respondents explained that for younger employees, they were more comfortable with adopting new technology, while older employees resisted the adaptation of new technology. The research was in line with research by Smith (2014) showing that seniors are late adopters of new technology, unlike their young compatriots who adopt technology faster.

Smith (2014)'s explanation of the adaptation of technology showed that younger employees had a positive attitude towards technology changes and also had a better understanding of the manner in which technology works. The results are also in line with research from Lapointe and Reward (2005), who state that the stereotypes perpetuated

about older people's receptivity to change lead to them accepting that they are incapable of coping with the technology changes that organisations introduce.

As a result, the older people are threatened by the changes taking place within the organisation and fear being fired for failing to successfully adopt new technology. The results are also supported by Warr and Fay (2011) explanation showing that among older employees, there was a lower level of personal initiative towards trying to use new technology. Morris and Venkatesh (2000) stated that since older people feel that technology is difficult to learn, it threatens their positions in the workplace and places them at the threat of being sacked from their jobs.

Respondents highly rated every new technology for making work easier for them (mean = 3.9, standard deviation = 1.4). The rating of new technology as making work easier is an important factor in determining the acceptability of the new technology. The findings in this research were in line with Lai (2017) findings that individuals make decisions based on the advantages they perceive as likely to be acquired through the use of a given technology. The theoretical concept used in this research, the diffusion of innovation theory, also identifies the relative advantage provided by a technology as a critical determinant of acceptability. The improvement of individual performance measured in this research is identified by Lai (2017) as improving the speed of doing things or doing things in a better manner than was possible before adopting the technology. At CEMASTEIA, this entails using e-mail or doing online business transactions.

The respondents confessed that adaptability to a new technology is largely affected by their personal beliefs (mean = 3.8, standard deviation = 1.1) with a significant portion of them fearing new technology (mean = 3.6, standard deviation = 0.8). Personal beliefs were also identified as major determinants of employee acceptability of technology by Myers and Sadaghiani (2010). The researchers found that the manner in which people perceive new technology influences the likelihood of adopting the technology.

The issues that the employees were concerned about include the likelihood of changing their job descriptions and compensation. Al-Haderi (2013) identified the essence of technology as transcending even age. While the results show that older people are likely to

resist adoption of technology when they have high self-efficacy, they are more likely to accept new technology than younger people who have low self-efficacy. Therefore, individual belief in their own ability leads to better working with ICT technology. The concept of individual belief and acceptance of new technology was true for CEMASTEА.

The regression results showed an R-Square of 0.749 with the standard error of estimate being 0.235. This implied that for any variation in the adoption of new technology by one unit, organisational factors explained 74.9% of such variation. The remaining 25.1% represented a composite score of other variables that were not considered in this study and that do influence the adoption of new technology. Findings on the Relationship between Personal Factors and Adoption of New Technology showed that when personal factors are held constant, adoption of new technology will remain at 0.575. At the same time, an increase in organisational factors by one unit leads to an increase in the adoption of new technology by 0.866 units with a p-value of $0.000 < 0.05$.

5.2.4 Technological factors and adoption of new technology in education support organizations

Concerning the technological, findings indicated that the current location of the offices was significantly affecting how employees got new technology (mean = 4.4, standard deviation = 0.7). CEMASTEА is located within the urban areas of Kenya. The results show that the location of the office is one of the main determinants of the adaptation of technology. The results are in line with research by Oluoch (2016). According to the research, in Kenya, access to technology is not even equal. Instead, urban areas enjoy the benefit of modern technology, which reaches the urban areas faster than in the rural areas. Further, according to research done by Malecki and Boush (2003), CEMASTEА would have found it difficult to install the same technology because of the "rural penalty". The rural areas do not have many connections to the internet and other ICT infrastructure. Therefore, CEMASTEА might have considered ICT essential due to its relative proximity to the existing technology.

Interviewed employees indicated that there was good technological infrastructure in our premises (mean = 4.1, standard deviation = 1.0). The results were in line with research by

Ross (2016) showing that the technology infrastructure laid down by an organisation determines the likelihood of employees accepting new technology. When there is infrastructure for new technology, it means that there will be good use and flow of technology.

At CEMASTEVA, the infrastructure laid down was a major factor that helped in the growth and success of the organisation. The organisation has good infrastructure which has been laid down to ensure that any introduction of new technology would go smoothly. The results are also in line with the confirmation by Putman and Kolko (2010), who stated that socio-technical factors such as the available ICT resources determined whether there would be sustained use of technology. The good infrastructure in CEMASTEVA was identified as a result of Kenya's ICT infrastructure improvement as identified by the UN (2013), where Kenya was identified as having performed well in achieving the Millennium Development Goals. Among the infrastructure at CEMASTEVA resulting from Kenya's efforts is the presence of cable internet after the country provided the undersea internet cable. Such infrastructural development, as identified by Muriithi, Horner and Pemberton (2016), results in employees finding the need for ICT in the organisation.

Government laws were found to be having a moderate influence on the adoption of a new technology at CEMASTEVA (mean = 3.5 and standard deviation = 0.7). This contradicts the research by Muthoni and Moturi (2020), who identify the legal environment as being critical to the uptake of technology. In this case, the issues identified as affecting technology adaptation most are the principles introduced to guide regulation in the ICT field. However, the fact that government laws were identified as having a moderate impact could be the result of the government's seeking to ensure technology neutrality in the introduction of new laws. The non-interference of governments as recommended by the World Summit on the Information Society (Wsis, 2011) may be the reason most of the respondents did not find government regulations to have a significant impact on technology adaptation.

However, considering that Kenya imports most of the ICT equipment, CEMASTEVA is likely to feel the impact of government regulations if the government creates an environment that is not conducive for foreign investment. Sag, Sezen, and Guzel (2016)

agree that legal instability and uncertainty in governing laws may reduce investment in the ICT sector. For this reason, while the research identified government regulations as moderate, these laws are critical in influencing the cost of ICT infrastructure and the decision of SMEs to invest in ICT-related commodities. Since the governing laws also influence the cost of ICT infrastructure, it is likely to influence the decision of SMEs to invest in ICT.

The regression results showed an R-Square of 0.861 with the standard error of estimate being 0.175. This implied that for any variation in the adoption of new technology by one unit, technological explained 86.1% of such variation. The remaining 13.9% represented a composite score of other variables that were not considered in this study and that do influence the adoption of new technology.

Findings on the Relationship between technological and Adoption of New Technology showed that when technological are held constant, adoption of new technology will remain at 0.597. At the same time, an increase in technological by one unit leads to an increase in adoption of new technology by 0.859 units with a p-value of $0.000 < 0.05$. Given the p value did not exceed 0.05, the researcher therefore rejected the null hypothesis and accepted the alternative hypothesis.

5.3 Summary of Main Findings

5.3.1 New technology

To establish the combined effects of the three objectives of external factors on the adoption of new technology, the following variables were used: increased number of admissions, customer satisfaction, external ratings, new collaborations, and new partnerships. The increase in the number of admissions after the introduction of a new technology had a mean of 4.1 and a standard deviation of 0.9. New technology brings customer satisfaction had a mean of 4.1 and a standard deviation of 1.1. External ratings of the organisation after the successful introduction of a new technology got a mean of 4.2 and a standard deviation of 0.9, while building collaborations got a mean of 4.2 and a standard deviation of 1.0, and new partnerships a mean of 4.4 and a standard deviation of 0.9 were found.

To examine the relationship between the variables in the study, the Pearson correlation coefficient (r) was used. The coefficient indicated the direction and extent of the relationship between all the variables included in the study. The highest correlation was found between personal factors and new technology (0.679) and technological with new technology (0.673). The lowest correlation was between technological and organisational factors, which was -0.074. This implies that, while all the independent variables highly and positively correlate with the performance of the dependent variable (new technology), there is a dimmed correlation between the independent variables. This shows that there was little or no co-linearity problem and is a healthy indication that the variables selected were quite independent of each other.

5.3.2 External Factors

5.3.2.1 Organizational factors and adoption of new technology in education support organizations

The following variables were used to examine the relationship between organisational factors and the adoption of new technology: good training, employee participation, good communication, and good leadership. Respondents asserted that good training influences the adoption of new technology with a mean of 4.2. Employee participation during the implementation of new technology was the other variable that was measured and gave a mean of 4.2. Good communication during adoption of new technology was a variable that was also used to measure organisational factors influencing adoption of new technology and gave a mean of 4.2. Good leadership, on the other hand, gave a mean of 4.1. On average, the relationship between organisational factors and adoption of new technology was found to have a mean of 4.0, thus indicating that, indeed, organisational factors do have an influence on adoption of new technology.

Further, inferential statistics on the relationship between organisational factors and adoption of new technology by CEMASTEAs entailed coefficient of determination (R-Square), analysis of variance (ANOVA), as well as the model coefficient matrix. The results gave an R-Square of 0.749, with the standard error of estimate being 0.235. This means that for any variation in the adoption of new technology by one unit, organisational

factors explain 74.9% of such variation. The remaining 25.1% represents a composite score of other variables not considered in the current study and that do influence the adoption of new technology.

5.3.2.2 Personal factors and adoption of new technology in education support organizations

To establish the relationship between personal factors and the adoption of new technology at CEMASTE A, the variables that were used included age, perceived usefulness of the new technology, and personal beliefs. A mean of 4.2 was found on the question of age and technology. A mean of 3.9 was found on the perceived usefulness of new technology, where employees asserted that, new technology made work easier for them. A mean of 3.8 was found on personal beliefs, where employees believed that their personal beliefs affected how they adopted a new technology.

Inferential statistics on the relationship between personal factors and adoption of new technology by CEMASTE A entailed coefficient of determination (R-Square), analysis of variance (ANOVA), as well as the model coefficient matrix. A test for autocorrelation was also performed. Results showed an R-Square of 0.736, with the standard error of estimate being 0.241. This implied that for any variation in the adoption of new technology by one unit, personal factors contributed 73.6% of such variation. The remaining 26.4% represents a composite score of other variables not considered in the current study and that do influence adoption of new technology.

5.3.2.3 Technological factors and adoption of new technology in education support organizations

The relationship between technological factors and the adoption of new technology was measured using the locations of the offices, technological infrastructure, and government laws. A mean of 4.4 was found at the location of the offices. The mean values for good technological infrastructure and government laws were as follows; 4.1 and 3.5, respectively.

Inferential statistics on the relationship between technological factors and adoption of new technology by CEMASTEAM entailed coefficient of determination (R-Square), analysis of variance (ANOVA), as well as the model coefficient matrix. A test for autocorrelation was also performed. Results showed an R-Square of 0.861 with the standard error of estimate being 0.175. This implies that for any variation in the adoption of new technology by one unit, technological explain 86.1% of such variation. The remaining 13.9% represents a composite score of other variables not considered in the current study and that do influence adoption of new technology.

5.4 Conclusion

From the findings, it can be concluded that new technology generally has exerted a great influence on improvements in organisations. In this respect, it has greatly enhanced the effectiveness and efficiency of work organisations, even though it is yet to ensure improved accountability in the process. It can be inferred that all the various variables examined, including the organisational factors, personal factors, and technological, have had a major positive influence on the adoption of new technology, including increased student admissions, increased customer satisfaction, increased external ratings, more collaborations, and enhanced partnerships. Comparatively, organisational factors and technological have exerted the greatest influence as compared to personal factors.

Organisational factors mainly influenced the adoption of new technology by improving communication to affected parties, having great leadership, good communication between the leaders and the employees, employees' involvement, and the cost of new technology. New technology has improved flexibility and service awareness to the target customers, thus the high enrolment at CEMASTEAM. Technological motivate new technology through the location of offices, technological infrastructure, and laws. Personal factors, on their part, normally facilitate new technology through employees' perception of the value and usage of the technology as well as the new technology making work easier.

Collectively, organisational factors, personal factors, as well as technological, explain over four-fifth of all the technological changes in organisations. They tend to depict a direct relationship where an increase in any of these variables increases the high acceptance of

adoption of new technology in organisations by a certain margin. New technology has the capacity to increase productivity and create more cost effective output with the same or less inputs and second; development of technological applications for business use alter the approach organisations function and eventually, improve their services as well as products.

5.5 Recommendations and Impact of the Research

On organisational factors, the researcher established that, good training, user participation, and good communication influence the adoption of new technology. Gil et al. (2015) identified that strategic training and development were essential for organisational change. On the other hand, Al-Gahtani and Wang (2007) noted that employees do not mind change if they are given the opportunity to interact with the new changes and impact the directions the changes are shaping.

Organisations should therefore be keen on communicating and involving their employees and other stakeholders during the adoption of new technology and how it will affect all the parties. This will make the new technology effective and ensure little or no resistance is witnessed during the adoption. The findings show that communication is essential both at the organisational factor level.

Effective communication is going to occur when the organisation defines the communication needs of different departments and the expected results of the communication. The research indicated that within the organisation, good communication during the introduction of new technology ensured that the employees utilized the information when making decisions. The result of proper communication is employee empowerment throughout the organisation.

On personal factors, the outstanding personal factor affecting adoption of technology in CEMASTEVA is age. The literature review identified old people as being resistant to technology change (Morris & Venkatesh, 2000) and also identified them as being used to non-technology solutions for business tasks. The fact that there is a difference between old people and young people in terms of their use of technology indicates a generational gap

within the workplace. Such a gap is likely to hinder the introduction of new technology at CEMASTEAM.

However, the research further indicated that personal beliefs are stronger indicators of the likelihood of accepting technology than age or gender (Al-Haderi, 2013). When the two factors are coupled, it shows that more research should be conducted to identify whether older people with high self-efficacy are a good fit for organisations that are undergoing technological changes. The essence of this is to identify whether even the older people in CEMASTEAM can reduce resistance to technological change if they have higher self-efficacy. This is an essential consideration for CEMASTEAM and any other organisation utilizing the results of this research to identify ways of reducing resistance to the introduction of technology. When people are not afraid of new technology, they are less likely to resist it, and they are more willing to try using new technology to improve their services. Improving self-efficacy is likely to lead to employees viewing technology as useful.

This is essential since, according to Al-Rahmi et al. (2019), adopting technology is dependent on the advantages individuals view as accompanying the technology. While it is true that ICT is likely to have a lot of benefits for CEMASTEAM, the employees must perceive these benefits in their places of work for them to reduce resistance to the introduction of technology. The failure to do this is likely to lead to resisting technology that might actually benefit the employees. While IT investment contributes to the overall improvement of CEMASTEAM, combining the investments in work practices, human capital, and company restructuring with IT investment is essential for stabilization and supporting future growth (Rivard & Lapointe, 2012).

The government and all relevant authorities should formulate and implement policies that will assist organisations to adopt and adapt to new technologies in a favourable and user-friendly environment. While CEMASTEAM might not directly influence government actions in terms of the policies made, it is a stakeholder in higher education. Already, policymakers are trying to be neutral in their policies concerning technology. However, this denies the opportunity for growth in various areas of ICT. Considering that Kenya mostly relies on importation of ICT equipment, it is essential for the government to create incentives for

importers. The government's actions affect the cost of products and the types of technology that are readily available to people. Further, since the government is a major stakeholder in infrastructure development, there is a need to influence policymakers to ensure that the infrastructure for the latest technology is available across the country. While CEMASTEAM is located in an urban setting that has good infrastructure, some of its clients are from rural areas that are poorly served by technology. This hinders such clients from enjoying the newly introduced technology in the institution.

The researcher established that, adoption of new technology brought about new collaborations and partnerships. Hao and Yu (2011) noted that ICT impacts the success of an organisation. The research did not delve into the implications of technology improvement in ensuring that stronger partnerships are maintained. Therefore, the employees will find a need for ICT introduction while the consumers, who in this case are students, will also benefit from timely and relevant information. Already, CEMASTEAM has improved its collaboration efforts in e-learning. Therefore, the organisation can go further in identifying new areas within the organisation where communication improvement using ICT may benefit it in achieving its overall goals.

5.6 Areas for Further Studies

Since this study did not consider all factors, it is recommended that another study be conducted focusing on such other factors in organisations for a more diverse perspective on the general influence of adoption of new technology.

A similar study should also be conducted in other organisations and the results compared. This will give insights as to the key improvements that may be required to enhance effectiveness in various areas in light of what is happening in other areas.

A survey of the factors influencing the adoption of new technology should be conducted across different sectors and companies.

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APPENDICES
APPENDIX I: QUESTIONNAIRE

Section 1: General Information

1. How old are you? _____
2. How many years have you worked with CEMASTEAM?
 - a) 1-3yrs
 - b) 3-5yrs
 - c) 6-10yrs
 - d) 11-15yrs
 - e) Above 15 years
3. Which department do you work in?
4. What is the latest technology introduced in your department?
5. Do you like it when a new technology is introduced in your organisation?

Yes

No

Section 2: Organisational Factors

In this section please tick (✓) the most appropriate response for each of the questions in the table below with the scores in the bracket. **Strongly agree = 5, Agree = 4, Don't Know = 3, Disagree =2 and Strongly Disagree = 1**

	Strongly Disagree	Disagree	Don't Know	Agree	Strongly Agree
Good training helps employees to adopt easily to a new technology					
When I participant in implementation of a new technology, I adapt fast					
How a new technology is communicated to me affects how I adapt to it?					
Leadership of our management affects the way I adapt to a new technology					
The cost of a new technology determines if our organisation will buy it or not					

Section 3: Personal Factors

In this section please tick (✓) the most appropriate response for each of the questions in the table below with the scores in the bracket. **Strongly agree = 5, Agree = 4, Don't Know = 3, Disagree =2 and Strongly Disagree = 1**

	Strongly Disagree	Disagree	Don't Know	Agree	Strongly Agree
My ages influences how I perceive a new technology					
Every new technology makes work easier for me					
My personal beliefs affect how I adapt to a new technology					

Section 4: Technological factors

In this section please tick (✓) the most appropriate response for each of the questions in the table below with the scores in the bracket. **Strongly agree = 5, Agree = 4, Don't Know = 3, Disagree =2 and Strongly Disagree = 1**

	Strongly Disagree	Disagree	Don't Know	Agree	Strongly Agree
Our current location of the offices affects how we get a new technology					
Government laws has had influence on adoption of a new technology in our institution					
We have good technological infrastructure in our premises					

Section 5: New Technology

In this section please tick (√) the most appropriate response for each of the questions in the table below with the scores in the bracket. **Strongly agree = 5, Agree = 4, Don't Know = 3, Disagree =2 and Strongly Disagree = 1**

	Strongly Disagree	Disagree	Don't Know	Agree	Strongly Agree
New technology increased students admissions					
New technology brought customer satisfaction					
New technology has helped in external ratings of CEMASTE A					
New Technology has helped in building collaborations					
New Technology has helped in building new partnerships					

APPENDIX II: APPROVAL LETTER



AFRICA NAZARENE
UNIVERSITY

26th, September 2017

E-mail: researchwriting.mba.nzu@gmail.com

Tel. 0202711213

Our Ref: 14S03DABA004

The Director,
National Commission for Science,
Technology and Innovation (NACOSTI),
P. O. Box 30623, 00100
Nairobi, Kenya

Dear Sir/Madam:

RE:RESEARCH AUTHORIZATION FOR: MS. ANN MWENDE KISAUMBI

Ms. Kisaumbi is a postgraduate student of Africa Nazarene University in the Master of Business Administration (MBA) program.

In order to complete her program, Ms. Kisaumbi is conducting a research entitled: "Factors Influencing the Adoption of New Technology in Organization: A Case of CEMASTE A"

Any assistance offered to her will be highly appreciated.

Yours Faithfully,

**PROF. ORPHA ONG'OTI,
PRINCIPAL: NAIROBI CBD CAMPUS.**

APPENDIX III: RESEARCH CLEARANCE PERMIT

THIS IS TO CERTIFY THAT:
MS. ANN MWENDE KISAUMBI
 of AFRICA NAZARENE UNIVERSITY,
 42493-100 Nairobi, has been permitted
 to conduct research in *Nairobi County*

Permit No : NACOSTI/P/17/44275/19766
 Date Of Issue : 15th November, 2017
 Fee Received :Ksh 1000

on the topic: **FACTORS INFLUENCING
 ADOPTION OF NEW TECHNOLOGY IN
 ORGANIZATIONS: A CASE OF CEMASTEVA**

for the period ending:
 14th November, 2018



[Handwritten Signature]

 Applicant's
 Signature

[Handwritten Signature]

 Director General
 National Commission for Science,
 Technology & Innovation

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