# FACTORS INFLUENCING ADOPTION OF ELECTRONIC DATA CAPTURING SYSTEMS BY TECHNOSERVE KENYA

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## RESEARCH PROJECT PRESENTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF BUSINESS ADMINISTRATION, SCHOOL OF BUSINESS, UNIVERSITY OF NAIROBI.

## DECEMBER 2018

# DECLARATION

This research project is my original work and has never been submitted for a degree in any other University.

Signed……………………….. Date ………………………

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This research project has been submitted for examination with my approval as a university supervisor.

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# ACKNOWLEDGMENTS

# DEDICATION

I would like to dedicate this work to my younger brother Mr. Paul Arthur Bulimu. You have all it takes to conquer this world brother. May God be your helper and guide and may he bless you abundantly.

# LIST OF ABBREVIATIONS AND ACRONYMS

**BA**          Business Advisor

**CEO**         Chief Executive Officer

**Comm**        Communication

**CRO**         Clinical Research Organizations

**EDC**         Electronic Data Capture

**EMR**         Electronic Medical Records

**HR**          Human Resources

**IT**          Information Technology

**M&E**         Monitoring and Evaluation

**M-Banking**   Mobile Banking

**MMRS**        Mosoriot Medical Recording System

**MSME**        Micro Small and Medium Enterprises

**MUFHS**       Moi University Faculty of Health Sciences

**NGO**         Non-governmental Organization

**ODK**         Open Data Kit

**Ph.D.**       Doctor in Philosophy

**PM**          Program Manager

**PMTCT**       Prevention of Mother to Child Transmission

**SBA**         Senior Business Advisor

**SME**         Small and Medium Enterprises

**TAM**         Technology Adoption Model

**TDT**         Technology Diffusion Theory

**TNS**         TechnoServe Inc.

**TNS-Kenya**   TechnoServe Kenya

**UTAUT**       Unified Theory of Acceptance and Use of Technology

# TABLE OF CONTENTS

# LIST OF TABLES

# LIST OF FIGURES

# ABSTRACT

Accurately captured data that leads to timely information places an organization in its contextual environment and offer, perceptions on how to conquer new markets, develop new products, grow and sustainably become profitable. The speed of acquisition of data, its collation, storage, and analysis to provide valuable information and wisdom is key in giving an organization competitive advantage in the market. There has been a rise in the use of various Electronic Data Capture (EDC) system technologies that could speed up the process of data collection, improve accuracy, the veracity of the data and shorten time to report writing considerably. The main objective of the study was to determine the factors that influence adoption of the EDC systems. The other objectives of the study were to establish the extent of adoption of electronic data capture, and the impact of adoption of electronic data capture systems. The study was anchored on the Unified Theory of Acceptance and Use of Technology (UTAUT), Technology Acceptance Model (TAM), and Technology Diffusion Theory (TDT). An exploratory cross-sectional survey design was used for the study. A census targeting 60 TechnoServe Kenya employees was conducted with the questionnaire being administered to TechnoServe-Kenya employees through the email method with a server link. The response rate for the administered questionnaire was 73.33%. The collected data was analyzed using frequency tables, descriptive statistics, factor analysis and cross-tabulation. The findings are presented using tables, bar-graphs and percentages. The study revealed that the top three electronic data capture systems that the respondents were aware of and used mostly were Google Forms, SurveyMonkey and ODK Collect. The results show that computer-based EDC systems were more preferable to the employees than mobile phone-based systems. It also reveals that most of the employees who used mobile based EDC systems preferred to use ODK Collect. The study showed that there are eight key factors that influence the adoption of EDC systems, which are: the functionality of the system, the organizational characteristics, support and influence of the top level management, perceived efficiency brought about by using the system, costs associated with the system, ease of learning how to use the system, the availability of equipment for the system and finally donor requirements. The biggest impacts of adoption of EDC systems were; improved data accuracy and increased efficiency at work. Based on the findings of the study, the recommendations were that TechnoServe-Kenya should choose appropriate EDC systems based on their functionalities for the different departments independently.

# CHAPTER ONE
# INTRODUCTION

## 1.1   Background of the study

Accurately captured data that provides timely information is the cornerstone of every successful business (Chen, Chiang, & Storey, 2012). This is because data gives a business an identity of whom they are and their position in the environment in which they operate. Accurately captured data can give an organization a true reflection of what is happening currently, what happened in the past and a forecast of how the future will look like. It is imperative that organizations put in place efficient and effective systems for data collection, collation, aggregation, storage, analysis, and use. In the past, a majority of the firms in agriculture, health, manufacturing, housing, transport, and other business sectors have been using pen and paper method of data collection and storage. In the past three decades, there have been several innovative data collection methods such as using mobile phones, tablets, and computers to collect data. Electronic Data Capturing (EDC) is currently used in various fields such as health, agriculture, education, transportation, finance, manufacturing, and housing (Anokwa, Hartung, & Brunette, 2009).

Data and information place an organization in its contextual environment and offers perceptions on how to conquer new markets, develop new products and business lines, grow and sustainably become profitable. The speed of acquisition of data, its collation, storage, and analysis to provide valuable information and wisdom is key in giving an organization competitive advantage in the market.  For a long time, organizations have been operating by developing paper and pen kind of tools. In the recent past though, there has been a rise in the use of various EDC technologies that could speed up the process of data collection, improve accuracy, the veracity of the data and shorten the time for report writing considerably.

Several factors influence people to adopt EDC systems and the study sought to find out what these are and be able to advise TechnoServe organization in the best utilization of these systems. The study used an exploratory survey design. To study factors that influence the adoption of EDC systems, the Unified Theory of Acceptance and Use of Technology (UTAUT), Technology Acceptance Model (TAM), and Technology Diffusion Theory (TDT) were used. These theories

have factors and variables that were useful in the construction of the conceptual framework, and a questionnaire for this study.

### 1.1.1 Electronic Data Capture Systems

Electronic data capture systems (EDC systems) are devices and applications that enable the data entry and sharing from the source of the data in near real time. Previously, the term EDC systems referred to computerized systems that were designed to collect and store patients' information electronically mainly for clinical trials. These systems have however become ubiquitous and used in several fields (Harris et al., 2009). Some of the fields that currently use electronic data capturing are agriculture, manufacturing, housing, education, transportation, and finance. Electronic Data Capture (EDC) is the collection of data in electronic form as opposed to paper and pen form (Walther et al., 2011). EDC systems come with different functionalities that need to be understood before a tool can be used. The ease of use, compliance with other systems, organizational policies on systems, the time taken from questionnaire development to use, the need for training and support, pricing, new features and versions, company history and cultural issues need to be considered before taking up EDC systems.

Welker, (2007) postulates that electronic data collection comprises of a device that is either stationary or portable such as a cell phone or a computer. The data collected has various features such as; photos, videos, audio, signatures, geo-points, qualitative, and quantitative. The enumerators use an interactive screen with various radio buttons to capture data. The tools have skip pattern logic, and constraints that are inbuilt and help to ensure the data collected is accurate and has veracity.

EDC systems can be used across the globe both online and offline. The internet connection is needed for downloading the applications and questionnaire forms. The devices can then be used in offline mode to collect data and thereafter, the data can be sent to a server using internet connection. These feature of EDC systems enable rapid scalability, quick study designs, improved data quality, easy data transfer and integration (Meyer et al., 2012).

### 1.1.2 Adoption of Electronic Data Capture Systems

Adoption is the selection and use of a technology by individuals or an organization. This is done through innovation, adoption, and diffusion. For technology adoption to be successful, the diffusion of the technology must get to a critical mass (Hall & Khan, 2002). Adoption of Electronic data capturing (EDC) systems by various entities such as governments, and non-governmental institutions has increased rapidly (Borras, 2004). Perceived benefits, external pressure, and stimulus from the society have a significant positive relationship between the firms' decision to adopt these EDC systems (Tung & Rieck, 2005).

A Thai study by Narattharaksa, Speece, Newton, and Bulyalert, (2016), investigating the key success factors behind electronic medical record (EMR) adoption in Thailand, used a qualitative approach to interview 1,069 medical personnel. The study found 12 key elements were essential in the successful implementation of EMR which were related to managing the implementation process and IT expertise. Although the findings were clearly separated to managerial and IT dimensions, the managerial dimensions were found to be more critical in influencing the adoption of EMR systems.

Chau and Tam, (1997) posited in their study exploratory on the factors affecting the adoption of open systems that organizations usually focus more on the ability to adopt rather than the benefits from adoption of systems. They also asserted that organization most often take a reactive rather than a proactive approach in the adoption of systems. After in-depth interviews with 89 senior executives responsible for managing IT in their organizations, they resolved that issues such as compatibility and interoperability of systems, as well as scalability and efficient use of IT resources can be resolved by setting and strictly following software and hardware standards for both development and management.

### 1.1.3 Impact of Adoption of EDC Systems

Electronic Data Capture has made it cheaper and more convenient for the interviewer and interviewee to conduct surveys (Sproull, 1986). EDC is capable of reducing data collection costs by 55% (Pavlović, Kern, & Miklavčič, 2009). The use of electronic data collection leads to fewer missing responses as questions have to be answered compulsorily before moving to consequent

parts of the questionnaire, and that it has more flexibility such as change of language and logical skip patterns for questions (Boyer, Olson, Calantone, & Jackson, 2002).

A crossover randomized trial study on handheld versus laptop computers for electronic data collection in clinical research found out that electronic mode of data capturing significantly reduced the recording processes, it also improves data accuracy by reducing typing errors. The level of missing data is also statistically significantly reduced, and that electronic data entry is perceived to be faster and more satisfying (Haller, Haller, Courvoisier, & Lovis, 2009a).

### 1.1.4   TechnoServe Organization

TechnoServe (TNS) is a non-profit organization, founded by Ed Bullard in 1968. Currently, TechnoServe works in 29 countries around the world, with a staff population of 1,300. The focus of the organization is to help alleviate poverty. TechnoServe works with enterprising businesses, institutions and farms to grow sustainable businesses and markets that help to create incomes, jobs, and wealth. TechnoServe works in three main areas, which are capacity building by linking individuals and communities to technology, new skills, and knowledge, secondly, it also helps to catalyze markets and build market connections by coordinating various industry players from the primary producer to consumers. Lastly, TechnoServe works to link the clients and beneficiaries to financial markets and institutions and addresses policy issues to enable better functioning of market actors in various value chains.

TechnoServe carries out this work through a portfolio of projects. This work requires that TechnoServe staffs have to collect data at various stages of project implementation. This includes conducting feasibility studies, baseline survey, mid-term surveys and the end of project evaluations. TechnoServe also has to carry out monitoring of the projects, which involves regular data collection. TechnoServe has various departments such as Human Resources, Finance, Procurement, Administration, Project Management, Business Advisory, Monitoring and Evaluation, and other support staff. Staffs collect data at various stages of conducting their jobs. The data could be collected by both pen and paper method or through EDC. Due to the challenges posed by paper and pen kind of data collection versus benefits to be accrued from the adoption of EDC systems, the researcher would like study factors influencing the adoption of EDC systems.

## 1.2    Research Problem

Electronic data capturing (EDC) systems using mobile phones and computers is gaining momentum in the world. EDC systems increase efficiency in data collection, reduce errors, and increase the speed of conducting surveys and enhancing data security. Currently, there are a number of mobile applications used to collect data such as ODK Collect, Askia Face, SurveyToGo, SurveyCTO, CommCare as well as using emails such as Google Forms and SurveyMonkey. Electronic Data Capture (EDC) is widely used across the globe from Africa to India to China to the USA. Over fifty companies are listed on the Open Data Kit (ODK) site as users of the EDC system. Some of these companies are  Moeen IT from Sudan, MobileWorks from South America, Vera Solutions which has members in Mumbai, Boston, Cape Town and Geneva, E-Health Nigeria, and CityPulse in Pakistan (Borriello, 2011).

A study on gender differences influencing the adoption of technologies by individuals was conducted using the theory of planned behavior longitudinally. Research findings indicated that male adoption and continued use of technology was strongly influenced by the assertiveness towards the new technology, whereas females were more heavily inclined to take up technologies based on the individual norms and seemingly behavioral control (Viswanath Venkatesh, Morris, & Ackerman, 2000b).

Age differences as a factor of adoption of technologies have been studied using the theory of planned behavior. The study investigated the adoption and continued use of technology at work. They found that younger workers were more strongly influenced by the approach, whereas elder workers were more stalwartly influenced by particular rules (M. G. Morris & Venkatesh, 2000).

In Kenya, Lule and Mwololo Waema (2012), did a survey to investigate how M-Banking in Kenya was influenced by the application of the technology acceptance model. They found that M-Banking uptake was still low despite efforts from financial institutes and mobile phone service suppliers coming together to promote it. The study focused on M-banking and M-Kesho technologies. Their research findings were that the customers' perception of how easy it is to use,

the usefulness of the technology, and the credibility of the platform played a big role in taking up and using M-Banking.

Indiana University together with Moi University Faculty of Health Sciences (MUFHS) did a study on the implementation of a health system in a remote village called Mosoriot. The study focused on designing an automated medical recording method at the Mosoriot Health Center. This was meant to fasten data collection, enhance the eminence of health data collection, and subsequently improve how patients are cared for (Hannan et al., 2000).

Although studies focusing on information technology adoption in numerous fields and using different theories and variables have been conducted, there has not been any study focusing on the non-governmental sector type of information technologies and their adoption and impact on the organizations. It was imperative that a survey is conducted in this important sector to ascertain factors that influence the adoption of information technology and the impact of such adoption. This survey will also focus on the various information technologies available for electronic data capture and how employees perceive them. Therefore, the researcher would like to find out the factors that could lead to the adoption of electronic data capture technologies, by non-governmental institutions such as TechnoServe. Technoserve has been selected for this study because it is an innovative company that needs to be abreast of the external environment and be informed of its internal capabilities in order for it to be competitive in the NGO industry.

## 1.3   Research Objective

The main objective of this study was to establish the factors influencing adoption of electronic data capturing systems by TechnoServe-Kenya staffs.

### 1.3.1   Specific objectives

   i.   To establish the extent of adoption of EDC systems in TechnoServe-Kenya

  ii.   To determine the factors that influence adoption of EDC systems in TechnoServe-Kenya

 iii.   To establish the impact of adoption of EDC systems in TechnoServe-Kenya

## 1.4 Value of the study

This study is particularly valuable in providing a theoretical understanding of EDC systems and improving the use of the systems by different parties. The study builds on knowledge of the existing EDC systems and addressed gaps in the factors influencing the adoption of the EDC systems. It also provides a platform for further research on EDC systems. The study will be beneficial to organizations that are both for profit and not for profit, public and private, governmental and non-governmental, research and development institutions and universities in planning for EDC systems adoption.

It would also be beneficial to universities and other research and development institutions who wish to condense the time between questionnaire design, interviewing, data entry, cleaning, analysis, visualizations, interpretation, and reporting. By reviewing the curriculum and introducing this topic of EDC systems, universities will be able to churn out students with versatile skills of data collection. This will increase the capacities of the students and they will be able to add value to their employers or their businesses upon graduation. The study would also serve as a basis for further research on these electronic data capturing systems and enable the developers to make them more user-friendly.

# CHAPTER TWO

# LITERATURE REVIEW

## 2.1   Introduction

This chapter presents a review of related studies that cover the adoption of technology in different industries. The chapter provides a theoretical, and an empirical reviews of theories and studies relevant to this study. The conceptual framework and research gaps are provided herein.

## 2.2   Theoretical Review

Information Technology adoption can be explained by three main theories; namely the Unified Theory of Acceptance and Use of Technology (UTAUT), Technology Acceptance Model (TAM), and Technology Diffusion Theory (TDT).

### 2.2.1   Unified Theory of Acceptance and Use of Technology

This theory holds that how people expect the technology to perform, the level of effort required using the technology, social influence such as perception of peers and the facilitating conditions are the main factors towards acceptance of the technology. The first three factors illustrate usage intention and behavior while the last one gives the user behavior. The relevance of this theory to the study is that it gives us functional variables to pursue in establishing why staffs of different firms adopt different information technology.

Variables such as gender proportions, age differences, and expertise of the workers and voluntariness of use moderate the four focal concepts. The theory was developed after an evaluation of eight other theories namely; theory of reasoned action, technology acceptance model, motivational model, the theory of planned behavior, a combined theory of planned behavior and technology acceptance model, the model of personal computer use, diffusion of innovation theory, and social cognitive theory. Nearly 70% of peoples usage of technology could be explained by this theory, as well as nearly 50% of actual use (V Venkatesh, Morris, Davis, & Davis, 2003). Lescevica, Ginters, and  Mazza, (2013) used the theory to study market analysis for a product known as "FP7 Choreos". The objective of the study was to establish exploitable choreos products, methods, and market trends that might feat them. UTAUT was also used in a study known as "An International Comparison of Technology Adoption: Testing the UTAUT model" where a

8

comparison of MP3 players usage and adoption of internet banking were examined under the model in Korea and the United States of America.
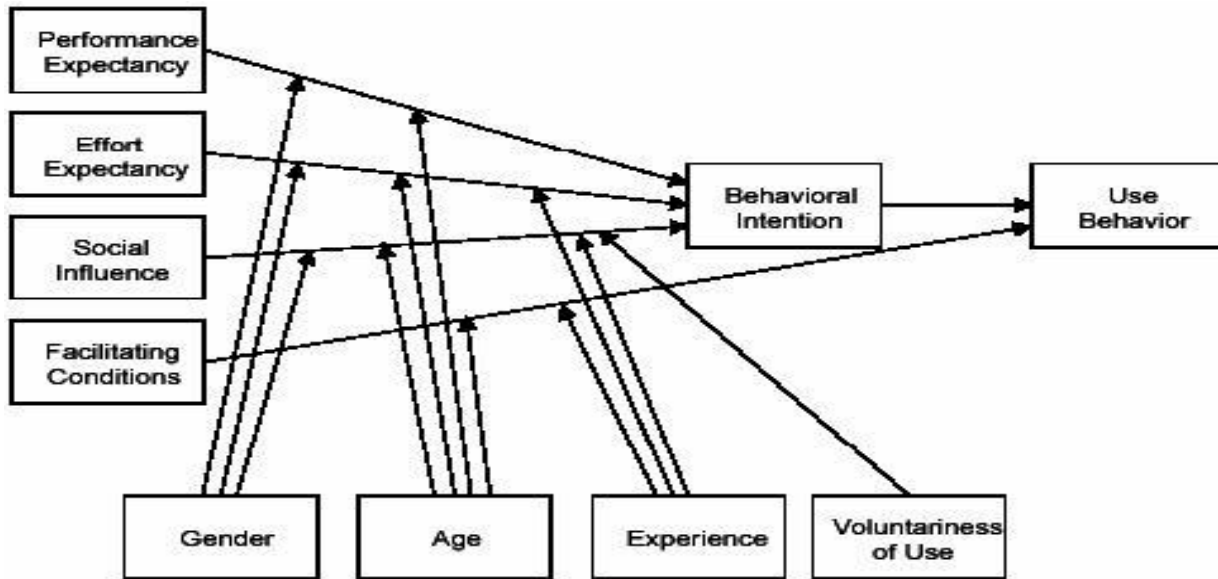


**Figure 2.1: Unified Theory of Acceptance and Use of Technology (UTAUT)**

### 2.2.2 Technology Acceptance Model

This theory models the path users take in acceptance and usage of a technology. TAM was offered by Davis in 1989 and is founded on the theory of reasoned action. It comprises two beliefs, which are how users perceive the usefulness and how easy it is to use a technology. These two beliefs feed into attitudes to adopt new technologies. The theory is useful for this study as it helps us formulate variables that could explain why TechnoServe staffs would perceive EDC to be useful. In addition, how they would find it easy to use the proposed technology.

Several studies have used this theory, such as "The Technology Acceptance Model: Its past and its future in Health Care", where the researcher conducted secondary data collection on clinics that were using healthcare IT. The studies diverged significantly in samples and backgrounds, the kind of health IT studied, models of the research, the relationships tested, and types of hypothesis

operationalization, the findings were that TAM forecasts a significant portion of acceptance of healthcare IT. The theory needed additions and modifications though (Holden & Karsh, 2010).
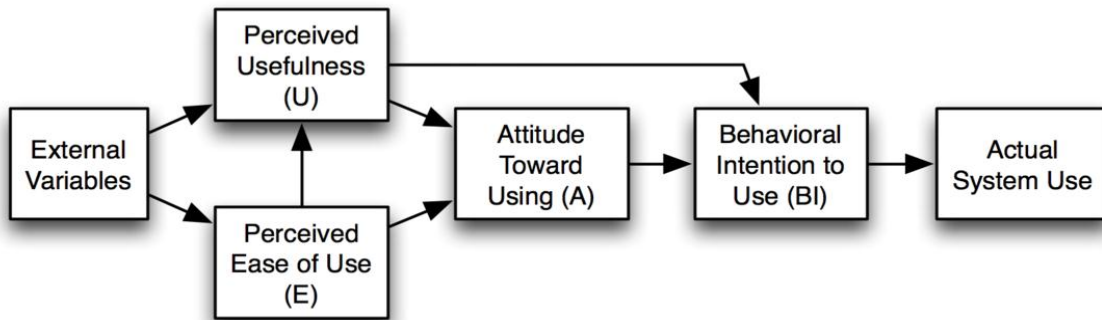


**Figure 2.2: Technology Acceptance Model (TAM)**

### 2.2.3   Technology Diffusion Theory

This theory explains the methods and the reasons why and the speed at which new ideas and technology spread. Technology Diffusion Theory (TDT) holds in this study, as it will help categorize employees. Everett Rogers popularized the theory.   The theory suggests how technology is transferred over a particular period among societal members.

For the diffusion of ideas to occur, four core elements are thought to play significant roles which are; the innovation itself, transmission channels, the period, and the society. The innovation must be widely adopted and reach a critical mass in order to be sustainable, a process that requires intense human capital. Attewell, (1992), suggested that the overriding explanation for the extent of technological innovations highlights procedures of sway and evidence drift. He further suggested that companies that have pre-existing users of their technologies, learn about the new technologies faster and adopt them, whereas firms that are at the periphery of communications with their uses have a slower movement of their technologies.

Gatignon and Robertson (1989) conducted a study on the effects of competition on how organizations take up new technologies. Their findings were that firms with the highest adoption rates of innovation are in concentrated industries with restricted price intensity and those incentives offered by suppliers and networks with buyers are vital in realizing adoption. The study explained further that adopters could be differentiated from non-adopters by how they process information.
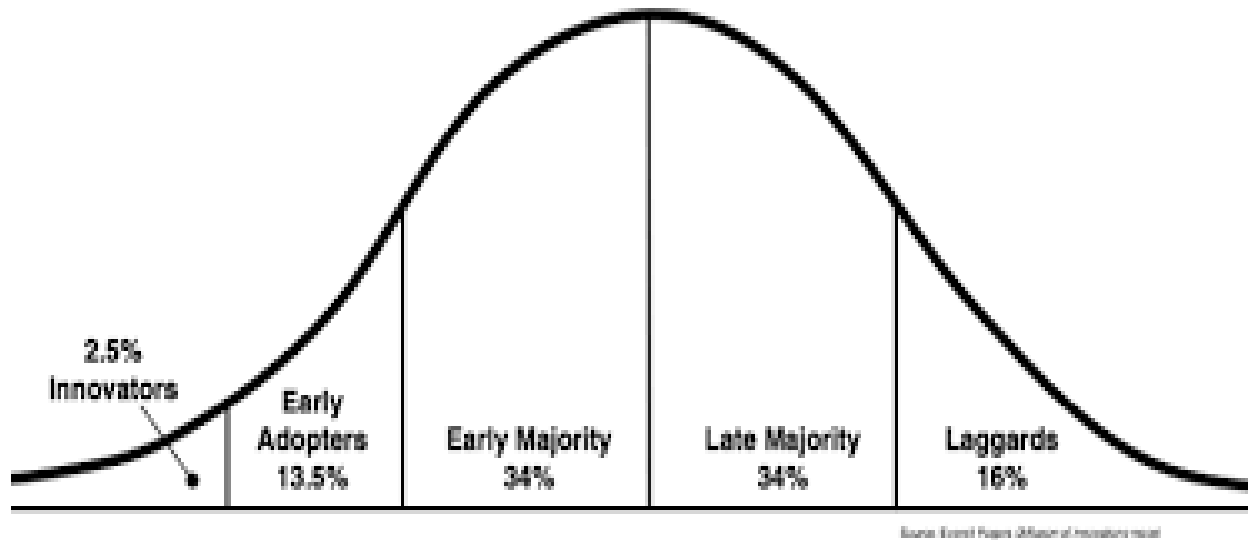


**Figure 2.3: Technology Diffusion Theory (TDT)**

## 2.3 Empirical Review

An Australian study was undertaken on how Micro Small and Medium Enterprises (MSME) should structure their adoption of IT. The researcher sought ideas of proprietors and executives of MSME on ten issues representing contemporary IT adoption. The study posits that there are three phases in the adoption of an innovative information technology by a firm. These are that firms have to assess the benefits of IT and the organization culture and suitable type of IT required by the firm. Secondly, the firms have to look at the obtainability of means and procedures necessary for the successful implementation of IT. Lastly, the Small and Medium Enterprises (SME) had to look at the external environment for support resources if there were insufficient internal resources. The study found that following each step reduced the risks associated with the acquisition and adoption of innovative IT (Fink, 1998).

Thong carried out a study on chief executive officer (CEO) individualities, organizational characteristics and IT adoption in MSME and found two main variables in innovation adoption. These are individual and organizations characteristics. The paper examined three characteristics of the CEOs, which were how innovative were they in terms of IT, their general attitude towards the adoption of IT, and their IT familiarity. The study also looked at the sizes of their businesses, how competitive was the business environment and information intensity for the organizational characteristics. The study suggested that CEO characteristics are significant factors affecting IT implementation in small businesses. It further suggests that MSME are more likely to adopt IT if the CEOs are more inventive, have an affirmative attitude and good knowledge of IT (Thong & Yap, 1995).

A survey on why salespeople adopt information technology found that adoption of IT technology was strongly depended on their perceptions on how the technology enhances their performance, their personal innovativeness and the training they got due to organizational efforts. It was suggested that managerial participation in the adoption process enhanced the uptake of IT technology. Finally, the study found that the threat from competing salespeople using similar technology was of secondary importance in taking up of IT technology (Schillewaert, Ahearne, Frambach, & Moenaert, 2005).

An investigation of hospitals' adoption of IT and the association between organizations and market factors found out that strategic IT was mostly adopted by hospitals with higher overall IT adoption whereas administrative IT was adopted by hospitals with lower IT adoption. The hospital scope, its locality, the system membership, proprietorship, and market rivalry positively influenced IT adoption (Burke, Wang, Wan, & Diana, 2002).

A Kenyan study on the use of individual digital assistants for data collection in a contagious and fatal illness, worked within a large Prevention of Mother to Child Transmission (PMTCT) working with a PDA-based data collection system. They used a sample of 1270 participants and their results showed that they had lower costs of implementation of their project, time for data entry was significantly reduced and the data quality was greatly enhanced (Onono, Carraher, Cohen, Bukusi, & Turan, 2011).

A study was carried out to determine the adoption of e-procurement by large manufacturing firms in Nairobi, Kenya. The other objectives of the study were to establish the critical success factors and challenges of the adoption of the e-procurement systems. This was a cross-sectional survey that adopted a descriptive approach. The sample size was 46 out of a population of 455 large manufacturing companies. The study revealed a high level of adoption of e-procurement practices. The success factors for adoption were determined to be top-level management support, monitoring the system performance, and user acceptance of the system.  (Mose, Njihia, & Magutu, 2013).

## 2.4    Conceptual Framework

This shows the relationship between the variables. The independent variables are demographic characteristics of the employees and the factors posited by the UTAUT and TAM theories. The dependent variable is the adoption of electronic data capturing systems.

**Employee Characteristics**:
Age, gender, experience, department, training on EDC, TNS enforcement of EDC, Personal curiosity of EDC

**Factors Influencing Adoption of Technology**
Ease of use, compliance with other systems, TNS policies, length of project implementation, need for training and support, price of EDC systems, new features and versions, company history and culture, perceived benefits, external pressures, social influence, different department requirements, attitudes towards new technology, norms and regulations, performance expectancy, communication channels, the size of the organization, perceived benefits of the systems

Adoption of Electronic Data Capturing Systems (Google Forms, Survey Monkey, ODK Collect, SurveyToGo, SurveyCTO)

**Figure 2.4: Conceptual Framework**

# CHAPTER THREE
# RESEARCH METHODOLOGY

## 3.1   Introduction

This chapter discusses how the study was designed, the population used for the study, how data was collected and analyzed.

## 3.2   Research Design

An exploratory cross-sectional survey was carried out to determine factors influencing the adoption of electronic data capturing systems in TechnoServe Kenya. A cross-sectional study is one where data is collected at a particular point in time (Gelman, 2004).

## 3.3   Population

The population for this study was 60 employees of TechnoServe-Kenya. A census was conducted for all the departments in TechnoServe-Kenya. These included the employees in the administration department the communications department, the finance department, the procurement department, the human resource department, and the project implementation department.

## 3.4   Data Collection

The study used both quantitative primary data that was collected using a structured questionnaire. The first section of the questionnaire captured the demographics and general information, the second section was on awareness and adoption of EDC systems, the third section was on factors that were perceived to influence adoption of EDC systems, the fourth section was on impact of adoption of EDC systems. Lastly, there was a question on any other information the respondent was willing to give about EDC systems adoption. The third and fourth sections of the questionnaire used a Likert scale of 1 to 5 to capture the perceptions of the respondents. The questionnaire was administered to TechnoServe-Kenya staffs through an email that contained a link to the server hosting the google form questionnaire.

## 3.5   Data Analysis

To establish the extent of adoption of EDC systems in TechnoServe Kenya, frequency and cross-tabulation analysis were used. Factor analysis was used to establish the factors that influence adoption of EDC systems in TechnoServe-Kenya. While impact of adoption of EDC systems was analyzed using cross-tabulations.

# CHAPTER FOUR

# DATA ANALYSIS, FINDINGS AND DISCUSSIONS

## 4.1   Introduction

This chapter presents the findings of the study and the discussions on the findings. The results are presented based on the objectives of the study. The three objectives of this study were to establish the extent of adoption of electronic data capture (EDC) systems in TechnoServe (TechnoServe) Kenya, to establish the factors that influence the adoption of EDC systems by TechnoServe Kenya, and lastly was to establish the impact of adoption of EDC systems in TechnoServe Kenya.

## 4.2   Response Rate

Out of the targeted population of 60 TechnoServe employees, 44 of them responded to the administered questionnaire. This represents 73.33% of the population. According to Baruch and Holtom, (2008), the average response rate for organizational studies is 35.7%. This, therefore, means that the response rate is good enough to proceed with further analysis.

## 4.3   Respondents Demographics
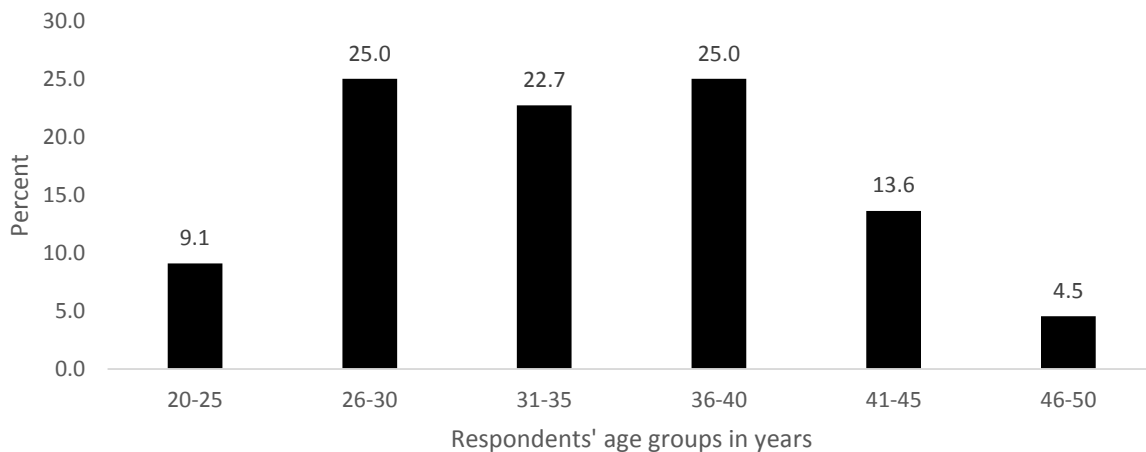


**Figure 4.1: Distribution of the respondents by age**

Source (Researcher, 2018)

Figure 4.1 above reveals an almost normal distribution of the respondents by their age groups. Most of the employees at TechnoServe are between 26 to 45 years of age.

**Table 4.1: Distribution of respondents by gender**

| Gender | Frequency | Percent |
|--------|-----------|---------|
| Female | 15 | 32.61% |
| Male | 31 | 67.39% |
| Total | 44 | 100.00% |

Source (Researcher, 2018)

Table 4.1 above shows that male respondents represented a majority (67.39%) of the workforce at TechnoServe.
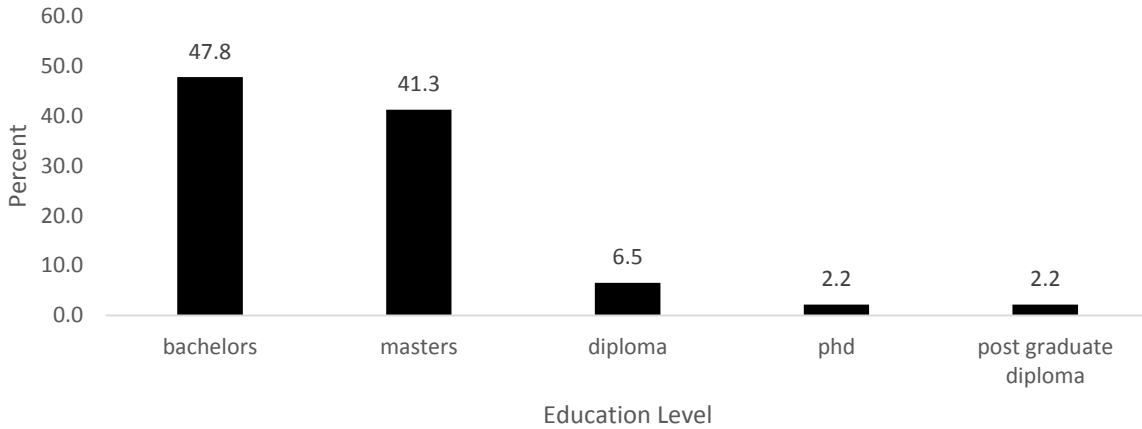


**Figure 4.2: Distribution of respondents by education level**

Source (Researcher, 2018)

Figure 4.2 reveals that majority of the respondents (47.8%) had a bachelors' degree while very few of the respondents have a Ph.D. 2.2% or a post-graduate diploma 2.2%. Analysis of the data on the current job designation of employees at TechnoServe reveals that 31.8% of the respondents were in monitoring and evaluation (M&E), 20.5% were business advisors (BA), and 13.6% came from the administration department which included the top level management while another 13.6% came from the finance department, 9.1% of the respondents were in project management, 4.5% came from the communications department while a further 4.5% are senior business advisors (SBA). Finally, 2.3% of the population came from the human resources (HR) department.

## 4.4 The extent of Adoption of EDC Systems in TechnoServe-Kenya

### 4.4.1 Awareness Level of EDC Systems

The study revealed that the top three EDC systems that the respondents are aware of are Google Forms, SurveyMonkey and ODK Collect in descending order. Table 4.2 below gives the distribution of awareness of the EDC systems

**Table 4.2: Distribution of awareness of different EDC systems**

| EDC Systems | Frequency | Percent |
|---|---|---|
| SurveyMonkey | 30 | 27.0 |
| Google Forms | 29 | 26.1 |
| ODK Collect | 26 | 23.4 |
| CommCare | 14 | 12.6 |
| SurveyCTO | 6 | 5.4 |
| SurveyToGo | 5 | 4.5 |
| None | 1 | .9 |
| Total | 111 | 100.0 |

Source (Researcher, 2018)

There were statistically significant differences with a chi-square value of 11.726 and (p=0.039) between age groups and awareness of ODK Collect were 72.7% of the respondents stated that they were unaware of the system came from the age group of 26-30 years and 100% of the respondents between 46-50 years were aware of the system. Gender also presented statistically significant differences, with a chi-square value of 15.749 and (p=0.028), 42.9% for female and 76.7% for male were aware of ODK Collect.

### 4.4.2 Use of Different EDC Systems at TechnoServe-Kenya

**Table 4.3: Distribution on use of different EDC systems by respondents**

| EDC Systems | Frequency | Percent |
|---|---|---|
| SurveyMonkey | 30 | 27.0 |
| Google Forms | 29 | 26.1 |
| ODK Collect | 26 | 23.4 |
| CommCare | 14 | 12.6 |
| SurveyCTO | 6 | 5.4 |
| SurveyToGo | 5 | 4.5 |
| None | 1 | .9 |
| Total | 111 | 100.0 |

Source (Researcher, 2018)

Table 4.3 shows that the three most commonly used EDC systems are SurveyMonkey (n=30, 27%), Google Forms (n=29, 26.1%) and ODK Collect (n=26, 23.4%). The study also revealed statistically significant differences with a chi-square value of 15.767, (p=0.027) among different departments and employees who used none of the EDC systems. The employees who used none of the EDC systems came from the Finance (100%) and Project Management (100%) departments. All the other departments had use of EDC systems. This is attributed to their day to day jobs that do not require data collection and entry.

**Table 4.4: Job Category versus which EDC system to enforce**

| Job Category/ EDC System | Admin | Comm | Finance | HR | M&E | BA | SBA | PM |
|---|---|---|---|---|---|---|---|---|
| CommCare | 22.2% | | 11.1% | | 55.6% | | | 11.1% |
| Google Forms | | | 25% | | | 75% | | |
| None | 25% | 25% | 25% | | 25% | | | |
| ODK Collect | 18.2% | | 9.1% | 9.1% | 36.4% | | | 27.3% |
| SurveyCTO | | | | | 66.7% | | 33.3% | |
| SurveyMonkey | | 20% | 20% | | | 40% | 20% | |
| SurveyToGo | 25% | | | | 50% | 25% | | |
| Total | 13.6% | 4.5% | 13.6% | 2.3% | 31.8% | 20.5% | 4.5% | 9.1% |

Source (Researcher, 2018)

Table 4.4 reveals that there is also a statistically significant difference, with a chi-square value of 58.450 and (p=0.047) among departments and the system they would like TechnoServe to enforce the use of. ODK Collect, CommCare, and SurveyMonkey have support in at least four departments. The number of years that employees have worked at TechnoServe also revealed statistically significant differences, with a chi-square value of 22.465 and (p=0.049) on the EDC systems suggested for enforcement.

## 4.5 Factors Influencing the Adoption of EDC Systems in TechnoServe-Kenya

### 4.5.1 Introduction

To determine the factors that influence adoption of EDC systems in TechnoServe-Kenya, a Likert Scale was prepared by consideration of various factors that might be related to adoption of EDC systems. The values in the Likert scale ranged from 1 to 5, where 1 represented "strongly disagree",

2 represented "disagree", 3 represented "neutral", 4 represented "agree", and 5 represented "Strongly Agree". The respondents were given an option to select only one response per question. A dimension reduction analysis using factor analysis was used to analyze the 28 variables that had been picked earlier.

### 4.5.2    Mean and Standard Deviation of Values in the Likert Scale

The findings were interpreted as a range because of the means from the values in the Likert Scale. Values that fall between 1 – 1.4 were interpreted as "strongly disagree", those that fell between 1.5 – 2.4 was interpreted as "disagree", values between 2.5 – 3.4 were interpreted as "neutral", those values between 3.5 to 4.4 were interpreted to mean "agree" and 4.5-5 meant "strongly agree", finally, 6 stood for "I do not know".

**Table 4.5: Descriptive Statistics of the Factors**

| Factors | Mean | Std. Deviation |
|---|---|---|
| The ease of integration of the EDC system with other systems used in TechnoServe for data management is a major influence on which EDC system to adopt | 4.59 | 0.816 |
| The data security features of a particular EDC system is a major factor for consideration in the adoption of a system | 4.52 | 0.698 |
| The initial purchase cost of Electronic Data Capture (EDC) systems is a major factor in adopting a particular EDC system | 4.50 | 1.110 |
| Maintenance cost of a particular EDC system is a determinant on which system to adopt | 4.36 | 0.892 |
| The speed of conversion of questionnaires into useable EDC format is a major influence on which system to use | 4.36 | 0.967 |
| The availability of equipment required for EDC systems is a major factor in the adoption of a particular EDC system | 4.32 | 0.771 |
| The level of trust one has in a particular system concerning data is a major influence on which system to adopt | 4.23 | 0.886 |
| The extent to which the EDC system use leads to  minimization of missing responses is a major factor to consider in the adoption of an EDC system | 4.23 | 1.054 |
| The ease of learning how to use a particular system is a major influence on which EDC system to adopt | 4.20 | 0.904 |
| The level of support offered for any EDC system is a major influence on which one to adopt | 4.18 | 0.724 |
| The speed with which I expect to accomplish data collection tasks by using an EDC system is a major factor in the adoption of the system | 4.18 | 0.922 |

| Factors | Mean | Std. Deviation |
|---|---|---|
| Cost of training on specific EDC systems is a major factor in the adoption of a particular system | 4.16 | 1.160 |
| Partners/donors requirements influence the adoption of a particular EDC system | 4.05 | 1.099 |
| The frequency with which new versions of EDC systems are released is a major factor to consider when taking up a system | 3.91 | 1.074 |
| How information on the functionalities of a particular system are publicized is a major factor in the adoption of the system | 3.84 | 1.119 |
| The perception that adoption of a particular EDC system would provide TechnoServe with a competitive advantage is a major factor in the adoption of the system | 3.84 | 1.160 |
| Top level management influence which EDC system to adopt | 3.80 | 1.304 |
| Different departments day to day jobs consideration is a major factor in which EDC system to adopt | 3.77 | 1.217 |
| The duration of a project is a major factor to consider in choosing which EDC to adopt | 3.70 | 1.340 |
| The computer skills of a particular individual are key in influencing adoption of any EDC systems | 3.70 | 1.091 |
| The non-governmental organizations adopting a particular EDC system is a major influence on which system to adopt | 3.66 | 1.119 |
| The willing attitude of TechnoServe staffs to learn new ways of working is a major factor in the adoption of EDC systems | 3.66 | 1.160 |
| The extent to which use of a particular EDC system is perceived to supersede the other data collection systems is a major factor in the adoption of the system | 3.61 | 1.083 |
| Amount of free trial period offered by a particular EDC system is a major factor for consideration in adopting a system | 3.11 | 1.298 |
| My personal decisions are a major factor in which EDC system to adopt | 3.05 | 1.238 |
| The number of staff in TechnoServe is a major factor in the adoption of a data collection system | 2.91 | 1.217 |
| The annual turnover of TechnoServe is a major factor in the adoption of a data collection system | 2.84 | 1.493 |
| My peer's influence which EDC system I adopt | 2.77 | 0.985 |

Source (Researcher, 2018)

Table 4.5, posits that the top three factors that the respondents strongly agreed that they influence the adoption of electronic data capture systems were; ease of integration with other systems currently in use which had a mean of 4.59, the data security features offered by a particular EDC system which had a mean of 4.52 and the cost of initial purchase of a particular EDC system with a mean of 4.50. The factors with the lowest scores which were interpreted to mean that the

respondents were neutral on them were; the number of staff that TechnoServe has with a mean of 2.91, the annual turnover of TechnoServe with a mean of 2.84 and peer influence with a mean of 2.77. The high standard deviations on the last three values indicate that the respondents had very varied opinions on these factors influencing adoption of EDC systems by TechnoServe-Kenya staff.

### 4.5.3  Communalities

Table 4.6 below gives patterns of relationships between variables using communalities.

**Table 4.6: Communalities**

| Factors | Initial | Extraction |
|---|---|---|
| The ease of learning how to use a particular system is a major influence on which EDC system to adopt | 1.000 | .870 |
| Partners/donors requirements influence the adoption of a particular EDC system | 1.000 | .852 |
| Top level management influence which EDC system to adopt | 1.000 | .841 |
| The initial purchase cost of Electronic Data Capture (EDC) systems is a major factor in adopting a particular EDC system | 1.000 | .832 |
| The speed of conversion of questionnaires into useable EDC format is a major influence on which system to use | 1.000 | .822 |
| The availability of equipment required for EDC systems is a major factor in the adoption of a particular EDC system | 1.000 | .815 |
| The computer skills of a particular individual are key in influencing adoption of any EDC systems | 1.000 | .811 |
| The annual turnover of TechnoServe is a major factor in the adoption of a data collection system | 1.000 | .801 |
| Maintenance cost of a particular EDC system is a determinant on which system to adopt | 1.000 | .774 |
| The non-governmental organizations adopting a particular EDC system is a major influence on which system to adopt | 1.000 | .760 |
| The speed with which I expect to accomplish data collection tasks by using an EDC system is a major factor in the adoption of the system | 1.000 | .757 |
| The number of staff in TechnoServe is a major factor in the adoption of a data collection system | 1.000 | .751 |
| Cost of training on specific EDC systems is a major factor in the adoption of  a particular system | 1.000 | .744 |
| The perception that adoption of a particular EDC system would provide TechnoServe with a competitive advantage is a major factor in the adoption of the system | 1.000 | .743 |
| The duration of a project is a major factor to consider in choosing which EDC to adopt | 1.000 | .731 |

| Factors | Initial | Extraction |
|---|---|---|
| The data security features of a particular EDC system is a major factor for consideration in the adoption of a system | 1.000 | .724 |
| My peer's influence which EDC system I adopt | 1.000 | .720 |
| The level of support offered for any EDC system is a major influence on which one to adopt | 1.000 | .709 |
| My personal decisions are a major factor in which EDC system to adopt | 1.000 | .698 |
| The level of trust one has in a particular system concerning data is a major influence on which system to adopt | 1.000 | .694 |
| The extent to which the EDC system use leads to minimization of missing responses is a major factor to consider in the adoption of an EDC system | 1.000 | .693 |
| Different departments day to day jobs consideration is a major factor in which EDC system to adopt | 1.000 | .678 |
| How information on the functionalities of a particular system are publicized is a major factor in the adoption of the system | 1.000 | .670 |
| The willing attitude of TechnoServe staffs to learn new ways of working is a major factor in the adoption of EDC systems | 1.000 | .659 |
| Amount of free trial period offered by a particular EDC system is a major factor for consideration in adopting a system | 1.000 | .655 |
| The extent to which use of a particular EDC system is perceived to supersede the other data collection systems is a major factor in the adoption of the system | 1.000 | .641 |
| The ease of integration of the EDC system with other systems used in TechnoServe for data management is a major influence on which EDC system to adopt | 1.000 | .597 |
| The frequency with which new versions of EDC systems are released is a major factor to consider when taking up a system | 1.000 | .595 |

Source (Researcher, 2018)


### 4.5.4   Factor Extraction

Values that had eigenvalues of greater than one were extracted. Eight groups of factors out of the 28 were identified to influence adoption of EDC systems. These factors had a cumulative value of 73.709% meaning they could explain nearly 74% of all variance in the factors that influence adoption of EDC systems by TechnoServe-Kenya. Table 4.7 below provides the factor extraction.

**Table 4.1: Factor Extraction (Total Variance Explained)**

| Component | Initial Eigenvalues | | | Extraction Sums of Squared Loadings | | |
|---|---|---|---|---|---|---|
| | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % |
| 1 | 8.699 | 31.069 | 31.069 | 8.699 | 31.069 | 31.069 |
| 2 | 2.641 | 9.432 | 40.502 | 2.641 | 9.432 | 40.502 |
| 3 | 2.193 | 7.833 | 48.335 | 2.193 | 7.833 | 48.335 |
| 4 | 1.743 | 6.225 | 54.560 | 1.743 | 6.225 | 54.560 |
| 5 | 1.584 | 5.659 | 60.218 | 1.584 | 5.659 | 60.218 |
| 6 | 1.327 | 4.741 | 64.959 | 1.327 | 4.741 | 64.959 |
| 7 | 1.248 | 4.456 | 69.415 | 1.248 | 4.456 | 69.415 |
| 8 | 1.202 | 4.294 | 73.709 | 1.202 | 4.294 | 73.709 |
| 9 | .933 | 3.333 | 77.042 | | | |
| 10 | .817 | 2.918 | 79.960 | | | |
| 11 | .770 | 2.748 | 82.709 | | | |
| 12 | .742 | 2.651 | 85.359 | | | |
| 13 | .607 | 2.166 | 87.526 | | | |
| 14 | .541 | 1.931 | 89.456 | | | |
| 15 | .480 | 1.715 | 91.171 | | | |
| 16 | .433 | 1.546 | 92.717 | | | |
| 17 | .351 | 1.253 | 93.971 | | | |
| 18 | .311 | 1.111 | 95.082 | | | |
| 19 | .299 | 1.066 | 96.148 | | | |
| 20 | .254 | .907 | 97.056 | | | |
| 21 | .198 | .707 | 97.763 | | | |
| 22 | .165 | .591 | 98.354 | | | |
| 23 | .137 | .490 | 98.843 | | | |
| 24 | .114 | .408 | 99.252 | | | |
| 25 | .088 | .314 | 99.566 | | | |
| 26 | .066 | .237 | 99.803 | | | |
| 27 | .035 | .125 | 99.928 | | | |
| 28 | .020 | .072 | 100.000 | | | |

Extraction Method: Principal Component Analysis.
Source (Researcher, 2018)
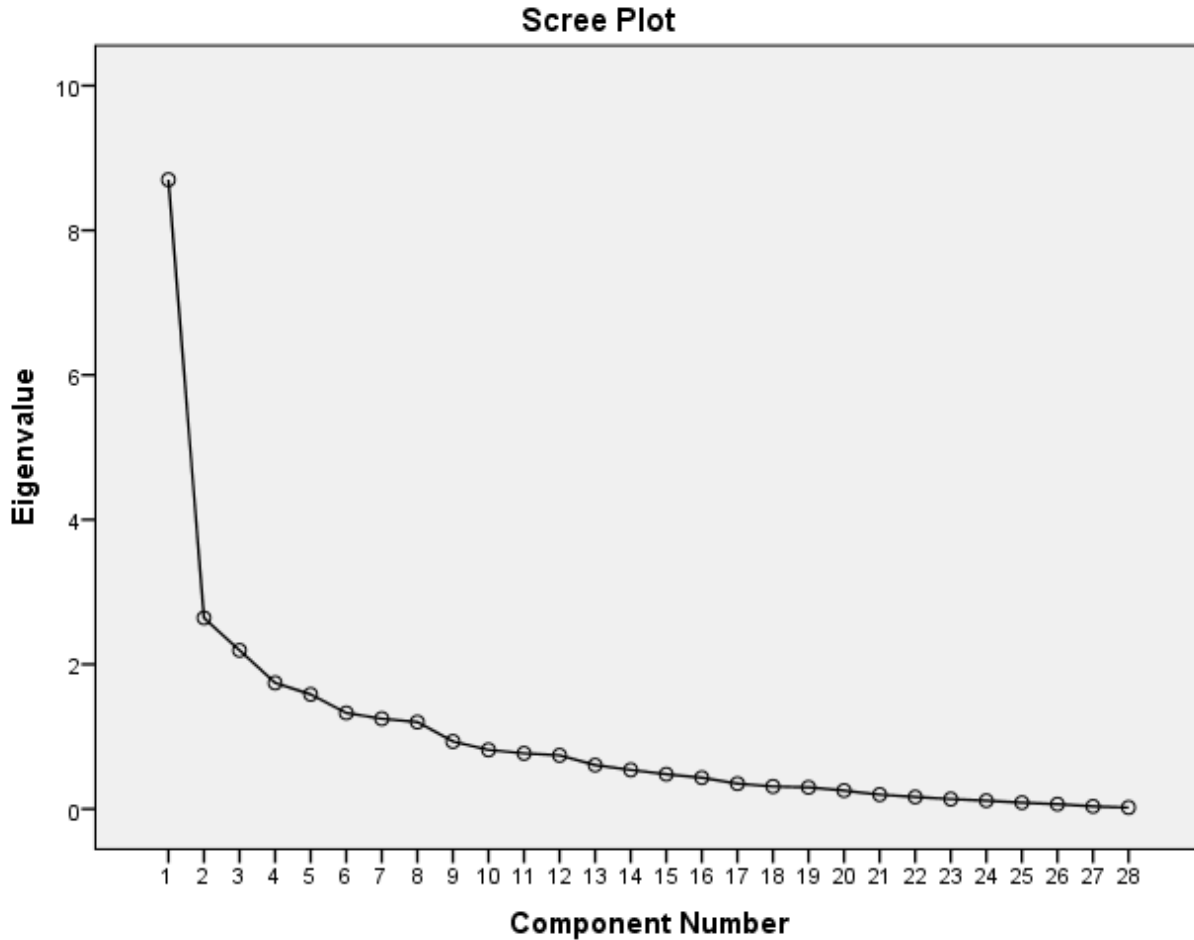
**Figure 4.3: Scree Plot**

Source (Researcher, 2018)

The scree plot in Figure 4.3 give the eight extracted factors with an Eigenvalue of greater than one. After the eighth factor, the scree plot gradient reduces and becomes almost flat. The graph shows that the first factor which is functionality of the system has a very high loading variables and the gradient is very steep.

### 4.5.5 Rotated Component Matrix

Table 8 in the appendices, gives the rotated component matrix that will enable the distinction of factors that influence the adoption of EDC systems by TechnoServe-Kenya. A summary of these factors is given in Table 4.8 below.

**Table 4.2: Summary of the Rotated Component Matrix**

| Factor 1 | What Does This Indicate |
|---|---|
| How information on the functionalities of a particular system are publicized is a major factor in the adoption of the system | The functionality of the system is a key factor for adoption of any EDC system |
| The speed of conversion of questionnaires into useable EDC format is a major influence on which system to use | |
| The frequency with which new versions of EDC systems are released is a major factor to consider when taking up a system | |
| Different departments day to day jobs consideration is a major factor in which EDC system to adopt | |
| The perception that adoption of a particular EDC system would provide TechnoServe with a competitive advantage is a major factor in the adoption of the system | |
| The duration of a project is a major factor to consider in choosing which EDC to adopt | |
| The extent to which use of a particular EDC system is perceived to supersede the other data collection systems is a major factor in the adoption of the system | |
| The level of trust one has in a particular system concerning data is a major influence on which system to adopt | |
| Amount of free trial period offered by a particular EDC system is a major factor for consideration in adopting a system | |
| **Factor 2** | |
| The annual turnover of TechnoServe is a major factor in the adoption of a data collection system | Personal and organizational characteristics influence adoption of EDC systems |
| The number of staff in TechnoServe is a major factor in the adoption of a data collection system | |
| My personal decisions are a major factor in which EDC system to adopt | |
| The computer skills of a particular individual are key in influencing adoption of any EDC system | |
| The non-governmental organizations adopting a particular EDC system is a major influence on which system to adopt | |
| The willing attitude of TechnoServe staffs to learn new ways of working is a major factor in the adoption of EDC systems | |
| My peer's influence which EDC system I adopt | |

| Factor 3 | What Does This Indicate |
|---|---|
| The level of support offered for any EDC system is a major influence on which one to adopt | Support offered and top-level management are significant factors in adoption of EDC systems |
| Top level management influence which EDC system to adopt | |
| **Factor 4** | |
| The data security features of a particular EDC system is a major factor for consideration in the adoption of a system | The efficiency brought about by using the system is key in adoption of EDC systems. |
| The speed with which I expect to accomplish data collection tasks by using an EDC system is a major factor in the adoption of the system | |
| The extent to which the EDC system use leads to minimization of missing responses is a major factor to consider in the adoption of an EDC system | |
| **Factor 5** | |
| The initial purchase cost of Electronic Data Capture (EDC) systems is a major factor in adopting a particular EDC system | Costs influence which EDC system to adopt |
| Maintenance cost of a particular EDC system is a determinant on which system to adopt | |
| Cost of training on specific EDC systems is a major factor in the adoption of a particular system | |
| **Factor 6** | |
| The ease of learning how to use a particular system is a major influence on which EDC system to adopt | Learning how to use the systems could influence adoption |
| **Factor 7** | |
| The ease of integration of the EDC system with other systems used in TechnoServe for data management is a major influence on which EDC system to adopt | Availability of equipment for EDC systems influence their adoption |
| The availability of equipment required for EDC systems is a major factor in the adoption of a particular EDC system | |
| **Factor 8** | |
| Partners/donors requirements influence the adoption of a particular EDC system | Donors and partners influence which EDC system to adopt |

Source (Researcher, 2018)


### 4.5.6   Interpretation of the Rotated Component Matrix

Table 4.8, the rotated component matrix groups' variables into eight components. From the analysis, it can be deduced that the first factor that influences the adoption of EDC systems by TechnoServe staff can be summarized as "functionality of the system". The second factor is the

"characteristics of the organization", while the third is "support and influence of top-level management". The fourth factor is the "efficiency brought about by using the system", and the fifth is "costs associated with the EDC system". The sixth factor is "ease of learning", the seventh is equipment availability and lastly, the eight-factor is "donor requirements".

## 4.6 Impact of Adoption of EDC Systems in TechnoServe-Kenya

**Table 4.3: Summary Table on Impact of Adoption of EDC Systems**

| Impact of Adoption of EDC Systems | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree | I do not know | Total |
|---|---|---|---|---|---|---|---|
| Use of EDC system increases efficiency in data collection | 0.0% | 0.0% | 2.3% | 15.9% | 79.5% | 2.3% | 100.0% |
| Use of EDC system increases the accuracy of organizational data | 0.0% | 4.5% | 9.1% | 20.5% | 63.6% | 2.3% | 100.0% |
| Use of EDC system reduces data collection errors | 0.0% | 9.1% | 9.1% | 34.1% | 43.2% | 4.5% | 100.0% |
| Use of EDC system increase data security for TechnoServe | 0.0% | 4.5% | 6.8% | 40.9% | 45.5% | 2.3% | 100.0% |
| Use of EDC system reduces the time taken to complete evaluations | 0.0% | 4.5% | 2.3% | 34.1% | 56.8% | 2.3% | 100.0% |
| Use of EDC systems reduces data collection costs | 0.0% | 4.5% | 13.6% | 40.9% | 38.6% | 2.3% | 100.0% |
| Use of EDC systems increases job satisfaction of TechnoServe employees | 0.0% | 13.6% | 29.5% | 31.8% | 18.2% | 6.8% | 100.0% |

Source (Researcher, 2018)

Table 4.9 reveals that majority (79.5%) of the respondents strongly agreed that use of any EDC system would lead to increased efficiency in data collection. It is also revealed that 63.6% of the respondents strongly agreed that EDC systems lead to improved accuracy of the organizational

data. According to the table, 34.1% agreed and 43.2% strongly agreed that EDC systems reduce data collection errors. Furthermore, the table shows that 40.9% agreed and 45.5% strongly agreed that EDC systems increase data security for the organization. On the time taken to complete evaluations, 34.1% of the respondents agreed and 56.8% strongly agreed that EDC systems reduce the time taken to conduct evaluations. Majority of the respondents (79.5%) were in agreement that EDC systems reduce data collection costs. Fifty percent of the respondents were also in agreement that EDC systems increase job satisfaction for employees at TechnoServe, while 29.5% were neutral about the matter and 13.6% disagreed on the subject.

## 4.7    Discussions

The study found that the three EDC systems that the respondents were aware off in descending order are Google Forms, SurveyMonkey and ODK collect, while the ones they used the most in order of preference were SurveyMonkey, Google Forms and ODK Collect. SurveyMonkey and Google Forms are computer-based applications for both data collection and storage, whereas ODK Collect is a mobile-based application for data collection and uses a computer-based applications for data storage. These findings are in line with a study by Haller et al., (2009), that stated that people preferred using laptop computers to handheld devices for data capturing as they significantly improved data accuracy.

There were also statistically significant differences between different age groups and their awareness and use of different EDC systems. This is also in line with the study by Morris and Venkatesh, (2000), that found that younger people were influenced by the approach of delivery of a system, whereas the elders were more influenced by enforcement of rules to adopt a system.

Gender also presented statistically significant differences in the awareness and use of different EDC systems. This is comparable to a study by (Viswanath Venkatesh, Morris, & Ackerman, 2000a). This study posits that female take up technologies based on their individual norms and through the enforcement of rules to take them up, whereas male was more assertive in taking up new technologies.

The study also revealed that there are eight key factors that influence adoption of EDC systems; which are the functionality of the system, organizational characteristics, support and influence of the top level management, efficiency brought about by using the system, the costs associated with the EDC system, the ease of learning how to use the system, the availability of equipment for EDC system adoption and finally donor requirements. These findings are comparable to the study by Schillewaert et al., (2005), that posits that top-level management is a key influencer of adoption of EDC systems but contradicts with the finding that external competition is a key factor in the adoption of EDC systems.

This study also reveals that adoption of EDC systems would increase efficiency at work (94.5% of the respondents), reduce time taken for evaluations (90.9% of the respondents), improve data security (86.4% of the respondents), improve data accuracy (84.1% of the respondents), reduce data collection costs (79.5% of the respondents) and reduce data errors (77.3% of the respondents), and increase job satisfaction (50% of the respondents). This findings are in tandem with the study by Sproull, (1986) that posited that EDC systems make it cheaper to conduct surveys, they are also comparable to the study by (Haller, Haller, Courvoisier, & Lovis, 2009b) that suggested that EDC systems are able to accomplish tasks faster and reduce data errors by use of compulsory questions, skip logic patterns, inbuilt controls and constraints.

# CHAPTER FIVE

# SUMMARY, CONCLUSION AND RECOMMENDATIONS

## 5.1    Introduction

The key findings, the conclusions, and the recommendations will be provided in this chapter. The three objectives of the study will be addressed in the recommendations and conclusions of this study. These objectives were to establish the extent of adoption of EDC systems in TechnoServe-Kenya, to determine the factors that influence adoption of EDC systems in TechnoServe-Kenya and to establish the impact of adoption of EDC systems in TechnoServe-Kenya.

## 5.2    Summary of Findings

A census of 60 TechnoServe was conducted and the response rate was 73%. The relevant job categories of TechnoServe-Kenya, which included monitoring and evaluation 31.8%, project implementation business advisors 20.5%, administration department – that include the top level management 13.6%, finance department employees 13.6%, project managers 9.1%, communications department employees 4.5%, project implementation senior business administrators 4.5% and human resources department 2.3% were included in the study. The demographic statistics of the study revealed that majority (86.3%) of the respondents lay between the ages of 26 to 45 years. The youth between the ages of 20 to 35 years in the organization was 56.8%. There were 65.9% males interviewed for the survey. Most of the respondents (47.7%) at TechnoServe Kenya are bachelor's degree holders, while 40.9% are masters' degree holders.

The study revealed that 59.1% of the staff use ODK Collect, 15.9% use SurveyCTO, 11.4% use SurveyToGo, 31.8% use CommCare, 65.9% use google forms, 68.2% use SurveyMonkey and only 9.1% of the total did not use any of the EDC systems. This shows that computer-based EDC systems were more preferable to the staff than mobile phone-based systems. It also reveals that most of the employees who used mobile based EDC systems preferred to use ODK Collect. The study found out that there were eight key factors that influence the type of EDC systems that were adopted by employees at TechnoServe Kenya. These were the functionality of the system, demographics of the organization, support and influence of top-level management, efficiency brought about by using the system, costs associated with the EDC system, ease of learning to use the particular EDC system, equipment availability for EDC system use and lastly, the eight-factor

is donor requirements. The study reveals that the use of EDC systems increases efficiency at work and improves data accuracy. There were mixed reactions from employees that adoption of EDC system could increase job satisfaction of employees at TechnoServe-Kenya.

## 5.3    Conclusion

It can be concluded that the employees at TechnoServe-Kenya are well educated and come from diverse age groups. From the study, it is agreeable that the employees of TechnoServe-Kenya were aware of several EDC systems and adopted different the EDC systems due to a myriad of reasons that could be summarized to eight key factors. It is also the researcher's conclusion that the main benefits that are derived from the adoption of EDC systems include increasing efficiency at work and improving data accuracy.

## 5.4    Recommendations

Based on the findings of this study, it is recommended that the employees at TechnoServe-Kenya be trained on the different EDC systems available from time to time. It is also recommended that TechnoServe-Kenya should hire a consultant to evaluate the skill levels of different employees on the use of EDC systems and also help in the choosing of the most appropriate EDC system for the different departments at TechnoServe-Kenya. The last recommendation is that TechnoServe-Kenya should choose appropriate EDC systems based on their functionalities for the different departments independently.

## 5.5    Limitations of the study

The study was limited to one non-governmental organization and the electronic data capturing systems used at TechnoServe Kenya. With new technologies coming up frequently, there is need to explore more on the EDC systems available and their use in different organizations in the health, transportation, education, finance, and other areas.

## 5.6    Areas of Further Research

Further research can be done on the adoption of EDC systems in different organizations both public and private. These organizations should also include schools, colleges, and universities. Further research can be conducted on how to increase the adoption of EDC systems given that they improve data accuracy and efficiency at work. Businesses can also be investigated on the use of EDC systems and the impact they have on their profitability and successes.

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# APPENDICES

## APPENDIX I: Rotated Component Matrix

**Table 1.0: Rotated Component Matrix**

| Questions | Component | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| How information on the functionalities of a particular system are publicized is a major factor in the adoption of the system | .707 | .213 | -.020 | -.132 | .282 | .047 | -.140 | .077 |
| The speed of conversion of questionnaires into useable EDC format is a major influence on which system to use | .706 | .227 | -.241 | -.008 | .268 | .277 | .026 | -.255 |
| The frequency with which new versions of EDC systems are released is a major factor to consider when taking up a system | .679 | .024 | -.064 | .113 | .057 | .087 | .238 | .224 |
| Different departments day to day jobs consideration is a major factor in which EDC system to adopt | .623 | .136 | .410 | .205 | .057 | .086 | .087 | .207 |
| The perception that adoption of a particular EDC system would provide TechnoServe with a competitive advantage is a major factor in the adoption of the system | .606 | .289 | .360 | .048 | -.005 | .263 | -.024 | .303 |
| The duration of a project is a major factor to consider in choosing which EDC to adopt | .599 | .205 | .330 | .213 | .112 | -.114 | .387 | .031 |
| The extent to which use of a particular EDC system is perceived to supersede the other data collection systems is a major factor in the adoption of the system | .567 | .098 | .353 | .306 | -.092 | -.009 | .284 | -.045 |
| Amount of free trial period offered by a particular EDC system is a major factor to consider in adopting a system | .527 | .443 | .323 | .057 | .156 | .046 | .163 | -.143 |
| The annual turnover of TechnoServe is a major factor in the adoption of a data collection system | .373 | .771 | .127 | .146 | .079 | -.002 | .153 | -.023 |
| The number of staff in TechnoServe is a major factor in the | .160 | .736 | .211 | .012 | .353 | -.118 | .033 | -.021 |

| Questions | Component | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| adoption of a data collection system | | | | | | | | |
| My personal decisions are a major factor in which EDC system to adopt | .038 | .643 | .239 | .059 | .128 | .345 | .001 | .297 |
| The computer skills of a particular individual are key in influencing adoption of any EDC system | -.047 | .631 | -.297 | .019 | -.021 | .353 | .390 | .210 |
| The non-governmental organizations adopting a particular EDC system is a major influence on which system to adopt | .379 | .500 | .295 | .303 | -.152 | -.032 | -.223 | .336 |
| The willing attitude of TechnoServe staffs to learn new ways of working is a major factor in the adoption of EDC systems | .118 | .486 | .411 | .407 | -.171 | -.123 | .134 | .109 |
| The level of support offered for any EDC system is a major influence on which one to adopt | .112 | .153 | .782 | .055 | .141 | .151 | .124 | .023 |
| Top level management influence which EDC system to adopt | .002 | .225 | .781 | .262 | .183 | -.006 | -.087 | .265 |
| The data security features of a particular EDC system is a major factor for consideration in the adoption of a system | -.117 | -.001 | .104 | .809 | .104 | .105 | -.019 | .154 |
| The speed of conversion of questionnaires into useable EDC format is a major influence on which system to use | .127 | .121 | .175 | .803 | -.106 | .050 | .031 | -.190 |
| The extent to which the EDC system use leads to minimization of missing responses is a major factor to consider in the adoption of an EDC system | .298 | .065 | .020 | .751 | .059 | .085 | .151 | .040 |
| The initial purchase cost of Electronic Data Capture (EDC) systems is a major factor in adopting a particular EDC system | .100 | .317 | -.098 | .002 | .782 | .093 | -.143 | .269 |
| Maintenance cost of a particular EDC system is a determinant on which system to adopt | .170 | .058 | .363 | .118 | .748 | .089 | .165 | .037 |

|  | Component | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Questions | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Cost of training on specific EDC systems is a major factor in the adoption of a particular system | .398 | -.083 | .222 | -.091 | .606 | .140 | .356 | -.090 |
| The ease of learning how to use a particular system is a major influence on which EDC system to adopt | .124 | .132 | .113 | .114 | .100 | .893 | .021 | -.066 |
| The level of trust one has in a particular system concerning data is a major influence on which system to adopt | .546 | -.141 | -.007 | .168 | .115 | .571 | .086 | -.037 |
| The ease of integration of the EDC system with other systems used in TechnoServe for data management is a major influence on which EDC system to adopt | .189 | .051 | .358 | .019 | .131 | .390 | .371 | .351 |
| The availability of equipment required for EDC systems is a major factor in the adoption of a particular EDC system | .225 | .174 | -.009 | .383 | .158 | .039 | .720 | .204 |
| My peer's influence which EDC system I adopt | .183 | .442 | .264 | -.335 | -.048 | .109 | .522 | -.152 |
| Partners/donors requirements influence the adoption of a particular EDC system | .127 | .113 | .166 | .009 | .142 | -.066 | .103 | .872 |
| Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. <br> a. Rotation converged in 17 iterations. | | | | | | | | |

Source (Researcher, 2018)

# APPENDIX II: QUESTIONNAIRE

**Declaration**

This questionnaire is intended to collect information concerning factors affecting the adoption of electronic data capture (EDC) systems by Technoserve Kenya staffs only. The data and information given herein will be treated with utmost confidentiality and will be used for the intended purpose of submission of a thesis on the said topic to The University of Nairobi only.

**Questionnaire for the Study**

**PART A: Demographics and general information**

1. Age of the respondent in years:

   [] 20 – 25      [] 26 – 30      [] 31-35      [] 36-40      [] 41 – 45      [] 46-50

   [] 51 – 55      [] Above 55

2. Gender of the respondent

   [] Male                    [] Female

3. Highest level of education attained by the respondent

   [] Diploma              [] Bachelors    [] Masters      [] Post Graduate Diploma      [] PhD

4. Kindly indicate which department you work for in TechnoServe

   [] Human Resources            [] Finance      [] Administration

   [] Project Management          [] SBA          [] BA            [] Monitoring and Evaluation

5. Kindly indicate your current job group

   [] Operational level    [] Mid-level management      [] Top Management

6. Kindly indicate the number of years you have worked in TechnoServe

   _____

7. Kindly indicate the number of years you have been working in your current designation

   _____

**PART B: Extent of EDC Systems Awareness and Adoption**

8.      Kindly indicate the Electronic Data Capturing (EDC) Systems you are aware of

      [] ODK Collect                [] SurveyCTO          [] SurveyToGo       [] CommCare

      [] Google Forms             [] SurveyMonkey      [] None

9.      Kindly indicate the EDC systems you have used

      [] ODK Collect      [] SurveyCTO        [] SurveyToGo     [] CommCare

      [] Google Forms     [] SurveyMonkey     [] None

10.     Kindly indicate which EDC systems you would like TechnoServe to enforce use of

      [] ODK Collect,      [] SurveyCTO,      [] SurveyToGo,     [] CommCare

      [] Google Forms     [] SurveyMonkey     [] None

11.     Please give reasons why you would like this system to be enforced by TechnoServe

      ……………………………………………………………………………………………………

      ……………………………………………………………………………………………………

12.     Have you received any training on electronic data capturing systems?

      [] Yes         [] No

13.     If yes to question 12 above, which EDC systems have you received training to work with?

      [] ODK Collect                [] SurveyCTO          [] SurveyToGo       [] CommCare

      [] Google Forms                [] SurveyMonkey

14.     If yes to question 12 above, who provided the training?

      [] TechnoServe employee           [] Hired Consultant

In the table below, kindly indicate your answer in the provided space by inserting the appropriate number against each question.

| PART C: Factors that could influence adoption of EDC systems | 1=Strongly Disagree | 2=Disagree | 3=Neutral | 4=Agree | 5=Strongly Agree | 6= I do not know |
|---|---|---|---|---|---|---|
| 15. The initial purchase cost of Electronic Data Capture (EDC) systems is a major factor in adopting a particular EDC system | | | | | | |
| 16. Maintenance cost of a particular EDC system is a determinant on which system to adopt | | | | | | |
| 17. Cost of training on specific EDC systems is a major factor in the adoption of a particular system | | | | | | |
| 18. Partners/donors requirements influence the adoption of a particular EDC system | | | | | | |
| 19. The frequency with which new versions of EDC systems are released is a major factor to consider when taking up a system | | | | | | |
| 20. The availability of equipment required for EDC systems is a major factor in the adoption of a particular EDC system | | | | | | |
| 21. The non-governmental organizations adopting a particular EDC system is a major influence on which system to adopt | | | | | | |
| 22. Different departments day to day jobs consideration is a major factor in which EDC system to adopt | | | | | | |
| 23. How information on the functionalities of a particular system are publicized is a major factor in the adoption of the system | | | | | | |
| 24. The willing attitude of TechnoServe staffs to learn new ways of working is a major factor in the adoption of EDC systems | | | | | | |
| 25. The duration of a project is a major factor to consider in choosing which EDC to adopt | | | | | | |
| 26. The ease of integration of the EDC system with other systems used in TechnoServe for data management is a major influence on which EDC system to adopt | | | | | | |
| 27. The speed of conversion of questionnaires into useable EDC format is a major influence on which system to use | | | | | | |
| 28. The level of trust one has in a particular system concerning data is a major influence on which system to adopt | | | | | | |
| 29. The perception that adoption of a particular EDC system would provide TechnoServe with a competitive advantage is a major factor in the adoption of the system | | | | | | |

| PART C: Factors that could influence adoption of EDC systems | 1=Strongly Disagree | 2=Disagree | 3=Neutral | 4=Agree | 5=Strongly Agree | 6= I do not know |
|---|---|---|---|---|---|---|
| 30. The level of support offered for any EDC system is a major influence on which one to adopt | | | | | | |
| 31. The speed with which I expect to accomplish data collection tasks by using an EDC system is a major factor in the adoption of the system | | | | | | |
| 32. The extent to which the EDC system use leads to minimization of missing responses is a major factor to consider in the adoption of an EDC system | | | | | | |
| 33. The data security features of a particular EDC system is a major factor for consideration in the adoption of a system | | | | | | |
| 34. The ease of learning how to use a particular system is a major influence on which EDC system to adopt | | | | | | |
| 35. Top level management influence which EDC system to adopt | | | | | | |
| 36. My peer's influence which EDC system I adopt | | | | | | |
| 37. My personal decisions are a major factor in which EDC system to adopt | | | | | | |
| 38. The number of staff in TechnoServe is a major factor in the adoption of a data collection system | | | | | | |
| 39. The annual turnover of TechnoServe is a major factor in the adoption of a data collection system | | | | | | |
| 40. Amount of free trial period offered by a particular EDC system is a major factor for consideration in adopting a system | | | | | | |
| 41. The extent to which use of a particular EDC system is perceived to supersede the other data collection systems is a major factor in the adoption of the system. | | | | | | |
| 42. The computer skills of a particular individual are key in influencing adoption of any EDC systems | | | | | | |

**PART D: Impact Information**

For the questions in the table below, score each from 1 to 5, where 1 is the strongly disagree and 5 strongly agree.

| Questions on Impact of Adoption of EDC Systems | 1=Strongly | 2=Disagree | 3=Neutral | 4= Agree | 5= Strongly Agree | I do not know |
|---|---|---|---|---|---|---|
| 43. Use of EDC system increases efficiency in data collection | | | | | | |
| 44. Use of EDC system increases the accuracy of organizational data | | | | | | |
| 45. Use of EDC system reduces data collection errors | | | | | | |
| 46. Use of EDC system increase data security for TechnoServe | | | | | | |
| 47. Use of EDC system reduces the time taken to complete evaluations | | | | | | |
| 48. Use of EDC systems reduces data collection costs | | | | | | |
| 49. Use of EDC systems increases job satisfaction of TechnoServe employees | | | | | | |

50. Is there any other information you would like to share on Electronic Data Capturing Systems?

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