SCHOOL OF BUSINESS

THE IMPACT OF COMPUTER BASED ASSESSMENT SYSTEM ON CUSTOMER SATISFACTION: THE CASE OF CITY GOVERNMENT OF ADDIS ABEBA EDUCATION AND QUALITY CONTROL AUTHORITY

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A Thesis Submitted to St. Mary's University School of Business in Partial Fulfillment for the Award of the Degree

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I declare hereby the thesis entitled: "The Impact of Computer based Assessment System on Customer Satisfaction: The Case of City Government of Addis Abeba Education and Quality Control Authority" presented for the requirement for the degree of MASTERS OF BUSINESS ADMINISTRATION is prepared by me and it is original document.

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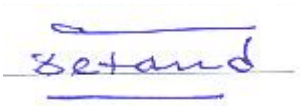
External Examiner:	Dr Getie Andualem		14/2/2022
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ABSTRACT

This study aimed at identifying the impact of customer satisfaction during computer based assessment. Customers here in this research were candidates of computer based assessment system (CBAs) that includes teachers, students, assessors, focal persons, shop assistants and other experts. These all taken part in the assessment using CBAs, using explanatory research method through both quantitative and qualitative approach. The data were collected from six different TVET colleges and other office experts. The collected data were analyzed through SPSS version 20 form, in this research multi-criteria satisfaction analysis variables (system quality, information quality, technical quality and service quality) was taken as independent variable used to measure customer's satisfaction of CBAs and system ease of use, efficiency, interaction, memorability, learnability, response time and satisfaction were considered as sub-variables and customer satisfaction as dependent variable, The result of descriptive statistics shows that CBA system has better performance on system quality; The correlation analysis also indicates a moderate and positive relationship between all selected variables and customer satisfaction. Multiple regressions were also applied by selecting the major controlling variables of predictor, the result also show that system quality of CBAs is greater than the other independent variables that is system quality has greater impact on customer satisfaction and also all variables are statistically significant. The researcher recommended that CBAs satisfaction factors i.e. system quality, information quality, technical quality and service quality all have significant value over customer satisfaction. It implies that this factors can improve the system for better performance and also can improve customer satisfaction.

Key words: Computer based assessment system, multi-criteria satisfaction analysis variables and customer satisfaction.

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ABBREVIATIONS

OCACC	Occupational competency assessment and certification center
OS	Occupational Standards
COC	Center of competency
CBA	Computer based Assessment
CBT	Computer based training
TVET	Technical Vocational Education Training
FTA	Federal TVET Agency

CHAPTER ONE: INTRODUCTION

1.1. BACK GROUND OF THE STUDSY

Here under Chapter One, background of the study is presented with specific emphasis on Computer –based Assessment System and Customer satisfaction, which actually are the central themes of the study.

1.1.1. COMPUTER BASED ASSESSMENT SYSTEM IN ADDIS ABABSA

Computer based assessment is not a new idea. In fact; it has been around in some form since 1959, when the very first computer based training (CBT) system was built.

Communications and computer technologies have been developed very quickly wide spreading to be used for several purposes. Information and Communication Technology (ICT) is used intensively in higher education at several aspects such as students' evaluation and electronic learning. Computer Based Assessment systems are implemented using ICT tools and applications. Computer Based Assessment systems is considered as a very important tool to evaluate students at specific point and to help learners in identifying the gap between required standard and actual level of the learners. This systems have several competitive advantages such as security, cost, and accuracy. Moreover, they reduce the efforts and time in exams generating, scheduling, marking, and results recording and analyzing (Mahmoud et al., 2015).

Occupational Competency Assessment and Certification Center (OCACC) of the City Government of Addis Ababa started its work officially in 2008 and plays its role in producing competent citizen for the industries. OCACC became part of City government of Addis Abeba Education and Quality Control Authority in 2019.

Occupational standards are combinations of the competencies required from an individual to do certain job and the competencies need to be at the same qualification levels as indicated by the national qualification framework (Chekole and Brhanu, 2020).

Occupational Standards (OS) are the most important quality assurance documents and are basis for training, assessment and certification according to Occupational Competency Assessment

and Certification Directive. The training is provided based on the curriculum developed according to occupational standards. Whatever modality of training is followed, occupational standards are base documents and quality assurance tools. Anyone who believes he/she could demonstrate his/her knowledge, skills and right work attitude through occupational competency assessment can sit for occupational competency assessment and be given national competency certificate if he/she proved to be competent. Currently in Ethiopia, every Technical Vocational Education Training (TVET) students and teachers are expected to pass through occupational competency assessment to join the world of work. Uniformly across the country, assessment by qualification level and by unit/s of competence is the only method of implementing assessments in all occupations for all candidates,

Computer based assessment system is developed by Federal TVET of Ethiopia to replace the manual paper-pencil assessment system at national level for all Occupational Competency Assessment and Certification (COC) organizations in the country. This system is organized for written exam or knowledge test of COC assessment. Before this new system, the test was given by paper and pencil and this mechanism makes the exam unmasked and stolen by different mechanisms, such as taking photos or by peoples who have contact with the exam administration. Though these knowledge exam sheets are prepared by different versions, they are not updated in timely manner. Because of this reason, the exams are used for more than five or six years without being updated, such practices, provide opportunities to the candidates to become familiar with the exams. The new system aimed at protecting or securing the exam from being stolen, improving service quality and achieving organizational objectives. It is managed by the organization's supervisors, and it doesn't allow the supervisors or the examiners to see or access the exams.

The privilege of the examiners or supervisors are creating groups, user names password, assign the test on the system and then facilitate and/or supervise the process. Each student is required to login using the password and user name designated or given by the supervisor. The test is actually s multiple choices; and as soon as the students summit their answer the system gives their result automatically.

Kotler et al. (2009:120) define satisfaction as ‘a person’s feeling of pleasure that result from comparing a product’s perceived performance (or outcome) to their expectation’. It means if the performance matches the expectation, the customer will be satisfied. In the context of higher education, the matter of satisfaction is what students expect from their educational institution, in fact, everything that makes them eligible to become productive and successful person in their practical lives.

Computer-based examinations are going to be demonstrated to be a better tool for the assessment of academic work and students’ overall performance will be enhanced using this type of assessment method. (Lent et al., 2007)

The major objective of this study were to identify the major factors that affect the customers of City Government of Addis Abeba Education and Quality Control Authority on using of CBAs and/or showing the problem that may needs to be improve.

1.2. STATEMENT OF THE PROBLEM

According to Mihret, (2020) implementation of competence based computerized assessment system is increasing and getting complex from time to time.

Some students with poor ICTs knowledge and skill may face a range of problems with the new technology in the examination and need some technical assistance and training. The weak attitudes of some teachers regarding CBAs are also a critical challenges. Technical failures and challenges in case of technology are not unexpected, but it is important to be ready and arrange a back-up procedure and an alternative method for examination in times of emergency. The challenges should be considered by the planners and proctors in order to ideally manage the exams in such a way to maintain this method privileges (Mahboobeh, 2018).

Frankola (2000 as cited by Terzis, et al., 2010) argued that despite the increased use of CBA, many learners are against using CBAS. Studies by different authors have observed differences

in students' assessment scores when paper based assessment PBA and CBA are implemented for the same course (Ajayi, et al., 2016).

The major problem on CBAs include: hiding pictures and graphics, lack of experience to use computers for both candidates and supervisors, time limitation, and computer laboratory equipment limitation and accessibility problem.; Not only that, the student's results also differ between paper- panicle assessment (at times declining of results) in all sectors. Before CBAs implement 70% of candidates are competent on paper-pencil assessment system after CBAs implemented 50% of candidates are competent from all sectors. Electric fluctuation during the assessment are part of the problem. After the COC organization implemented the system, power fluctuation is a real problem and the cause for dissatisfaction of COC customers or candidates. Thus, the researcher is keen and interested to explore whether such problems are connected with the CBA system or not and developed it as such a research problem statement.

1.3. RESEARCH QUESTIONS

This study primarily attempts to explore answers for the following basic questions:-

- What do customers expect from computer based assessment system?
- What challenges are customers facing in using computer based assessment?
- What are the effects of computer based assessment on customers' satisfaction level?

1.4. OBJECTIVE OF THE STUDY

1.4.1. GENERAL OBJECTIVE OF THE STUDY

The general objective of the study was to measure the impact of computer based assessment system on customer satisfaction by taking City government of Addis Abeba Education and Quality Control Authority as a case.

1.4.2. SPECIFIC OBJECTIVE OF THE STUDY

In order to achieve the above general objective, the specific objectives of this study attempt to:

- Identify customer expectation from computer based assessment system
- Assess the existing practice of conducting computer based assessment by OCACC
- Identify challenges in the use of computer based assessment system
- Examine the significance of relationship between computers based assessment system and customer satisfaction.
- Examine the extent of use of computer based assessment system by customers.
- Forward recommendations relevant for addressing challenges

1.5. SIGNIFICANCE OF THE STUDY

CBAs is considered as a very important tool to evaluate students at specific point and to help learners in identifying the gap between required standard and actual level of the learners' competencies (Mahmoud et al., 2015).

As organizations grow and change, they depend more and more on information technology for their survival (Feeny & Willcocks, 1998). Companies today implement and use information technology to find solutions to business problems, improve management decision-making, enhance productivity and quality, and compete for new markets in our global and aggressive business environment (Porter & Millar, 1985). Moreover, IT can be seen as a powerful force that opens exciting opportunities for organizations to achieve their missions and goals in an effective way. Therefore, leaders in organizations must obtain an overall appreciation of the potential of IT and link the acquisition and utilization of IT to the organizational mission

(Hacker & Saxton, 2007). The major purpose of this study is to identify computer based assessment system impact on customer satisfaction in the case of City Government of Addis Abeba Education and Quality Control Authority to identify the factors that affect candidates or customers satisfaction and to contribute advice and recommendations to improve the system as necessary. The major significance of this study is for the organization City Government of Addis Abeba Education and Quality Control Authority to know the level of its customer satisfaction and also for the other researchers as a reference.

1.6. DELIMITATION OF THE STUDY

This research was delimited on City government of Addis Abeba Education and Quality Control Authority or (OCACC) organization, sample size of 384 OCACC candidates and consultation forum of CBAs expert's and explanatory research methods and mixed method of data collection tools.

1.7. LIMITATION OF THE STUDY

Even if the problems are assumed to be national, this research focused only on City government of Addis Abeba Education and Quality Control Authority or (OCACC) organization due to overall capacity and resource limitation. It is obvious that the research would have been richer if candidates participated in the assessment were involved, manuals were available; unfortunately, none of these were accessible or non-existent. For that this research suffers a lot by limiting its data source or samples.

CHAPTER TWO: LITERATURE REVIEW

2.1. COMPUTER- BASED ASSESSMENT

Nurudeen. A. Ajayi and Victor Faniran (2016) investigated on student perceptions about computer based assessments challenges students encounter while undertaking computer-based assessments. And these researchers proposed possible solutions to the challenges and the mode of assessment that they prefer. As shown by this study, it has been observed that most students are familiar with the use of computers before entering the university. This knowledge might convince more universities to implement CBAs, most especially, doubting universities, who are yet to implement CBAS due to the fear of students' unfamiliarity with computers. If it is discovered that more students are unfamiliar with the use of computers in a university, the researcher supports the recommendation of Stephen, as cited in Escudier, et al. [19], that a form of pre-assessment training and tutorial be done for those students before undertaking the CBA.

CBA applications have brought up some questions. There are many studies abroad on this issue (Choi & Tinkler, 2002; Kingston, 2009; Kim, 1999; McKee, L. M., & Levinson, E. M., 1990; Mead and Drasgow, 1993; Neuman, G., & Baydoun, R., 1998; Pomplun, M., & Custer, M., 2005). Those studies mainly focus on comparisons between paper-pencil tests (PPTs) and computer-based tests (CBTs). In their meta-analysis, Mazzeo and Harvey (1988), investigated the research that focused on paper-pencil and computer-based intelligence, aptitude, personality and achievement tests. The analyses revealed varying results, but showed that computer-based applications increased the response time compared to paper-pencil ones. Additionally, the studies (Choi & Tinkler, 2002; Kim, 1999; Kingston, 2009; Mead & Drasgow, 1993; Peak, 2005) done subsequently revealed no significant differences in achievement considering computer-based and paper-pencil exams; however taking the academic content and grade levels into consideration, it was observed that students had hard times with the CBTs.

Computerized testing is becoming a major component of and an increasingly preferable method of assessment (Eugene Gvozdenko, Kaye Stacey, Dianne Chambers and Vicki Steinle, 2011).

Computer Based Assessment (CBA) is an integral service which comes along with (learning management system) LMS or alone. It provides many advantages to teachers and learners. Learners can find CBA very useful because they can practice in any lesson or specific task they want in order to ameliorate their weaknesses and to evaluate their performance (Joosten-ten Brinke et al., 2007; Kaklauskas et al., 2010). On the other hand, educators savor other advantages such as: test security, reduction of time and cost, automation of records and distance learning/marking (Gvozdenko & Chambers, 2007; Smith & Caputi, 2007).

Irfan Yurdabakan, (2012 clarifies that CBA applications have brought up some questions. There are many studies abroad on this issue in their meta-analysis Mazzeo and Harvey (1988), investigated the research that focused on paper-pencil and computer-based intelligence, aptitude, personality and achievement tests.

The analyses revealed varying results, but showed that computer-based applications increased the response time compared to paper-pencil ones. Additionally, the studies (Choi & Tinkler, 2002; Kim, 1999; Kingston, 2009; Mead & Drasgow, 1993; Peak, 2005) done subsequently revealed no significant differences in achievement considering computer-based and paper-pencil exams; however taking the academic content and grade levels into consideration, it was observed that students had hard times with the CBTs. Leeson (2006), identifies the factors lead to difficulties in CBA applications under two titles, as factors originating from “users” and “technology used”. He states that the user’s gender, his/her ability to process information, ability to use a computer, and his/her level of anxiety could have an influence on an application, whereas he gives the size and resolution of monitors, writing character and its length, the way the problem is presented, and having the option of review or not as technology originated factors. Many researchers have already done studies investigating the relationship between computer usage ability and achievement. Some of them (Goldenburg & Pedulla, 2002; Pomplun & Custer, 2005, Pomplun, Ritchie & Custer, 2006, Bennett, Braswell, Oranje, Sandene, Kaplan, & Yan, 2008) have stressed that computer usage ability is an important predictor of respondent achievement, therefore those students poor at computers may show low achievement in CBAs; however they add that with the increase in computer technologies and access opportunities, such problems may decrease.

Coniam (2009) summarizes the major arguments in the literature (e.g. Chapelle & Douglas, 2006; Dilki, 2006; Hughes, 2003) for using computers in assessing students' written work as money, time, objectivity, and reliability levels matching those attained by multiple human raters. Bull and McKenna (2004) argue that the use of computers in assessing written responses is pedagogically desirable as it can be integrated with existing assessment methods and strategies, increase the frequency of feedback, and broaden the range of assessed skills.

2.2. RELATIONSHIP BETWEEN CUSTOMER SATISFACTION AND CBAS

With the use of technology on the rise, the customer experience landscape has changed forever. Long wait times and slow responses are no longer acceptable and have a huge impact on customer satisfaction. Immediate gratification and meeting high customer expectations are paramount. Technology is what got your customers to start feeling this way, and it is also the solution to giving them the best experience possible Norfazlina et al., 2016.

S. Vairamuthu and S. Margret, 2016 Reconnoitering Students' Satisfaction of an Online Based Assessment System to Improve Usability using PSO: An Examination into a Problem Solving and Programming Course this work aimed to measure the level of users' satisfaction and provide feedbacks for continuous improvement of a course offered in an academic institution. End users here were the students enrolled for the course and the faculty members who offered the same and also acted as an assessor for the assessments. All assessments were scheduled and conducted online. This study was conducted to focus on two different aspects: Measuring User satisfaction and investigating information systems measures to improve usability using nature inspired computing. For user satisfaction analysis, the study employed the Multi-criteria Satisfaction Analysis. The findings show that analyzing the individual components in partial satisfaction measure, student's previous knowledge about computers contributed less in deciding the overall satisfaction level. The researcher take a closer look into this interpretation, the global satisfaction level of the portal is entirely different from the partial satisfaction level criteria. The factors contributed for the partial satisfaction level when measured individually differs drastically from the overall satisfaction measure. Several suggestions were recorded as their feedback to improve the usability of the portal that included improvements in user interface,

competency levels of questions etc. Some of the major findings were as follows: Almost 50% of the students that participated insisted that the interface needs more changes in UI. The questions for assessments should consider the competency level of all the students that depends on memorability and learnability factors. The infrastructure in terms of connectivity needs improvement for efficient utilization. The time bound assessments can be changed so as to make portal easy to use at any time. The stakeholders of this study were Core Management Team, Dean, Facilitator, Faculty members, Technical personnel for Portal, Students as the researcher listed but this research was focus only on the online assessment impact on students so, the system impact on other stakeholders are not curved.

Faniran and Ajayi, 2016 Students' Perceptions of Computer-Based Assessments: A Case of UKZN. The main objective of this study was to investigate student perceptions about computer based assessments. Other objectives of this study were to investigate the challenges students encounter while undertaking computer-based assessments and the mode of assessment that they prefer. This study also aimed at proposing possible solutions to these challenges. With five constructs, constructs are Computer self-efficacy, Perceived usefulness, Facilitating conditions, Perceived ease of use and Behavioral intention .By using Quantitative research methodology with 210 sample size. As shown by this study, it has been observed that most students are familiar with the use of computers before entering the university. The results of this study show that the availability of support, either staff or technical, might have an effect on students' performances while undertaking CBAs. The researcher recommends that any university intending to implement CBAs should provide students taking the CBAs with staff members who have been trained to handle and respond to any technical hitch experienced by the students. This form of assistance, as shown by literature, might improve the assessment performance of students. The results of this study show some of the challenges (and possible solutions) students experience while taking CBAs. These results might enable academic institutions understand how to manage the problems arising from the adoption of CBA.

Terzis et al., (2012) Computer Based Assessment Acceptance: A Cross-Cultural Study In Greece and Mexico. The survey study was conducted at two universities in Greece and Mexico. In order to eliminate any other effect except cultural, the questionnaire was distributed to first year students that were attending similar courses in the two universities. The course was an

introductory informatics course. Students were educated regarding general concepts of Information Technology and basic use of internet and word processing.

The CBA includes questions from this course. The participation in the CBA was voluntary. 117 first-year Greek students, 45 males (38%) and 72 females (62%), signed up and appeared to the procedure. The average age of Greek students was 19.2 (SD = 1.03). In addition, 51 first-year Mexican students, 19 males (37%) and 32 females (63%), participated to the procedure. The average age of Mexican students was 18.9 (SD = 1.05). Furthermore, from the mean and standard deviation of the Computer Self Efficacy variable, we are able to understand that students from both countries felt confident regarding their computer skills

This study compares the user's acceptance behavior of a computer based assessment system in two different cultural environments (Greece and Mexico) by applying the CBAAM (Terzis & Economides, 2011) in both cultures. Despite the good model fit in both countries and the aforementioned similarities which indicate a trend to a globalized use of CBA systems, ethnic or national culture plays important role on user's behavioral intentions regarding CBA acceptance.

This research faces some limitations which might have influenced the results. The first limitation is the small number of individuals regarding Mexico's sample. A sample with more students might have provided different and more significant results. Moreover, the sample is very specific. All the participants are first-year undergraduate students in an introductory course to informatics. Similar studies should be applied to other groups with different characteristics regarding age, specialization, nationality and course's content. Thus, the results should be treated as indications and not as proofs.

Study by Fábio et al., (2014) on Student Satisfaction Process in Virtual Learning System: Considerations Based in Information and Service Quality from Brazil's Experience. The researchers have investigated methods to assess the benefits of e-learning from a number of perspectives for distance learning. This survey assesses the associations among the system quality, information quality, and service quality on student satisfaction and use of systems in virtual learning environments using the e-learning success model adapted by Holsapple and Lee-Post from the Delone and McLean (1992, 2003) model as a theoretical basis.

The survey was carried out by means of an online program offered to 291 students from public and private institutions from several regions of Brazil. Confirmatory Factor

Analysis and Structural Equation Modeling were used for data analysis in order to understand the student satisfaction process in virtual learning system. Findings show that variations in system quality, information quality, and service quality influence the use of the system, and the User Satisfaction construct had 89% of variance explained by Information Quality and Service Quality. The limitation of this study as the researcher identified the possible impact of using a 5-point Likert scale. Nevertheless, the model's adjustment indices were not greatly affected. In addition, good results can be obtained when one uses Likert-type scales with at least five categories (Hancock and Mueller, 2006).

2.3. CUSTOMER EXPECTATION ON CBAS

Customer expectation encompasses everything that a customer expects from a product, service or organization. Customer expectations are created in the minds of customers based upon their individual experiences and what they have learned, combined with their pre-existing experience and knowledge. (Terzis, et al., 2010)

One of the most significant factors influencing customer expectations is their prior experience with your organization. If existing customers are highly satisfied then this sets a high level of expectation which must be maintained. But if their previous experience has been suboptimal then they may lack confidence in your business and their expectations may be quite low (Lindsay, 2019).

2.4. USABILITY OF CBA

Usability addresses the relationship between a software tool and its users. It represents an important aspect for the evaluation of CBA systems since they are designed to be used by assessors and students without specific background knowledge in computer science. Thus,

usability can make the difference between performing assessment accurately and completely or not, and enjoying the process or being frustrated.

Although there is a lot of work in the literature on the criteria to be adopted for the evaluation of the User Interface (UI) from the point of view of usability (see for instance Nielsen & Molich, 1990 and Gilham et al., 1995), this issue appears to be systematically overlooked in the evaluation of educational software. We strongly believe that the evaluation of the interface is a qualifying aspect for the evaluation of both subsystems of a CBA tool. This is true if we take into account the fact that neither the assessor nor the students may have advanced computer skills.

2.5. SATISFACTION ANALYSIS

MULTI-CRITERIA USER SATISFACTION ANALYSIS (MUSA)

Nazareno, et.al, (2014) has investigated on Student Satisfaction Process in Virtual Learning System: Considerations Based in Information and Service Quality from Brazil's Experience The survey was carried out by means of an online program offered to 291 students from public and private institutions from several regions of Brazil. Confirmatory Factor Analysis and Structural Equation Modeling were used for data analysis in order to understand the student satisfaction process in virtual learning system. Findings show that the construct System Quality has a low influence on the Use variable and no predictive power with regard to Satisfaction, which weakened the construct in this model. System Quality is just a complement for the remaining factors in distance learning. Students did not report direct satisfaction just because they liked the system that managed the program. Rather, they report satisfaction after identifying other values in connection with content and services. Generally variations in system quality, information quality, and service quality influence the use of the system, and the User Satisfaction construct had 89% of variance explained by Information Quality and Service Quality.

MUSA (Multi-criteria User Satisfaction Analysis) S. Vairamuthu and S. Margret, (2016) MUSA (Multi-criteria User Satisfaction Analysis) was employed for result interpretation. This research has focused on four major factors to measure candidates' satisfaction. Major classification included: System Quality, Information Quality, Technical Quality and Service Quality.

SYSTEM QUALITY refers to aspects of the information system itself, such as processing speed, ease of use, necessary requirements, and navigability. These are important factors that are the responsibility of the technical team, from the inception of the system to its planning and implementation. Twelve works by Delone and Mclean (1992) employed the following measures on a frequent basis: response time, system reliability, and especially, ease of use.

INFORMATION QUALITY refers to the quality of the content stored in the system. In this case, it includes factors such as the quality of graphs and data, and the clarity with which the information is presented to users. Delone and Mclean (1992) created thirty factors related to this dimension, including importance, reliability, relevance, currency, clearness, legibility, and interpretability. A significant majority of these are measured from the user's viewpoint.

SERVICE QUALITY is essential to implement the information system, as some essential services are fundamental, such as user training, a help desk, and support. The quality of the services depends on the performance of those who provide them at the moment they are delivered. Services can be offered either through the information system itself or offline.
USER SATISFACTION refers to the extent to which the user is satisfied with the system, information, and service. The user's perception of attitude toward the environment as a whole reflects the concept of user satisfaction. (Nazareno et al., (2014).

CBA is being a main part of electronic learning and assessment systems in higher education institutions. Therefore, it is very essential to investigate the factors that affect the candidates' attitude toward using CBA in order to implement CBA systems successfully (Mahmoud et al., (2015). The CBA is not new idea but its new for implement in Ethiopia starting on 2018, so we are on the binging to implement this system, therefore there is a lots of things to challenge, to

improve and to maintain towards OCACC candidates' expectation. This research aims to examine the factors that influence the candidates' attitude toward using CBA system in OCACC using factors of System Quality, Information Quality, Technical Quality and Service Quality.

2.7. RESEARCH FRAMEWORK

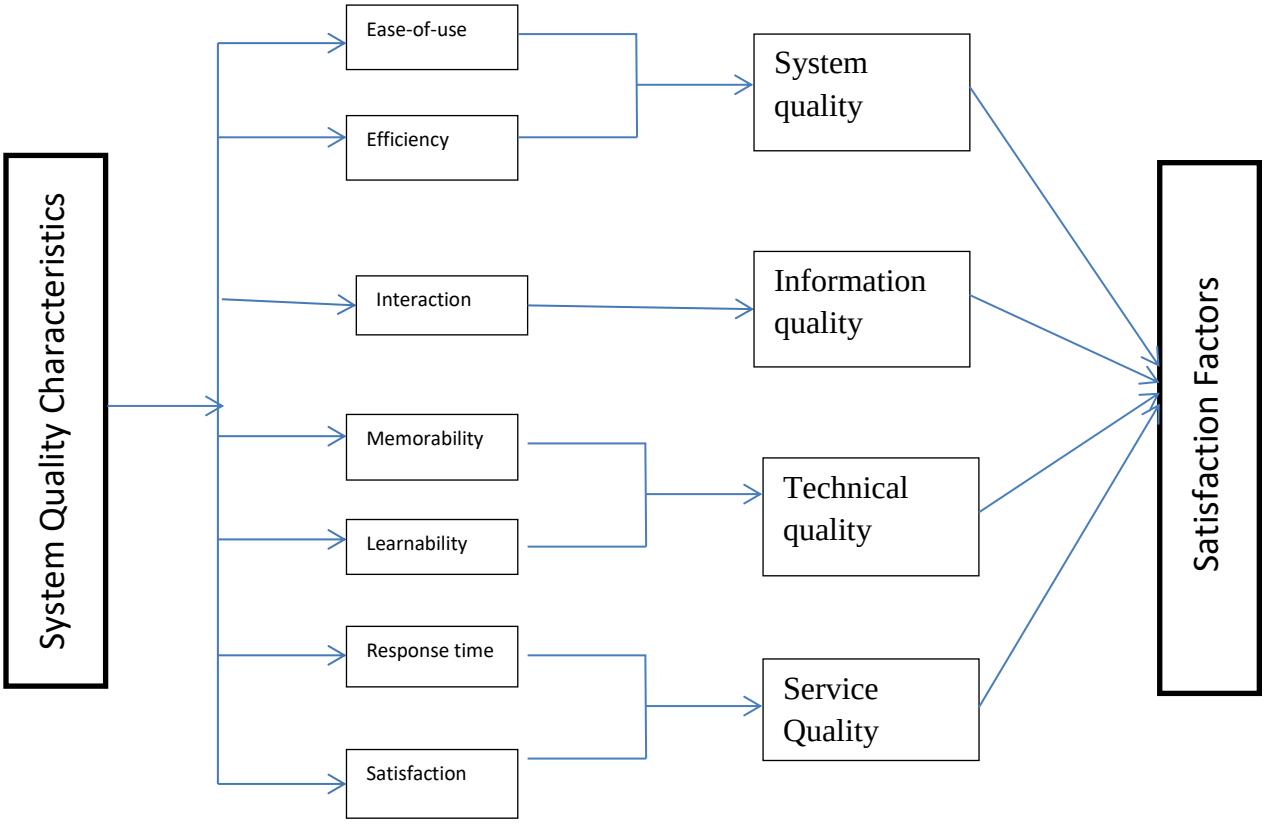

Figure 1: Research framework

2.6. HYPOTHESIS OF THE STUDY

H1: System Quality positively influences User Satisfaction;

H2: Information Quality positively influences User Satisfaction;

H3: Technical Quality positively influences User Satisfaction.

H4: Service Quality positively influences User Satisfaction. (Nazareno, et.al. 2014)

CHAPTER THREE: METHODOLOGY

This chapter presents research strategy, the research method, the research approach, and the methods of data collection, selection of the sample, research process, and type of data analysis.

3.1. RESEARCH APPROACH

Research can be classified in to three research approaches. These are qualitative research, quantitative research and mixed research. Qualitative research involves studies that do not attempt to quantify their results through statistical summary or analysis.

Quantitative research is the systematic and scientific investigation of quantitative properties and phenomena and relationships. The objective of quantitative research is to develop and employ mathematical models; it usually starts with a theory or a general statement proposing a general relationship between variables.

Therefore for this the researcher, use mixed approach research or both quantitative and qualitative together method to describe impact of computer based assessment system on customer satisfaction.

3.2. RESEARCH DESIGN

Research design forms the blue-print or maps that details how the researcher collect data that is relevant to address the research questions. It is a general blue-print for the collection, measurement and analysis of data, with the central goal of solving the research problem. (Creswell & Clark, 2007).

The research can be classified in to three as descriptive, explanatory and exploratory. Descriptive research sets out to describe & to interpret what is. It aims to describe the state of affairs as it exists.

Explanatory research is conducted when we encounter an issue that is already known and have a description of it, we might begin to wonder why things are the way they are. The desire to know “why”, to explain, is the purpose of explanatory research.

Exploratory research is conducted when there are few or no earlier studies to which references can be made for information. It provides insights into and comprehension of an issue or situation for more rigorous investigation later.

Explanatory studies seek to ask ‘why’ and ‘how’ questions (Grey, 2014). It builds on exploratory and descriptive research and goes on to identify actual reasons a phenomenon

occurs. Explanatory research looks for causes and reasons and provides evidence to support or refute an explanation or prediction. It is conducted to discover and report some relationships among different aspects of the phenomenon under study (Tesfaye, 2018).

This research describes the computer based assessment system impact on customer satisfaction by using explanatory research method, with four independent and one dependent variable. The dependent variable is customer satisfaction and the independent variables are system quality, information quality, and technical quality and service quality of CBAs.

3.3. DATA TYPES AND DATA SOURCES

The main source for this study was primary data source. The data was collected from the City government of Addis Abeba Education and Quality Control Authority or (OCACC) candidates who attended level three and four assessment by CBAs that included TVET students, Assessors, shop assistances, focal persons, TVET teachers and also form industry who is take the assessment with Mixed data type.

3.4. POPULATION OF THE STUDY

Population refers to the entire group of people, events or things of interest that the researcher wishes to investigate (Sekaran, 2005). A study population can be defined as the entire collection of cases or units about which the researcher wishes to draw conclusions. One of the major steps in formulating a research design is to define the population according to the objectives of the study. The population of interest for this research is all City government of Addis Abeba Education and Quality Control Authority or (OCACC) level three and four candidate from all sector of education and industries who has relation with the system. One of the major steps in formulating a research design is to define the population according to the objectives of the study.

The population size for this research is not fixed and huge in number because OCACC level three and four candidates come from all TVET Colleges and industries and also from other reigns to take the assessment and their number varies from time to time.

3.5. SAMPLE SIZE AND SAMPLING TECHNIQUE

3.5.1. SAMPLE SIZE

Sampling is the process of using a small or parts of a larger population to make conclusions about the whole population. Sampling is one of the components of research design. Jankowicz, 1995 defines sampling as the deliberate choice of a number of people; the sample provides data from which to draw conclusions about some larger group, the population, whom these people represent. This enables the research to be conducted economically feasible to use part of the population and also within the limited time frame.

The number of candidate for level 3 and above levels are not known so this makes the population size uncountable. So the researcher used the following formula to determine the appropriate sample size.

$$n = \frac{z^2 * p * q}{e^2}$$

Source: (Kothari, 2004)

Where n= sample size

z=the value of standard value of a given confidence level

P= sample proportion

q=1-p

e=acceptable error so in this case we set

e= 0.05, z=1.96

p= 0.5 q= 0.5 and we get

n =

n= 384.16

n= 384

These research questionnaires were collected from five TVET colleges and the others from deferent office experts who are taking the assessment using CBAs in Addis Abeba. These TVET colleges were selected for the reasoning of large number of candidates with deferent departments or disciples are located in this colleges and the candidates include teachers, assessors, foals and shop assistances in the colleges and eleven questioners were collected from different office who are taking the assessment. Out of 384 distributed questionnaires, 300 were collected; out of 300 of collected, 285 were properly filled for 15 of questionnaires were dropped because they were not filled out properly.

Candidates	Akaki TVET	G/Winget TVET	Tegbare Eid TVET	Misrak ptc	Nifas silk ptc	Other
Female	28	15	20	15	13	5
Male	49	27	41	34	32	6
TOTAL	285					

Table 1 : Data source

3.5.2. SAPLING TECHNIQUES

Once you've chosen the sample size for your survey, you'll need to define which sampling technique you'll use to select your sample from the target population. The sampling technique that's right for you depends on the nature and objectives of your project. Sampling techniques can be broadly divided into two types: random sampling and non-random sampling.

RANDOM SAMPLING

As the name suggests, random sampling literally means selection of the sample randomly from a population, without any specific conditions. This may be done by selecting the sample from a

list, such as a directory, or physically at the location of the survey. The researcher uses these sampling techniques, because the sample of this research is scattered and large in size.

EXPERT SAMPLING

Expert sampling involves the assembling of a sample of persons with known or demonstrable experience and expertise in some area. (William, 2020).

In the City government of Addis Ababa occupational competency assessment and certification center (OCACC), there is 46 supervisors for computer based assessment. The interview questions were managed by supervisors and experts of CBAs consultation forum, related to CB knowledge assessment system problems and about compliance it prepared by organization CBAs administrators, from more than 20 supervisors were participated these forum. The researcher took evidence by voice record and take note that are related to the research interview questions.

Figure 2: Pictures during consultation forum

3.6. DATA COLLECTION INSTRUMENT

In order to gather firsthand data, questionnaire and interviews are prepared and administer based on the review of related literature important to the subject of the study. Based on which this study prepared questionnaires and interview as a tool to collect the preliminary data From City government of Addis Abeba Education and Quality Control Authority or (OCACC) candidates and supervisors, and all questioners and interview questions are adopted from (Terzis, 2010, Shu-Hui Hsieh Chang, 2006,Refik Şanli,2003 and Nazareno, et.al. 2014).

3.7. DATA COLLECTION PROCEDURE

The study were employ questionnaires as a tool for data collection. The questionnaire will be distributed for City government of Addis Abeba Education and Quality Control Authority or (OCACC) level three and above candidates.

The questionnaires were composed of three sections. The first section contained COC candidates or respondent's sex, age, educational background, level, number of assessment they took and there experience on using computers and internet before;

The second section contained questionnaire items used to collect the data related to computer based assessment system factors and its relationship to customer satisfaction based on five point Likert scale.

The tired section contained open ended questions to get candidates idea about what problem they face during the assessment and solutions.

The interview questioners are prepared for experts to identify the computer based assessment system impact on customer satisfaction. This question both interview and questioners are adopted from (Terzis, 2010, Shu-Hui Hsieh Chang, 2006, Refik Şanli, 2003 and Nazareno, et.al. 2014).

3.8. DATA ANALYSIS

The purpose of analysis is to build up a sort of empirical model where relationships are carefully brought out so that some meaningful inferences can be drawn Zikmund (2003). It were be necessary to employ statistical techniques such as Descriptive statistics, Correlation and Regression to analyze the data due to the quantitative nature of the study.

The collected data inserted in to SPSS version 20. The inserted data was cleaned form errors and inconsistencies and finally analyzed. The analyzed data presented in text and tables.

CHAPTER FOUR: DATA PROCESSING, INTERPRETATION AND ANALYSIS

The mixed methods research design were applied in this research study to acquire an experiential overview of measure the impact of computer based assessment system on customer satisfaction by taking City government of Addis Abeba Education and Quality Control Authority as a case. In this chapter, the captured data from the qualitative and quantitative research is presented, analyzed, described and interpreted in a systematic manner as the next step of the research process. The documentation and analysis process aimed to percent data in an intelligible and interpretable form in order to identify trends and relations in accordance with the research aims (vosloo, 2021).

4.1. DEMOGRAPHIC DATA ANALYSIS

Table 2: Demographic data

age					sex		Educational background			Take knowledge assessment before			level			Haw match time			perfectly using computer and internet		
		Frequency	Percent		Frequency	Percent		Frequency	Percent		Frequency	Percent		Frequency	Percent		Frequency	Percent		Frequency	Percent
Valid	15-20	59	20.7	female	96	96	TVET level	128	44.9	no	25	8.8	level 3	190	66.7	first	157	55.1	no	53	18.6
	21-25	124	43.5				diploma	68	23.9				level 4	31	10.9	second	69	24.2			
	26-30	69	24.2	male	189	66.3	degree	80	28.1	yes	260	91.2	both level 3 &	50	17.5	third	26	9.1	yes	232	81.4
	above 30	33	11.6				masters and above	9	3.2				other	8	2.8	above three	27	9.5			
	Total	285	100.0		285	100	Total	285	100		285	100	Total	279	97.9	Total	279	97.9	Total	285	100
													System	6	2.1	System	6	2.1			
													Total	285	100	Total	285	100			

The above demographic data table-2: shows that from the total number of respondents 189 are male and 96 female, 59 of respondent are the age of from 15-20, 124 of respondents are from 21-25, 69 respondents are from 26-30 and 33 respondents are above 30, from the total number of sample size 128 were TVET level, 68 diploma, 80 degree and the other 9 respondents are masters and above and also 157 of respondents are took the assessment for the first time, 69 of respondents are took the assessment for the second time, 29 of respondents are took the assessment took the assessment for the third time and 27 of respondents are took the assessment for above three times.

From total sample size of 285 respondent 232 of respondents are perfectly using computer and internet before the assessment and 53 of respondents are not using computer and internet before they took the assessment

4.2. DESCRIPTIVE STATISTICS

		Perfectly using computer and internet	
		No	Yes
		Count	Count
Overall, I was satisfied with this CBA	strongly disagree	12	35
	disagree	10	33
	neutral	8	35
	agree	14	50
	strongly agree	9	79
	total	53	232r

Table 3: Perfectly using computer and internet

The data in table-3: shows 79 candidates who are perfectly using computer and internet are very satisfied on CBAs 50 are satisfied, 35 neutral or they are not decided, 33 not satisfied and 35 very unsatisfied and also candidates who are not perfectly using computer and internet 9 are very satisfied, 14 are satisfied, 8 neutral or they are not decided, 10 not satisfied and 12 very

unsatisfied. This indicates most of candidate who can use computer and internet before the assessment are satisfied on using CBAs.

4.3. DESCRIPTIVE DATA ANALYSIS

In this section all respondents' response for all factors frequency and percentage were discussed as follows:

4.3.1. DATA ANALYSIS FOR CBA SYSTEM QUALITY

4.3.1.1. Ease-of-use

It is easy to take an exam using Computer Based Assessment System (CBA)			
		Frequency	Percent
Valid	strongly disagree	22	7.7
	disagree	13	4.6
	neutral	52	18.2
	agree	89	31.2
	strongly agree	109	38.2
	Total	285	100.0

Table 4: Ease-of-use 1

As shown above on table-4: 109 (38.2%) and 89 (31.2%) percent of candidates are strongly agreed and agreed respectively with the fact that it is easy to take an exam using Computer Based Assessment System (CBA) 52 (18.2%), 13 (4.6%) and 22 (7.7%) percent of candidates are neutral, disagreed and strongly disagreed respectively, that is 69.4% of respondent are satisfied with using CBAs is ease to take an exam.

Dealing with Computer Based Assessment System is easy, has no complexity			
		Frequency	Percent
Valid	strongly disagree	25	8.8
	disagree	24	8.4
	neutral	51	17.9
	agree	76	26.7
	strongly agree	109	38.2
	Total	285	100.0

Table 5: Ease-of-use 2

As shown above on table-5 109 (38.2%) and 76 (26.7%) percent of candidates are strongly agreed and agreed respectively that shows most of candidates are agreed with Dealing with Computer Based Assessment System is easy, has no complexity and 51 (17.9%), 24 (8.4%) and 25 (8.8%) percent of candidates are neutral, disagreed and strongly disagreed respectively, It means 64.9% of respondents or most of candidates are agreed with using CBAs is ease and has no complexity to take an examination.

The overall screen layout and window design of the system is appropriate, easy to use			
		Frequency	Percent
Valid	strongly disagree	23	8.1
	disagree	17	6.0
	neutral	47	16.5
	agree	78	27.4
	strongly agree	120	42.1
	Total	285	100.0

Table 6: Ease-of-use 3

As shown above on table-6: 42.1%) and 27.4% percent of candidates are strongly agreed and agreed respectively, and (16.5%), (6.0%) and (8.1%) percent of candidates are neutral, disagreed and strongly disagreed on the overall screen layout and window design of the system is appropriate, easy to use.

The Login interface is easy to operate			
		Frequency	Percent
Valid	strongly disagree	25	8.8
	disagree	19	6.7
	neutral	62	21.8
	agree	68	23.9
	strongly agree	111	38.9
	Total	285	100.0

Table 7: Ease-of-use 4

The Login interface is easy to operate 111 (38.9%) and 68 (23.9%) percent of candidates are strongly agreed and agreed respectively 25 (8.8%), 19 (6.7%) and 62 (21.8%) candidates are strongly disagreed, disagreed and neutral respectively as shown above on table-7, that means 62.8% of respondents are agreed with the system has ease login interface to operate.

I have followed the direction without any problem			
		Frequency	Percent
Valid	strongly disagree	26	9.1
	Disagree	17	6.0
	Neutral	64	22.5
	Agree	74	26.0
	strongly agree	104	36.5
	Total	285	100.0

Table 8: Ease-of-use 5

I have followed the direction without any problem 104 (36.5%) percent of respondents are strongly agree and 74 (23.9%) percent of candidates are agreed, 64 (22.5%) , 17 (6.0%) and 26 (9.1%) candidates are neutral, disagreed and strongly disagreed respectively As shown above on table-8 that is 60.4% of respondent are agreed.

4.3.1.2. Efficiency

The features or menus of Computer Based Assessment System (CBA) can be accessed quickly

		Frequency	Percent
Valid	strongly disagree	28	9.8
	disagree	20	7.0
	neutral	71	24.9
	Agree	62	21.8
	strongly agree	104	36.5
	Total	285	100.0

Table 9: Efficiency 1

For The features or menus of Computer Based Assessment System (CBA) can be accessed quickly 104 (36.5%), 62 (21.8%), 71 (24.9%), 20 (7.0%) and 28 (9.8%) percent of respondents are strongly agree, agree, neutral, disagree and strongly disagree respectively As shown above on table-9, that is 58.3% of respondent are satisfied on the system features or menus are quickly assessed.

The exam questions and related instructions or information can be accessed quickly

		Frequency	Percent
Valid	strongly disagree	20	7.0
	disagree	25	8.8
	Neutral	37	13.0
	Agree	82	28.8
	strongly agree	121	42.5
	Total	285	100.0

Table 10: Efficiency 2

As shown above on table-10: 121 (42.5%) and 82 (28.8%) percent of candidates are strongly agreed and agreed respectively with the exam questions and related instructions or information can be accessed quickly and 37 (13.0%), 25 (8.8%) and 20 (7.0%) percent of candidates are neutral, disagreed and strongly disagreed respectively It means 71.3% of candidates are satisfied that the exam questions and related instructions or information can be accessed quickly.

Navigation paths or menu or menu moves can be accessed quickly

		Frequency	Percent
Valid	strongly disagree	23	8.1
	disagree	28	9.8
	neutral	38	13.3
	agree	77	27.0
	strongly agree	119	41.8
	Total	285	100.0

Table 11: Efficiency 3

As shown above on table-11: 119 (41.8%) and 77 (27.0%) percent of candidates are strongly agreed and agreed respectively with Navigation paths or menu or menu moves can be accessed quickly and 38 (13.3%), 28 (9.8%) and 23 (8.1%) percent of candidates are neutral, disagreed

and strongly disagreed respectively, that is 68.8% of candidates are satisfied on system navigation paths.

The system enables me to effectively complete tasks			
		Frequency	Percent
Valid	strongly disagree	26	9.1
	disagree	37	13.0
	neutral	61	21.4
	agree	67	23.5
	strongly agree	94	33.0
	Total	285	100.0

Table 12 : *Efficiency 4*

The system enables me to effectively complete tasks as shown above on table-12: 94 (33.0%) and 67 (23.5%) percent of candidates are strongly agreed and agreed respectively and 61 (21.4%), 37 (13.0%) and 26 (9.1%) percent of candidates are neutral, disagreed and strongly disagreed respectively, hat is 56.5% of candidates are satisfied on effectiveness.

4.2.2. DATA ANALYSIS FOR CBA INFORMATION QUALITY

4.3.2.1. Interaction

My interaction with the system is understandable			
		Frequency	Percent
Valid	strongly disagree	30	10.5
	disagree	22	7.7
	neutral	51	17.9
	agree	84	29.5
	strongly agree	98	34.4
	Total	285	100.0

Table13: Interaction 1

My interaction with the system is understandable as shown above on table-13: 98 (34.4%) and 84 (29.5%) percent of candidates are strongly agreed and agreed respectively and 51 (17.9%), 22 (7.7%) and 30 (10.5%) percent of candidates are neutral, disagreed and strongly disagreed respectively, that is 63.9% of candidates are satisfied system interaction.

I feel the Computer Based Assessment (CBA) is Interactive (provides clear hints, examples and messages)					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly disagree	21	7.4	7.4	7.4
	disagree	40	14.0	14.0	21.4
	neutral	55	19.3	19.3	40.7
	agree	86	30.2	30.2	70.9
	strongly agree	83	29.1	29.1	100.0
	Total	285	100.0	100.0	

Table 14: Interaction 2

I feel the Computer Based Assessment (CBA) is Interactive (provides clear hints, examples and messages) as shown above on table-14: 83 (29.1%) and 86 (30.2%) percent of candidates are strongly agreed and agreed respectively and 55 (19.3%), 40 (14.0%) and 21 (7.4%) percent of candidates are neutral, disagreed and strongly disagreed respectively, that is 59.3% of candidates feel CBAs is interactive and they are satisfied with it.

Page by page questions makes me feel better in the exam			
		Frequency	Percent
Valid	strongly disagree	29	10.2
	disagree	37	13.0
	neutral	48	16.8
	agree	94	33.0
	strongly agree	77	27.0
	Total	285	100.0

Table 15: Interaction 3

Page by page questions makes me feel better in the exam as shown above on table-15: 77 (27.0%) and 94 (33.0%) percent of candidates are strongly agreed and agreed respectively and 48 (16.8%), 37 (13.0%) and 29 (10.2%) percent of candidates are neutral, disagreed and strongly disagreed respectively, that is 60% of candidates are satisfied of they feel better with page by page during the examination.

4.3.3. DATA ANALYSIS FOR CBA TECHNICAL QUALITY

4.3.3.1. Memorability

The interface of Computer Based Assessment (CBA) is memorable.			
		Frequency	Percent
Valid	strongly disagree	27	9.5
	disagree	31	10.9
	neutral	71	24.9
	agree	79	27.7
	strongly agree	77	27.0
	Total	285	100.0

Table 16: Memorability 1

The interface of Computer Based Assessment (CBA) is memorable as shown above on table-17: 77 (27.0%) and 79 (27.7%) percent of candidates are strongly agreed and agreed respectively and 71 (24.9%), 31 (10.9%) and 27 (9.5%) percent of candidates are neutral, disagreed and strongly disagreed respectively, that is 54.7% of candidates are memorized the interface of CBAs.

The use of CBAS can be remembered easily			
		Frequency	Percent
Valid	strongly disagree	30	10.5
	disagree	35	12.3
	neutral	52	18.2
	agree	82	28.8
	strongly agree	86	30.2
	Total	285	100.0

Table 17: Memorability 2

The use of CBAs can be remembered easily as shown above on table-17: 86 (30.2%) and 82 (28.8%) percent of candidates are strongly agreed and agreed respectively and 52 (18.2%), 35 (12.3%) and 30 (10.5%) percent of candidates are neutral, disagreed and strongly disagreed respectively, that is 59.0% of candidates are easily remembered how they use CBAs.

How to use CBAS can be remembered easily if I use it again after a while			
		Frequency	Percent
Valid	strongly disagree	29	10.2
	disagree	30	10.5
	neutral	44	15.4
	agree	79	27.7
	strongly agree	103	36.1
	Total	285	100.0

Table 18: Memorability 3

How to use CBA can be remembered easily if I use it again after a while as shown above on table-18: 103 (36.1%) and 79 (27.7%) percent of candidates are strongly agreed and agreed respectively and 44 (15.4%), 30 (10.5%) and 29 (10.2%) percent of candidates are neutral, disagreed and strongly disagreed respectively, that is 63.8% of candidates are easily remembered how they use CBAs again.

CBAS have appropriate background color.

		Frequency	Percent
Valid	strongly disagree	29	10.2
	disagree	45	15.8
	neutral	61	21.4
	agree	68	23.9
	strongly agree	82	28.8
	Total	285	100.0

Table 19: Memorability 5

CBAs have appropriate background color as shown above on table-19: 82 (28.8%) and 68 (23.9%) percent of candidates are strongly agreed and agreed respectively and 61 (21.4%), 45 (15.8%) and 29 (10.2%) percent of candidates are neutral, disagreed and strongly disagreed respectively, that is 52.7% of candidates are satisfied with appropriate colors of CBAs.

4.3.3.2. Learnability

The menu and contents in the Computer Based Assessment (CBAs) can be learned easily			
		Frequency	Percent
Valid	strongly disagree	23	8.1
	disagree	33	11.6
	neutral	70	24.6
	agree	75	26.3
	strongly agree	84	29.5
	Total	285	100.0

Table 20: Learnability 1

As shown above on table-20: 84 (29.5%) and 75 (23.9%) percent of candidates are strongly agreed and agreed respectively for The menu and contents in the Computer Based Assessment (CBA) can be learned easily and 70 (24.6%), 33 (11.6%) and 23 (8.1%) percent of candidates are neutral, disagreed and strongly disagreed respectively, that is 53.4% of candidates are can be learned easily of the system menu and contents.

The use of Computer Based Assessment (CBA) can be learned without written instruction			
		Frequency	Percent
Valid	strongly disagree	25	8.8
	disagree	36	12.6
	neutral	61	21.4
	agree	72	25.3
	strongly agree	91	31.9
	Total	285	100.0

Table 21: Learnability 2

The use of Computer Based Assessment (CBA) can be learned without written instruction as shown above on table-21: 91 (31.9%) and 72 (25.3%) percent of candidates are strongly agreed and agreed respectively and 61 (21.4%), 36 (12.6%) and 25 (8.8%) percent of candidates are neutral, disagreed and strongly disagreed respectively, that is 57.2% of candidates are can learn the use of CBAs without written instruction.

All the information (e.g. instructions on how to use the system) presented by Computer Based Assessment (CBA) can be easily learned.

		Frequency	Percent
Valid	strongly disagree	26	9.1
	disagree	36	12.6
	neutral	43	15.1
	agree	97	34.0
	strongly agree	83	29.1
	Total	285	100.0

Table 22: Learnability 3

All the information (e.g. instructions on how to use the system) presented by Computer Based Assessment (CBA) can be easily learned as shown above on table-22: 83 (29.1%) and 97 (34.0%) percent of candidates are strongly agreed and agreed respectively and 43 (15.1%), 36 (12.6%) and 26 (9.1%) percent of candidates are neutral, disagreed and strongly disagreed respectively, that is 63.1% of candidates are easily learned the information on CBAs.

The CBA's navigational path can be easily learned			
		Frequency	Percent
Valid	strongly disagree	25	8.8
	disagree	29	10.2
	neutral	70	24.6
	agree	72	25.3
	strongly agree	89	31.2
	Total	285	100.0

Table 23: Learnability 4

As shown above on table-23: (31.2%) and (25.3%) percent of candidates are strongly agreed and agreed respectively for The CBA's navigational path can be easily learned and (24.6%), (10.2%) and (8.8) percent of candidates are neutral, disagreed and strongly disagreed respectively, that is 56.5% of candidates are satisfied on the CBAs has easily navigational path.

It is easy to become skillful at using the system			
		Frequency	Percent
Valid	strongly disagree	25	8.8
	Disagree	29	10.2
	Neutral	59	20.7
	Agree	83	29.1
	strongly agree	89	31.2
	Total	285	100.0

Table 24: Learnability 5

It is easy to become skillful at using the system as shown above on table-24: (31.2%) and (29.1%) percent of candidates are strongly agreed and agreed respectively and (20.7%), (10.2%) and (8.8%) percent of candidates are neutral, disagreed and strongly disagreed respectively, that is 60.3% of candidates are they can easy to become skillful.

I was fully able to use the computer and Internet before I began using the Computer Based Assessment (CBA)			
		Frequency	Percent
Valid	strongly disagree	25	8.8
	Disagree	29	10.2
	Neutral	31	10.9
	Agree	65	22.8
	strongly agree	135	47.4
	Total	285	100.0

Table 25: Learnability 6

I was fully able to use the computer and Internet before I began using the Computer Based Assessment (CBA) as shown above on table-25: (47.4%) and (22.8%) percent of candidates are strongly agreed and agreed respectively for and (10.9%), (10.2%) and (8.8%) percent of candidates are neutral, disagreed and strongly disagreed respectively, that is 70.2% of candidates are fully able to use the computer and Internet before they attend the assessment.

4.3.4. DATA ANALYSIS FOR CBA SERVICE QUALITY

4.3.4.1. Response time

The system provides immediate feedback			
		Frequency	Percent
Valid	strongly disagree	15	5.3
	Disagree	26	9.1
	Neutral	21	7.4
	Agree	66	23.2
	strongly agree	157	55.1
	Total	285	100.0

Table 26: Response time 1

The system provides immediate feedback as shown above on table-26: 157 (55.1%) and 66 (23.2%) percent of candidates are strongly agreed and agreed respectively and 21 (7.4%), 26 (9.1%) and 15 (5.3%) percent of candidates are neutral, disagreed and strongly disagreed respectively, that is 78.3% of candidates are satisfied on getting immediate feedback.

The system demonstrated fast, consistent response time			
		Frequency	Percent
Valid	strongly disagree	36	12.6
	disagree	54	18.9
	neutral	35	12.3
	agree	62	21.8
	strongly agree	98	34.4
	Total	285	100.0

Table 27: Response time 2

The system demonstrated fast, consistent response time as shown above on table-27: 98 (34.4%) and 62 (21.8%) percent of candidates are strongly agreed and agreed respectively for and 35 (12.3%), 54 (18.9%) and 36 (12.6%) percent of candidates are neutral, disagreed and strongly disagreed respectively, that is 56.2% of candidates are satisfy on getting fast and consistent response.

The system enables me to complete my task faster than paper-pencil form			
		Frequency	Percent
Valid	strongly disagree	41	14.4
	disagree	33	11.6
	neutral	42	14.7
	agree	63	22.1
	strongly agree	106	37.2
	Total	285	100.0

Table 28: Response time 3

The system enables me to complete my task faster than paper-pencil form as shown above on table-28: 106 (37.2%) and 63 (22.1%) percent of candidates are strongly agreed and agreed respectively and 42 (14.7%), 33 (11.6%) and 41 (14.4%) percent of candidates are neutral, disagreed and strongly disagreed respectively, that is 59.3% of candidates are complete their tasks faster than paper-pencil forms.

4.3.4.2. Satisfaction

I enjoyed CBA			
		Frequency	Percent
Valid	strongly disagree	30	10.5
	disagree	46	16.1
	neutral	66	23.2
	agree	48	16.8
	strongly agree	95	33.3
	Total	285	100.0

Table 29: Satisfaction 1

As shown above on table-29: 33.3% and 16.8% percent of candidates are strongly agreed and agreed respectively for I enjoyed CBA and 23.2%, 16.1% and 10.5% percent of candidates are neutral, disagreed and strongly disagreed respectively, that is 50.1% of candidates are enjoyed CBAs.

CBE is better than paper-pencil form			
		Frequency	Percent
Valid	strongly disagree	35	12.3
	disagree	42	14.7
	neutral	37	13.0
	agree	61	21.4
	strongly agree	110	38.6
	Total	285	100.0

Table 30: Satisfaction 2

CBA is better than paper-pencil form as shown above on table-30: 38.6% and 21.4% percent of candidates are strongly agreed and agreed respectively and 13.0%, 14.7% and 12.3% percent of

candidates are neutral, disagreed and strongly disagreed respectively, that is 60.0% of the candidates agreed on CBA is better than paper-pencil form.

I am satisfied with the accuracy of CBA			
		Frequency	Percent
Valid	strongly disagree	31	10.9
	disagree	48	16.8
	neutral	50	17.5
	agree	57	20.0
	strongly agree	99	34.7
	Total	285	100.0

Table 31: Satisfaction 3

As shown above on table-31: 99 (34.7%) and 57 (20.0%) percent of candidates are strongly agreed and agreed respectively and 50 (17.5%), 48 (16.8%) and 31 (10.9%) percent of candidates are neutral, disagreed and strongly disagreed respectively, that is 54.7% of candidates are satisfied with the accuracy of CBA.

I would recommend the system (CBA) to my friends			
		Frequency	Percent
Valid	strongly disagree	35	12.3
	disagree	45	15.8
	neutral	50	17.5
	agree	67	23.5
	strongly agree	88	30.9
	Total	285	100.0

Table 32: Satisfaction 4

I would recommend the system (CBA) to my friends as shown above on table-32: 88 (30.9%) and 67 (23.5%) percent of candidates are strongly agreed and agreed respectively and 50 (17.5%), 45(15.8%) and 35 (12.3%) percent of candidates are neutral, disagreed and strongly disagreed respectively, that is 54.4% of candidates are recommended there friends to use this system.

Taking this assessment has improved my overall computer knowledge			
		Frequency	Percent
Valid	strongly disagree	51	17.9
	disagree	35	12.3
	neutral	51	17.9
	agree	65	22.8
	strongly agree	83	29.1
	Total	285	100.0

Table 33: Satisfaction 5

As shown on table-33: Taking this assessment has improved my overall computer knowledge, 29.1% and 22.8% percent of candidates are strongly agreed and agreed respectively and 17.9%, 12.3% and 17.9% percent of candidates are neutral, disagreed and strongly disagreed respectively, that is 51.9% of candidates are improve their computer knowledge after using CBAs.

After I took this assessment, my attitude towards having a completely CBA environment has changed positively			
		Frequency	Percent
Valid	strongly disagree	39	13.7
	disagree	46	16.1
	neutral	42	14.7
	agree	73	25.6
	strongly agree	85	29.8
	Total	285	100.0

Table 34: Satisfaction 6

After I took this assessment, my attitude towards having a completely CBA environment has changed positively as shown above on table-34: 85 (29.8%) and 73 (25.6%) percent of candidates are strongly agreed and agreed respectively and 42 (14.7%), 46 (16.1%) and 39 (13.7%) percent of candidates are neutral, disagreed and strongly disagreed respectively, that is 55.4% of candidates have positive attitude towards CBAs.

I personally benefitted from the existence of CBA in this institution			
		Frequency	Percent
Valid	strongly disagree	35	12.3
	disagree	44	15.4
	neutral	54	18.9
	agree	50	17.5
	strongly agree	102	35.8
	Total	285	100.0

Table 35: Satisfaction 7

I personally benefitted from the existence of CBA in this institution as shown above on table-35: 35.8% and 17.5% percent of candidates are strongly agreed and agreed respectively and

18.9%, 15.4% and 12.3% percent of candidates are neutral, disagreed and strongly disagreed respectively, that is 53.3% of candidates are benefited from CBAs.

CBA is extremely useful			
		Frequency	Percent
Valid	strongly disagree	36	12.6
	disagree	37	13.0
	neutral	46	16.1
	agree	55	19.3
	strongly agree	111	38.9
	Total	285	100.0

Table 36: Satisfaction 8

CBA is extremely useful as shown above on table-36: 38.9% and 19.3% percent of candidates are strongly agreed and agreed respectively and 16.1%, 13.0% and 12.6% percent of candidates are neutral, disagreed and strongly disagreed respectively, that is 59.2% of candidates are agreed on usefulness of CBAs.

Overall, I was satisfied with this CBA			
		Frequency	Percent
Valid	strongly disagree	47	16.5
	disagree	43	15.1
	neutral	43	15.1
	agree	64	22.5
	strongly agree	88	30.9
	Total	285	100.0

Table 37: Satisfaction 9

Overall, I was satisfied with this CBA as shown above on table-37: 88 (30.9%) and 64 (22.5%) percent of candidates are strongly agreed and agreed respectively and 43 (15.1%), 43 (15.1%) and 47 (16.5%) percent of candidates are neutral, disagreed and strongly disagreed respectively, that is 53.4% of candidates are Overall satisfied on CBAs.

4.4. RELIABILITY

Reliability Statistics

	system quality	information quality	technical quality	service quality	Overall value
Cronbach's Alpha	.948	.847	.956	.959	.981
N of Items	10	3	11	12	36

table 38:Reliability Statistics

On the above table-38: The instrument for this study contains 36 items that are in a Likert scale type. The overall reliability of the instruments is measured. A cronbach‟s alpha of 0.981 is obtained which is well above what is considered acceptable by scholars which is 70% (D.L.R Van der Waldt, T.M. Rebello and W.J. Brown, 2009).

4.5. RESULT OF CORRELATION ANALYSIS

Correlation matrix demonstrates how each CBAs quality characteristics such as system quality, information quality, technical quality and service quality was correlated with consumer's satisfaction. The result would be demonstrated as follows:

Correlations

Satisfaction Factors	System Quality Characteristics		Ease Of Use	Efficiency	Interaction	Memorability	Learnability	Response Time	Satisfaction
Customer Satisfaction		Pearson Correlation	1						
		Sig. (2-tailed)							
		N	285						
System quality	Ease of use	Pearson Correlation	.590**	1					
		Sig. (2-tailed)	.000						
		N	285	285					
	Efficiency	Pearson Correlation	.491**	.551**	1				
Information quality		Sig. (2-tailed)	.000	.000					
		N	285	285	285				
	Interaction	Pearson Correlation	.599**	.539**	.633**	1			
		Sig. (2-tailed)	.000	.000	.000				
		N	285	285	285	285			
Technical quality	Memorability	Pearson Correlation	.549**	.417**	.499**	.610**	1		
		Sig. (2-tailed)	.000	.000	.000	.000			
		N	285	285	285	285	285		
	Learnability	Pearson Correlation	.641**	.541**	.588**	.667**	.666**	1	
		Sig. (2-tailed)	.000	.000	.000	.000	.000		
		N	285	285	285	285	285	285	
Service quality	Response time	Pearson Correlation	.499**	.364**	.341**	.564**	.460**	.421**	1
		Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	
		N	285	285	285	285	285	285	285

**. Correlation is significant at the 0.01 level (2-tailed).

Table 39: *Correlation*

As shown on table 39: Test Correlation analysis aims to see the closeness of the relationship between two or more variables. The greater the correlation coefficient means the greater the degree of the relationship between two variables. Pearson correlation is usually in a linear relationship (both increased or both decreased). The criteria for correlation coefficient are: very strong > = +/- 0.80, strong = +/- 0.60 - 0.80, medium = +/- 0.40 - 0.60, low = +/- 0.20 - 0.40, and very low <= +/- 0.20 (Feby Artwodini Muqtadiroh et al.) based on the above explanation correlation for this research are most of the results shows perfectly positive and moderate correlation between variables. Significance (2-tailed) indicates the statistical significance level of the variable less than 0.05. Here, $p < 0.0005$, so this shows the variables are statistically significant in this case and the strong and greater correlation coefficient had learnability of CBAs this implies technical quality has the greater degree of relationship with CBAs customer satisfaction.

4.6. HYPOTHESIS TESTING

$H_0$1: System Quality has no positive and significant influences on User Satisfaction;

Ha1: System Quality has positive and significant influences on User Satisfaction;

> From Table 39, it is clear that there is a positive and statistically significant relationship between system quality and user or customer satisfaction (r = 0.590, r = 0.491 and p < 0.01) for both ease of use and efficiency. The researcher rejects the null hypothesis (H01) and concludes that there is sufficient evidence, that there is positive and statistically significant relationship between System Quality and customer satisfaction.

$H_0$2: Information Quality has no positive and significant influences on User (customer) Satisfaction;

Ha2: Information Quality has positive and significant influences on User Satisfaction;

From Table 39, it is clear that there is a positive and statistically significant relationship between Information Quality and User (customer) Satisfaction ($r = 0.599$ and $p < 0.01$). The researcher rejects the null hypothesis (H02) and concludes that there is sufficient evidence, that there is positive and statistically significant relationship between Information Quality and User (customer) Satisfaction.

$H_0$3: Technical Quality has no positive and significant influences on User Satisfaction.

Ha3: Technical Quality has positive and significant influences on User Satisfaction.

From Table 39, it is clear that there is a positive and statistically significant relationship between Technical Quality and User (customer) Satisfaction ($r = 0.549$, $r = 0.641$ and $p < 0.01$) for both memorability and learnability. The researcher rejects the null hypothesis (H03) and concludes that there is sufficient evidence, that there is positive and statistically significant relationship between Technical Quality and user (customer) satisfaction.

H04: Service Quality has no positive and significant influences on User Satisfaction.

Ha4: Service Quality has positive and significant influences on User Satisfaction.

From Table 39, it is clear that there is a positive and statistically significant relationship between Service Quality and User (customer) Satisfaction ($r = 0.499$ and $p < 0.01$). The researcher rejects the null hypothesis (H04) and concludes that there is sufficient evidence, that there is positive and statistically significant relationship between Service Quality and User (customer) Satisfaction.

4.7. RESULT OF REGRESSION ANALYSIS

4.7.1. ANOVA

The next table is the **ANOVA** table, which reports how well the regression equation fits the data (i.e., predicts the dependent variable) and is shown below:

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	314.196	4	78.549	74.409	.000[b]
	Residual	295.579	280	1.056		
	Total	609.775	284			

a. Dependent Variable: Overall, I was satisfied with this CBA

b. Predictors: (Constant), The system provides immediate feedback, It is easy to take an exam using Computer Based Assessment System (CBA)., The interface of Computer Based Assessment (CBA) is memorable., My interaction with the system is understandable.

Table 40: ANOVA[a]

The ANOVA tells us whether the model, overall, results in a significantly good degree of prediction of the outcome variable (Field, 2005). Since the significance result on the ANOVA table- 41 is 0.000 which is $p < 0.05$, the regression analysis proved the presence of a good degree of prediction.

4.7.2. MODEL SUMMARY

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.718[a]	.515	.508	1.02744

a. Predictors: (Constant), The system provides immediate feedback, It is easy to take an exam using Computer Based Assessment System (CBA)., The interface of Computer Based Assessment (CBA) is memorable., My interaction with the system is understandable.

b. Dependent Variable: Overall, I was satisfied with this CBA

Table 41: Model Summary[b]

As Riya Jain and Priya Chetty, *2019* Regression is a statistical technique to formulate the model and analyze the relationship between the dependent and independent variables. It aims to check the degree of relationship between two or more variables. This is done with the help of hypothesis testing. The hypothesis needs to be tested for determining the impact of CBAs impact on customer satisfaction.

Table 40 indicates R, R square, Adjusted R square and Standard error of the estimate. Further, it lists the independent variables that are entered into the regression model. R (0.718) is the correlation of the independent variables with the dependent variable after all the inter correlations are taken into account. The model summary, above shows the Adjusted R Square is 0.515 which means about 51.5% of the variance in the dependent variable i.e. consumers satisfaction was explained by the independent variables i.e. system quality, information quality, technical quality and service quality.

4.7.3. PRELIMINARY TEST RESULTS

4.7.3.1. NORMALIZATION

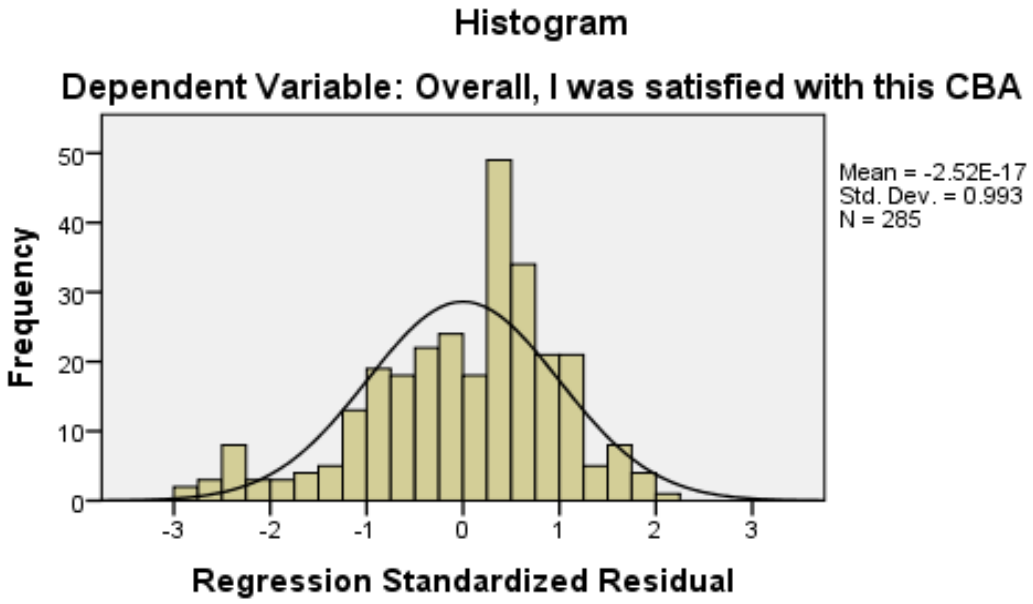

Figure 3: Histogram

In order to determine normality graphically, we can use the output of a normal P-P Plot. If the data are normally distributed, the data points will be close to the diagonal line. As shown on figure 4 below, can see from the normal P-P plot, the data is normally distributed.

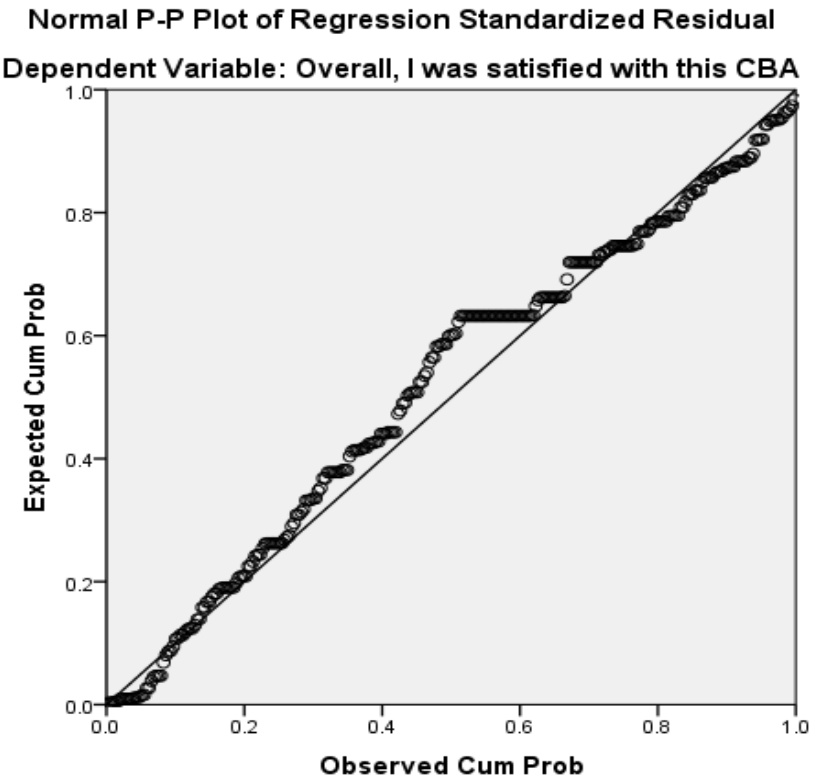

Figure 4: p-p plot

4.7.3. BETA COEFFICIENT

Coefficients[a]								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-.763	.258		-2.954	.003		
	System quality	.410	.061	.335	6.704	.000	.694	1.441
	Information quality	.217	.069	.192	3.146	.002	.463	2.159
	Technical quality	.250	.063	.214	3.992	.000	.600	1.667
	Service quality	.207	.062	.170	3.312	.001	.658	1.521
a. Dependent Variable: Overall, I was satisfied with this CBA								

Table 42: Coefficients

Table-42: shows regression coefficient (β) of system quality, information quality, technical quality and service quality. ” β” (beta) coefficient help to see the direction and strength of the relationship between independent and dependent variables. Accordingly, since the sign of the “β” coefficient for the independent variables is positive, there is a positive relationship between the independent variables (system quality, information quality, technical quality and service quality) and dependent variable (consumer’s satisfaction).

The above table 42 shows which among the independent variables influence customer satisfaction. Looking at the Beta under Standardized Coefficients, system quality of CBAs (0.335) value is greater than the other independent variables that is system quality has greater impact on customer satisfaction.

All independent variables are statistically significant, According to Andy Field (2005), when a statistic is significant, it simply means that you are very sure that the statistic is reliable.

4.8. OPEN ENDED DATA ANALYSIS

Some candidates had complain on system accessibility, i.e. they are not familiar with CBAs and some supervisors have lack of willingness to guide candidates during the assessment.

Some questions that have no choice under the questions, i.e. the questions are multiple choice and also the system had some graphical pictures that are not displayed or not visible.

The limitation of time is taking the candidates attention on CBAs but on paper and pencil assessment there is no tension regarding to time. And also all supervisors are not an expert on using computers and systems, some problems happens on using computer laboratory equipment's. During data collection the researcher observed that limited follow up and supervisor's skill gap on using system and facilitating networking system during the assessment.

4.9. QUALITATIVE DATA ANALYSIS

Qualitative data were collected through supervisor's consultation forum, which is prepared by CBAs administrators on the head office of OCACC.

The following statements are drive from supervisors and CBAs administrators from consultation forum:

- "There is some inappropriateness on the system for instance after the candidates are logging out the browser has saved the test except the history of browsers are not cleared and the candidates can copy the test questions by using back button on the browsers. After all the system is developing mainly for security purpose so that the questions are not still secure".
- "Because of limited number of questions on some discipline the system displays the same questions on different assessment, therefore the candidates are familiar with the assessment".
- "Because of limitation of shops, computers, and large number of candidates, electric fluctuation, connection problem and also there is accessibility problem".

- "There is a demo questions that are prepared for candidates to practice before starting the assessment but many supervisors are not yet use".
- "CBAs have on other features".
- "As a solution the Federal TVET has prepared copy distracter software to protect the system on supervisor's computer and upgrade the system to online".

4.10. DISCUSSION

According to the respondent: The descriptive result shows that most of consumers (65%) of candidates are satisfied on overall CBAs system quality, on information quality of CBAs 61% of respondents are satisfied, technical quality of CBAs 59% candidates are satisfied and 57% of candidates are satisfied on system service quality this impels that system quality has the greeter impact than others.

The results of correlation analysis suggested that the relationship of the four independent variables with dependent variables were moderate and positive. There was a positive and moderate relationship between system quality, information quality, technical quality and service quality with consumer's satisfaction. This suggested that CBAs characteristics which involve system quality, information quality, technical quality and service quality are positively related to consumer's satisfaction. As per the hypotheses tests, among the predictors: Ease of use ($r = 0.590$, $p < 0.01$) and Efficiency ($r = 0.491$, $p < 0.01$), this implies that system quality of CBAs positively affect customer satisfaction of CBAs, Interaction ($r = 0.599$, $p < 0.01$), this implies information quality positively affect customer satisfaction of CBAs Memorability ($r = 0.549$, $p < 0.01$) and Learnability ($r = 0.641$, $p < 0.01$) this implies technical quality of the CBAs positively affect customer satisfaction of CBAs and Response time ($r = 0.499$, $p < 0.01$) this implies service quality positively affect customer satisfaction of CBAs.

CBAs characteristics have a moderate and positive relationship with CBAs customer satisfaction.

Other research's related results shows that:

The study Abdulhakim et al. (2015) also examined the relationships between system quality and user satisfaction, and the impact of user satisfaction on usage continuance. The model adopted in this study explain that usability, efficiency, and reliability were positively related to system quality explaining the around 43.22% of the variance in system quality, while system quality was positively related to satisfaction explaining about 57.70 % of variance in satisfaction, and the last value of satisfaction was positively related to continuing to use explaining about 55.34% of the variance in intention to use. In sum-up, this study involved the system quality factors, specifically within the end-users' factors, which found that usability, reliability, and efficiency affected the system quality. Moreover, system quality is a significant attribute influencing user satisfaction in using an e-learning system. User satisfaction was also found to be significant in affecting users' intention to use.

The result of CBAs information quality are consistent with the results of Wu and Wang (2006), Halawi *et a*l (2007), and Kulkarni *et al* ., (2006) that the quality of information has a positive influence and significant to user satisfaction, and also Study on DAPODIK Information System: User Satisfaction as Mediation of System Quality and Information Quality on User Satisfaction , Farid et al., (2017) hat the quality of information has a positive influence and significant to user satisfaction but, in accordance with the research of Leclercq (2007) that the system quality has no significantly correlation to user satisfaction.

As it was mentioned earlier, multiple regression analysis was carried out to explain which predictor variable most affects the dependent variable and to formulate the research model. Among the four independent variables, system quality of CBAs affects consumers Satisfaction more than the other independent variables, due to $\beta = 0.335$. The least and but also significant contributor variable was service quality with $\beta = 0.170$. And on the model summary of the regression result, it was stated that ($R = 0.718$) is the correlation of the independent variables with the dependent variable after all the inter correlations were taken into account. Adjusted R

Square was 0.515 which means about 51.5% of the variance in the dependent variable i.e. consumer's satisfaction was explained by the independent variables.

The following table is a representation of the degree of influence towards consumer's satisfaction.

CHAPTER FIVE: CONCLUSION AND RECOMMENDATION

5.1. SUMMERY OF FINDINGS

- The major objective of this study was identifying the impact of computer based assessment on customer satisfaction to achieve this objective the researcher Used a combination of qualitative and quantitative research approaches or mixed research and from 384 OCACC candidates of sample size 285 respondents were fill out the questions properly and took OCACC supervisors consultation forum instead of interview, the data were collected through purposive or expert sampling and simple random sampling technique from both primary and secondary data source and the research design was explanatory and also the data analyzed by using SPSS v. 20 software.
- Four independent and one dependent variables were used to identify the major impact of CBAs on customer satisfaction the independent variables are system quality, information quality, technical quality and service quality, while the dependent variable were customer satisfaction, hear customers in these research are include all candidates of OCACC organization who took the examination by using CBAs.
- The correlation results shows that all variables are statistically significant and perfectly positive correlation ($p < 0.0005$).
- Technical quality of CBAs has the largest correlation value and the system quality has smallest correlation value both have moderate level of correlation.

The correlation matrix indicates that from selected CBAs quality characteristics: “Ease of use, Efficiency, Interaction, Memorability and Learnability” were positively and moderately correlated with consumer’s satisfaction with 95% confidence interval & < 0.01 p-value 2 tailed, by scoring a person correlation coefficient “R-value” of 0.590**, 0.491**, 0.599**, 0.549**, 0.641**, 0.499**.

- The highest strong coefficient of correlation in this research between CBAs characteristics and customer satisfaction is 0.641. In this case relatively technical quality

of CBAs had a highest strong relationship with customer's satisfaction ($r = 0.641$, $n = 285$, $p < 0.01$) than the other three independent variables.

- The score of the coefficient correlation determination (R- square) is 0.515 which indicate, 51.5% of the variability of overall consumer's satisfaction was explained by the four independent variables (system quality, information quality, technical quality and service quality).
- The descriptive result shows that most of consumers (65%) of candidates were satisfied on overall CBAs system quality, on information quality of CBAs, 61% of respondents were satisfied, technical quality of CBAs 59% candidates were satisfied and 57% of candidates are satisfied on system service quality this impels that according to customers response system quality of CBAs had the largest impact than others.
- According to qualitative data some difficulties are found that are related to lack of willingness of supervisors to support and equipment problem (shortage of computer laboratory, absence of electricity, etc.). Most of difficulties that are collected from qualitative and open ended questions are not exactly the system problem but stilly affect the customer satisfaction of CBAs.

5.2. CONCLUSION

The purpose of this study was to investigate the effect of computer based assessment system on customer satisfaction. To achieve the purpose of the study three basic research questions were proposed to investigate the effect of computer based assessment system on customer satisfaction and to answer the stated basic questions.

From the findings of the study it can be concluded that:

The entire research objective for this study was attained; the general objective of the study was to measure the impact of computer based assessment system on customer satisfaction by taking City government of Addis Abeba Education and Quality Control Authority as a case. All

selected computer based assessment system qualities have significant effect on consumer's satisfaction.

The descriptive result shows that based on customers the system quality of CBAs has a largest impact on customer's satisfaction relatively from other predictor variables.

Correlation analysis was conducted to analyze the relationships between variables; the correlation matrix revealed that all coefficients of correlations independent variables were positively and moderately correlated with the dependent variable.

Based on the correlation analysis all alternative hypotheses generated for this study is accepted and the entire null hypothesis rejected.

From the regression result, it can be concluded that system quality of CBA had the largest impact on consumer's satisfaction. This finding was also compared with empirical evidences to get additional insight. The result shows that all predictors contributed significant effect on consumer's satisfaction.

From open ended and interview result it can be concluded that candidate face challenges on using CBAs were lack of opportunity or there is no any opportunity to practice on the system. Even less willingness of supervisors to give Demo questions before the assessment and supervisor's limited support and guide.

5.3. RECOMMENDATION

Based on the finding and conclusion of the study the following recommendations are forwarded.

- CBAs satisfaction factors i.e. system quality, information quality, technical quality and service quality all have significant value over customer satisfaction. It implies that this factors can improve the system for better performance and also can improve customer satisfaction.
- City government of Addis Abeba Education and Quality Control Authority applied system is functional on networked computers but not online.
- The researcher recommended that if the system upgrade to online system, the use of online assessments saves organizations a lot of time and money. Often the assessments can be completed in less time, multiple candidates can complete the online assessment at the same time and there is no need for specialized (and expensive) personnel. Also, the test takers are able to take the assessment during class, or at home, using their own devices and so on, it can be allowed to use and add the above beliefs form online assessment and can make more secure from human touch.

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APPENDIX: I QUESTIONER

St. Mary’s University

School of Graduate

MASTERS OF BUSINESS ADMINISTRATION

City government of Addis Ababa occupational competency assessment and certification center (OCACC) has prepared knowledge assessment system for level 3 and 4 written exam. So I have prepared masters teases on the impact of this knowledge assessment system on customer satisfaction. The objective of this questionnaire is to identify the impact of CBAs on customer satisfaction. This questionnaire is developing for the evaluation of the computer based assessment system (Computerized knowledge assessment system). Your feedback is most important to evaluate and make improvements to this computer based assessment system.

I. Personal Information

1. Age

15 – 20 ☐ 21- 25 ☐ 26 – 30 ☐ above 30 ☐

2. Sex

Female ☐ Male ☐

3. Educational Background

TVET Level ☐ Diploma ☐ Degree ☐ Masters and above ☐

4. Do you take knowledge assessment before

Yes ☐ No ☐

5. Your answer for question number 4 is yes for what level you take the assessment

Level 3 ☐ level 4 ☐ other ☐

6. Haw much time you have taken the assessment

One ☐ two ☐ three ☐ above three ☐

7. Perfectly using computer and internet before taking the assessment.

Yes ☐ ☐ No

II. Questions for Computer Based Assessment System (CBA).

Please read carefully and give your answer as follows: 1 for strongly agree, 2 for Agree, 3 for Neutral, 4 for Disagree and 5 for strongly disagree by using "√ " sign on a given box.

Factors		Questions	1	2	3	4	5
Ease-of-use	EOF	1. It is easy to take an exam using Computer Based Assessment System (CBA).					
	EOF	2. CBA is user friendly.					
	EOF	3. Dealing with Computer Based Assessment System is easy, has no complexity					
	EOF	4. The overall screen layout and window design of the system is appropriate, easy to use.					
	EOF	5. The Login interface is easy to operate					
	EOF	6. I have followed the direction without any problem.					
Efficiency	EFF	1. The features or menus of Computer Based Assessment System (CBA) can be accessed quickly					
	EFF	2. The exam questions and related instructions or information can be accessed quickly					
	EFF	3. Navigation paths or menu or menu moves can be accessed quickly.					
	EFF	4. The system enables me to effectively complete tasks					
Interaction	INT	1. My interaction with the system is understandable.					
	INT	**2.** I feel the Computer Based Assessment (CBA) is Interactive (provides clear hints, examples and messages)					
	INT	3. Page by page questions makes me feel better in the exam					
Memorability	MEM	1. The interface of Computer Based Assessment (CBA) is memorable.					
	MEM	2. The use of CBA can be remembered easily					
	MEM	3. How to use CBA can be remembered easily if I use it again after a while					

	MEM	4. CBA has memorable colors					
	MEM	5. CBAS have appropriate background color.					
Learnability	LEA	1. The menu and contents in the Computer Based Assessment (CBA) can be learned easily					
	LEA	2. The use of Computer Based Assessment (CBA) can be learned without written instruction					
	LEA	3. . All the information (e.g. instructions on how to use the system) presented by Computer Based Assessment (CBA) can be easily learned					
	LEA	4. The CBA's navigational path can be easily learned					
	LEA	5. It is easy to become skillful at using the system.					
	LEA	6. I was fully able to use the computer and Internet before I began using the Computer Based Assessment (CBA).					
Response time	RES	**1.** The system provides immediate feedback					
	RES	**2.** The system demonstrated fast, consistent response time					
	RES	**3.** The system enables me to complete my task faster than paper-pencil form.					
Satisfaction	SAT	1. I enjoyed CBA.					
	SAT	2. CBE is better than paper-pencil form.					
	SAT	3. I am satisfied with the accuracy of CBA					
	SAT	4. I would recommend the system (CBA) to my friends.					
	SAT	5. Taking this assessment has improved my overall computer knowledge.					
	SAT	6. After I took this assessment, my attitude towards having a completely CBA environment has changed positively.					
	SAT	7. I personally benefitted from the existence of CBA in this institution					
	SAT	8. CBA is extremely useful					

	SAT	9. Overall, I was satisfied with this CBA					

III. Open ended questions

1. List any problems that you face during assessment.

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2. What are the solutions you think to solve these problems?

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APPENDIX: II QUESTIONER AMHARIC VERSION

ቅድስተ ምሪያም ዩኒቨርሲቲ ኮሌጅ

የንግድ አስተዳድር ድህረ ምረቃ ፕሮገራም ትምህርት ክፍል

ለተሳታፊዎች የተዘጋጀ መጠይቅ

ውድ ተሳታፊዎች፤ በአዲስ አበባ ከተማ አስተዳደር የትምህርትና ስልጠና ጥራት ሙያ ብቃት ምዘናና ማረጋገጫ ባለስልጣን በሙያ ብቃት ምዘና ሂደት (ሲኦሲ) ኮምፒተራይዝድ የጽሕፈት ፈተና ሲስተምን (computer based assessment system) በመጠቀም ላይ ስለሆንን ውጤታማነቱን መገምገምና ማሻሻል አስፈላጊ ነው። በመሆኑም ለደረጃ 3 እና 4 የጽሑፍ ፈተና (ሲ.ኦ.ሲ) ተመዛኞች የኮምፒውተራይዝድ የጽሑፍ ፈተና ሲስተም (computer based knowledge assessment system) በተፈታኞች ላይ ያሳደረውን ተፅዕኖ መገምገም በሚል የማስተርስ ድግሪ ማሟያ ጥናት እያደረግሁ እገኛለሁ። የዚህ መጠይቅ አላማ የኮምፒውተራይዝድ የጽሑፍ ፈተና ሲስተም በተመዛኞች ላይ ያለውን ተፅዕኖ ለመለየት እና ጠቃሚ አስተያየት ለመሰንዘር ነው:: እነዚህ ጥያቄዎች የተዘጋጁት ይህን ሲስተም ለማሻሻል እናንተ የምትሰጡት ሐሳብ በጣም አስፈላጊ ስለሆነ ነው። ስለሆነም፣ ከዚህ በታች የቀረቡትን ጥያቄዎች በጥንቃቄ በማንበብ ትክክለኛ መረጃ በመስጠት እንድትተባበሩ በትህትና እጠይቃለሁ። ስለትብብርዎም በቅድሚያ አመሰግናለሁ።

I. አጠቃላይ መረጃዎች፤

ከዚህ በታች ላሉት ጥያቄዎች በፊትለፊታቸው ባለው ሣጥን ውስጥ ይህንን "√"ምልክት በማድረግ መልስዎን ያመ ልክቱ።

1. እድሜ ፣

15 - 20 ☐ 21 - 25 ☐ 26 - 30 ☐ ከ30 በላይ ☐

2. ፆታ ፣

ሴት ☐ ወን☐

3. የትም ህርት ደረጃ

ቴክኒክና ሙያ ☐ ዲፕሎ ማ☐ ዲግሪ ☐ ማስትሬት ዲ☐ና በላይ

4. ከዚህ በፊት በኮምፒተራይዝድ ሲስተም የጽሑፍ ፈተና ወስደው ያውቃሉ?

አዎን ፣ ወስጃለሁ☐ አይ ፣ አልወሰድኩ☐

5. የ4ኛው ጥያቄ መልስዎ አዎን ከሆነ፤ፈተናውን የወሰዱበት ደረጃ (level) ምን ነበር?

ደረጃ 3☐ ደረጃ ☐ ☐

6. ፈተናውን የወሰዱት ለስንተኛ ጊዜ ነበር?

ለመጀመሪያ ጊዜ ☐ ለሁለተኛ ጊዜ ☐ ለሦስተኛ ጊዜ ☐ ከሦስት ጊዜ በላይ ☐

7. ከዚህ በፊት ኮምፒውተርና ኢንተርኔት በደንብ መጠቀም እችላለሁ።

አዎን ፣እችላለሁ ☐ አይ፣ አልችልም ☐

II. የኮምፒተራይዝድ ሲስተም የጽሑፍ ፈተናን በተመለከተ የቀረቡ ጥያቄዎች

ለእያንዳንዱ ጥያቄ በመልስነት ሊቀርቡ ይችላሉ ተብለው የሚታሰቡ አምስት አማራጮች ቀርበዋል። እነርሱም፡- 5 = በጣም እስማማለሁ፣ 4 = እስማማለሁ፣ 3 = እርግጠኛ አይደለሁም፤ 2 = አልስማማም፤ 1= በጭራሽ አልስማማም የሚሉ ናቸው። ከዚህ በታች በቀረቡት አማራጮች ትይዩ ከ 5—1 ተራ ቁጥር የተመለከቱ ክፍት ቦታዎች በሠንጠረዥ ቀርበዋል። እያንዳንዱን ጥያቄ በጥንቃቄ በማንበብ፣ የሚሰጡትን መልስ ይህንን "√" ምልክት በተሰጡት ሳጥኖች ውስጥ በማስቀመጥ ይግለፁ።

ምክንያቶች (Factors)	ጥያቄዎች	5	4	3	2	1
1. ለአጠቃቀም ቀላልነቱ (Ease-of-use)	1.1. ሲስተሙን ተጠ ቅሞ መፈተን ቀላል ነው።					
	1.2. ሲስተሙን በቀላሉ በመረዳት መጠቀም ችያለሁ::					

	1.3. ሲስተሙ ለአጠቃቀም ቀላል ፣ ው ስብስብት የሌለው ነው					
	1.4. እስክሪን አቀማመጡ ተገቢ፣ ለአጠቃቀም ቀላል ነዉ ::					
	1.5. የመግቢያው (login interface) ቀላል ነው::					
	1.6. ሁሉንም ሂደቶች (steps) ያለችግር መጠ ቀም ችያለሁ::					
2. ውጤታማነቱ (Efficiency)	2.1. ዝርዝር አማራጮችን (menus) በፍጥነት አገኛቸዋለሁ::					
	2.2. የፈተናውን ጥያቄዎችንና ትእዛዞችን በፍጥነት ያመጣ ልኛል::					
	2.3. መምረጫዎችን ስጫን በፍጥነት ያመጣልኛል::					
	2.4. ሲስተሙ ፈተናየን በተሳካ ሁ ኔታ እንድ ጨ ርስ አስችሎኛል::					
3. መስተጋብ ር (Interaction)	3.1. ከሲስተሙ ጋር በቀላሉ መግባባት ችያለሁ ::					
	3.2. ሲስተሙ ግልፅ መልእክቶች ፣ ጥቆማዎችና ምሳሌዎች እንዳሉት አስባለሁ::					
	3.3. ወደቀጣይ ገፆች ባለፍኩ ቁጥር የተሻለ ስሜ ት ይሰማ ኛል::					
4. የማስታዎስ ችሎታ (Memorability)	4.1. የሲስተሙ በይነመረብ/መግቢያ (interface) የማ ይረሳ ነው::					
	4.2. የሲስተሙን አጠቃቀም በቀላሉ አስታውሳለሁ ::					
	4.3. ከቆይታ በኋላ እንደገና ለፈተና ብቀርብ ሲስተሙን እንዴት እንደምጠ ቀም አስታውሳለሁ ::					
	4.4. ሲስተሙ የሚታወስ ቀለም አለው::					
	4.5. ሲስተሙ ተገቢ የመደብ (background) ቀለም አለው።					
5. መ ማ ር (Learnability)	5.1. የሲስተሙን ዝርዝሩንና ይዘቱን በቀላሉ ለመማር ችያለሁ					
	5.2. ስለአጠቃቀሙ የተፃፈ ትእዛዝ ባይኖርም ሲስተሙን ለመጠቀም ቀላል ነው ::					
	5.3. በሲስተሙ ላይ ስለአጠቃቀሙ የተቀመጡትን ትእዛዞች በቀላሉ ለመረዳት ችያለሁ ::					

	5.4. የሲስተሙን ቅደም ተከተል በቀላሉ አውቄያለሁ::					
	5.5. ሲስተሙን በቀላሉ በድንብ መጠቀም ችያለሁ::					
	5.6. ሲስተሙን ከመጠቀሜ በፊት ኮምፒውተርና ኢንተርኔት በደንብ መጠቀም እችላለሁ።					
6. የምላሽ ጊዜ (Response time)	6.1. ሲስተሙ በፍጥነት ውጤቴን ያሳውቀኛል።					
	6.2. ሲስተሙን በምጠቀምበት ሰአት አይቆራረጥም::					
	6.3. በወረቀት ከመፈተን በሲስተም መፈተን የተሻለ ፍጥነት አለው።					
7. እርካታ (Satisfaction)	7.1. በሲስተሙ ደስተኛ ነኝ::					
	7.2. ሲስተሙ ከወረቀትና እርሳስ ፈተና በተሻለ ለአሰራር ቀላል ነው።					
	7.3. በሲስተሙ ትክክለኛነት ተደስቻለሁ::					
	7.4. ለጓደኞቼ በሲስተሙ መፈተን የተሻለ እንደሆነ እመክራለሁ::					
	7.5. በሲስተሙ በመፈተኔ የኮምፒውተር ችሎታዬን አሻሽያለሁ።					
	7.6. ፈተናውን ከወሰድኩ በኋላ ለሲስተሙ ያለኝ አመለካከት ጥሩ ሆኗል::					
	7.7. ሲስተሙ በተቋሙ ተገባራዊ በመሆኑ ተጠቃሚ ሆኛለሁ።					
	7.8. ሲስተሙ በጣም ጠቃሚ ነው::					
	7.9. በአጠቃላይ በሲስተሙ እረክቻለሁ።					

III. ክፍት ጥያቄዎች

1. በምዘና ወቅት ያጋጠምዎት ችግር ካለ ይዘርዝሩ።

_____

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_____

2. ለችግሩ መፍትሄ ይሆናል ብለው የሚያስቡትን ቢያጋሩኝ።

_____

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_____

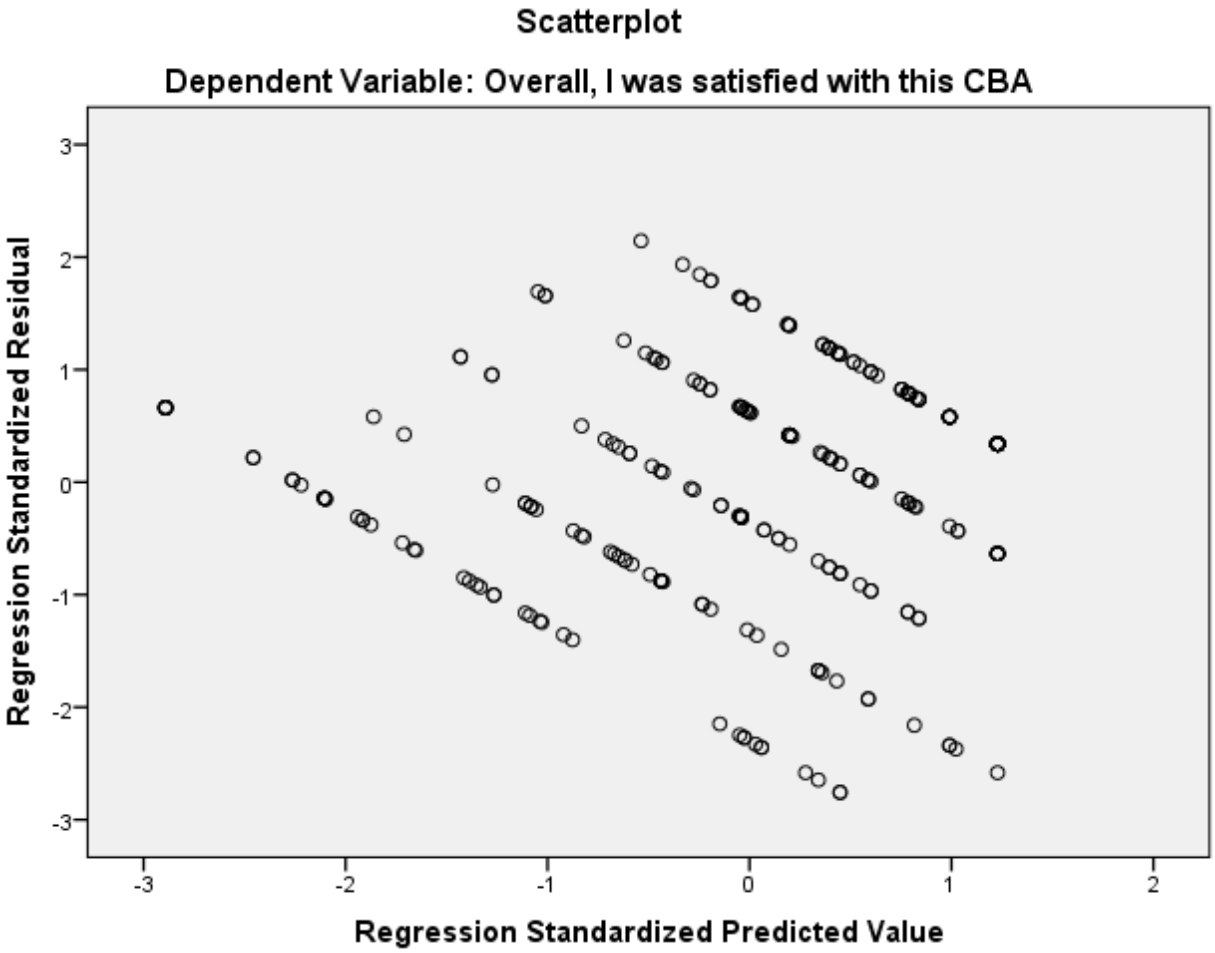
APPENDIX: III INTERVIEW QUESTIONS

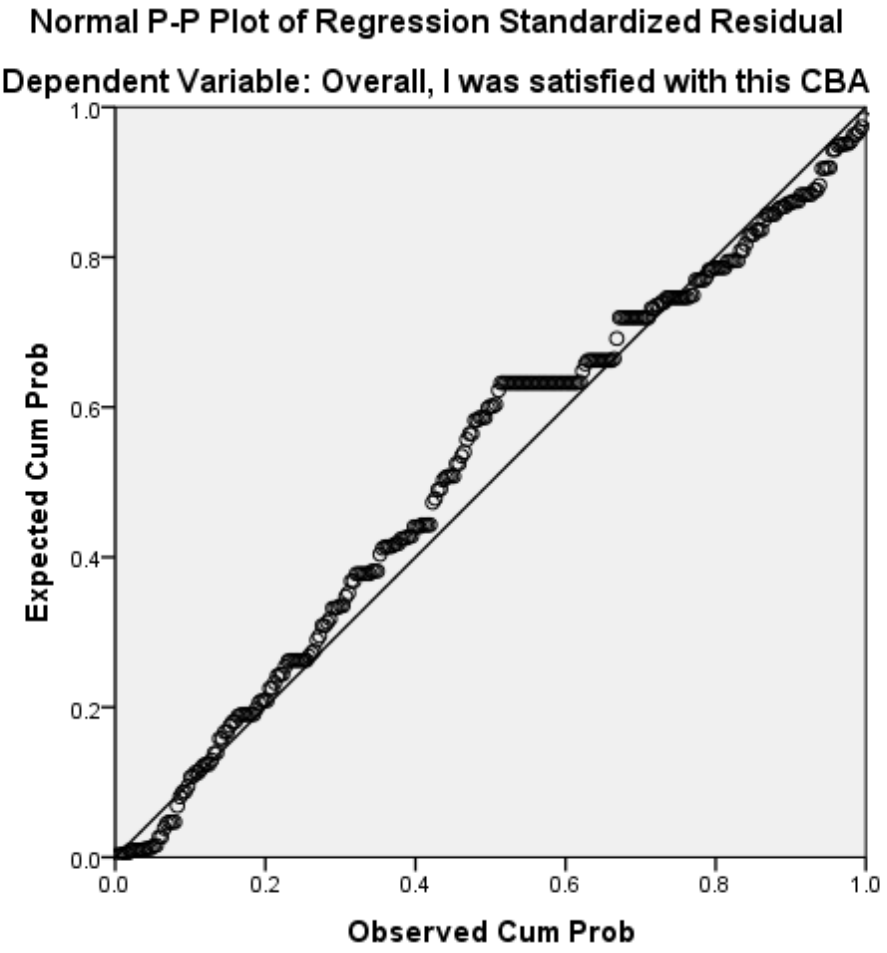
EXPERT VIEW INTERVIEW QUESTIONS

1. Are the contents of this CB assessment system appropriate?
2. Is there any shortcoming or inappropriateness?
3. Is there any way that the unique features or functions of CB assessment system can be much more manifested?

4. Which component or area needs to be improved most?
5. Is the screen and interface design of this online assessment system appropriate and convenient to use?
6. Are there any other issues or areas that have not been mentioned but need to be improved?

APPENDIX IV: DATA NORMALIZATION


Scatterplot
Dependent Variable: Overall, I was satisfied with this CBA
Regression Standardized Residual
Regression Standardized Predicted Value
3
2
1
0
-1
-2
-3
-3
-2
-1
0
1
2


Normal P-P Plot of Regression Standardized Residual
Dependent Variable: Overall, I was satisfied with this CBA
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0

APPENDIX V: CORRELATION RESULT

Correlations

		Overall, I was satisfied with this CBA	It is easy to take an exam using Computer Based Assessment System (CBA).	The features or menus of Computer Based Assessment System (CBA) can be accessed quickly	My interaction with the system is understandable.	The interface of Computer Based Assessment (CBA) is memorable.	The menu and contents in the Computer Based Assessment (CBA) can be learned easily	The system provides immediate feedback
Overall, I was satisfied with this CBA	Pearson Correlation	1	.590**	.491**	.599**	.549**	.641**	.499**
	Sig. (2-tailed)		.000	.000	.000	.000	.000	.000
	N	285	285	285	285	285	285	285
It is easy to take an exam using Computer Based Assessment System (CBA).	Pearson Correlation	.590**	1	.551**	.539**	.417**	.541**	.364**
	Sig. (2-tailed)	.000		.000	.000	.000	.000	.000
	N	285	285	285	285	285	285	285
The features or menus of Computer Based Assessment System (CBA) can be accessed quickly	Pearson Correlation	.491**	.551**	1	.633**	.499**	.588**	.341**
	Sig. (2-tailed)	.000	.000		.000	.000	.000	.000
	N	285	285	285	285	285	285	285
My interaction with the system is understandable.	Pearson Correlation	.599**	.539**	.633**	1	.610**	.667**	.564**

	Sig. (2-tailed)	.000	.000	.000		.000	.000	.000
	N	285	285	285	285	285	285	285
The interface of Computer Based Assessment (CBAS) is memorable.	Pearson Correlation	.549**	.417**	.499**	.610**	1	.666**	.460**
	Sig. (2-tailed)	.000	.000	.000	.000		.000	.000
	N	285	285	285	285	285	285	285
The menu and contents in the Computer Based Assessment (CBA) can be learned easily	Pearson Correlation	.641**	.541**	.588**	.667**	.666**	1	.421**
	Sig. (2-tailed)	.000	.000	.000	.000	.000		.000
	N	285	285	285	285	285	285	285
The system provides immediate feedback	Pearson Correlation	.499**	.364**	.341**	.564**	.460**	.421**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	
	N	285	285	285	285	285	285	285