Addis Ababa University

Addis Ababa Institute of Technology

School of Mechanical and Industrial Engineering

Investigate the Impacts of competency based Computerized Assessment on the Quality of TVET Occupational Competency Assessment & certification system and to Propose Improvement Model: (A Case in Addis Ababa City Administration)

By

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Declaration

I declare here by the thesis entitled: *The Impacts of Computerized Assessment Model on the Quality of Occupational Competency Based Assessment and to Propose Improvement Model in Addis Ababa City Administration* presented for the requirement for the degree of Master of Science in industrial Engineering is prepared by me and it is original document.

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This is to certify that the thesis prepared by Mihret Tigabie entitled: *The Impacts of Computerized Assessment model on the Quality of Occupational Competency Based Assessment and to Propose Improvement Model In Addis Ababa City Administration* presented for the requirement for the Degree of Master of Science in Industrial Engineering complies with the regulation of the university and meets the accepted standards with respect to originality and quality.

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ABSTRACT

The Thesis aimed at investigating the impacts of competency based computerized assessment on the quality of occupational competency assessment and certification system implementation in TVET in Addis Ababa city administration. The study used a mixed research design, employing both quantitative and qualitative data. Purposive sampling and simple random sampling techniques have been used. The data has been collected using questionnaires and interviews; and secondary sources such as reports and policy documents are used. The finding revealed that the extent of deviation of practice of occupational competency based computerized assessment from the standard procedure and principles were beyond acceptable level. Rent seeking practices and interference of training regulator are some among major challenges. The encoding, handling and managing of assessment tool at CoC authority level is also not secured and incapability of the leading and implementing body is basically manifested by inability to implement the system as per the standard procedures and principles. Practices out of standard procedures in assessment centers like shortages of resources are indications for the incapability of proper implementations. The impacts encountering the implementation of occupational competency based computerized assessment could be mitigated through the new model of computerized assessment implementation and enhancing the leading and implementing capacity of the federal and city administration bodies. Assessment tool encoding, managing and controlling system could be established at federal level and keeping continuous capacity building and improvement activities. Utilizing resources for competency based computerized assessment based on the standard in the entire process, from registration to the assessment, is also part of sustainable solutions for the challenges.

Key words: Competency based computerized assessment, CoC authority and competency based computerized assessment improvement model.

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LIST OF ACRONYMS

CBT	Computer Based Training
EOS	Ethiopian Occupational Standard
TVET	Technical and Vocational Education and Training
FTA	Federal TVET Agency
UNESCO	United Nation Educational, Scientific and Cultural Organization
OECD	Organization for Economic Co-operation and Development
ILO	International Labour Organization
ASEAN	Association of Southeast Asian Nations
SEAMEO	Southeast Asian Ministers of Education Organization
GTP	Growth and Transformation Plan
ESDP	Educational Sustainable Development Plan
CoC	Center of Competence
FDRE	Federal Democratic Republic of Ethiopia
NTQF	National TVET Qualifications Framework
MoE	Ministry of Education
UK	United Kingdom
FTI	Federal TVET institute
ETF	European Training Foundation
LOA	Training Oriented Assessment

CHAPTER ONE

Introduction and Research Justification

1.1. Introduction

Assessment in general is a critical measurement of knowledge, skill and attitude for students what they have learnt (Brown et al., 1997). In the world experiences education and training system, Computer based assessment is not a new idea; it has been around in some form since 1950s, when the very first computer-based training (CBT) system was built in elementary & high school and higher education institutes to measure the students' knowledge. However, like CBT, computer-based assessments didn't get much recognition until a few decades ago, and it only started becoming really influential in the past few years, as online technologies have greatly advanced what is possible in educational sector like elementary, high school and higher education institutes. Because computer-based assessment has changed so much since its inception, it isn't always clear what people are talking about when they use the term (Daly & Waldron, 2002; Paterson, 2002). But in my searching of literatures in different sources, still I haven't got the related literatures to occupational competency based computerized assessment on TVET occupational competency assessment system.

When we are coming to Ethiopian context, computer-based assessment is implemented in some higher education institutes to measure the general knowledge of students (Turi, 2018). In Ethiopian TVET system with respect to assessment and certification, Occupational competency-based assessment has been started since 2010 (EOS & assessment directives, 2010). Occupational competency-based assessment is among the key strategy that is implemented to possess the quality of outcome-based training by measuring the performances of the trainees (TVET strategy, 2008). TVET occupational Competency based assessment has conducted to collect evidences whether a person owns competencies to do a given job as per defined standard (EOS) or not. Those who have demonstrated their competency by a given assessment as per a particular occupational standard, they have been given certificate of competency (Assessment directive, 2018).

Although occupational competency based computerized assessment system in Ethiopia, particularly in Addis Ababa city administration, has been implementing for the last three years, the successful achievements of TVET regard to numbers of enrolment, accessibility of colleges & competency based assessment;, are measured and documented in each year according to the Ethiopian occupational standard (EOS) which is prepared by the industry but there is still challenges regard to training quality such as improvement on the acceptance of TVET graduates by industries (FTA reports, 2018). Simultaneously, during the implementation of competency based computerized assessment, challenges are also increasingly facing and getting complex in every year related to the implementation of competency based computerized assessment model that is why the TVET graduates challenged by the industries to accept and join the world of work. In order to solve this challenge, the impacts of computerized assessment model on the quality of occupational competency-based assessment system has been investigated and improvement model was conducted which is considered as an important instrument to assure the quality of the assessment implementation system, the training and the quality of workforce in general.

In order to implement computerized assessment throughout the country, the impacts of computerized assessment on the quality of occupational competency-based assessment could be studied in depth and improvement model to particular challenges was recommended for the future improvement of TVET assessment implementation system. This is the very reason why this research study is initiated.

1.2. Background of the Study

Now days Technical and Vocational Education and Training, across the world, is the most preferable educational and training system that prepares people for the world of work by providing applicable knowledge, practical skills and right attitude to perform required jobs for middle level workers (UNESCO, 2017, TVET strategy, 2008). TVET is expected to address the numerous demands of countries economic, social and environmental nature by providing training for the people to develop their problem solving applicable knowledge, practical skills and right attitude for self-employment, wodge employment, decent work

environment and entrepreneurship development by promoting equitable, inclusive and sustainable economic growth, and supporting transitions to sustainable economies and environmental protection (UNESCO, 2017, TVET strategy, 2008).

Technical and vocational education and training (TVET) is steadily gaining popularity at the global debates and government priorities for education and national development agendas (Marope, et al, 2015). TVET is also considered highly in strategic and operational priorities of the G20, the Organization for Economic Co-operation and Development (OECD), and of multilateral organizations such as the International Labour Organization (ILO), UNESCO, ASEAN, and SEAMEO. To realize its potential to impact development, however, TVET systems need sustained transformation and revitalization. This was reflected in Shanghai Consensus (UNESCO, 2012).

In the Southeast Asian context, both ASEAN (the Association of Southeast Asian Nations) and SEAMEO (the Southeast Asian Ministers of Education Organization) have placed TVET as a priority agenda. ASEAN Work Plan on Education 2016-2020 under the Strategic Goal, states that ASEAN supports the development of TVET and Lifelong Learning by (a) maximizing access to TVET, (b) strengthening Regional Harmonization and TVET Personnel Development, (c) establishing Regional Quality Assurance and Recognition of TVET, and (d) reducing the gap between supply and demand of skilled labours.

In developing country, like Ethiopia, Education and training gives significant attention to technical and vocational skills development, specifically regarding access to convincing quality of Technical and Vocational Education and Training that helps for gaining of TVET skills to workers/employments, decent work environments and entrepreneurship development (GTP II, 2016, ESDP V, 2014).

When we have come to Ethiopia, TVET has long history but there was no proper system for better development of TVET sector until 2008. Since 2008 Ethiopia establish new TVET reforms which is shifted from impute based training system to outcome based and demand driven TVET system (TVET strategy, 2008). The practice of outcome based TVET system in Ethiopia has bench marked from

Germany, Australia, and Philippines which is characterized by the Ethiopian occupational standards which is prepared by practitioners who are representatives of the industries. In outcome based Ethiopian TVET system, trainings do not take place without the consideration of the outcome, project based on each competency and labor market demand just because it has to be happened. The outcome and project-based training is based on the demand of the industry that has stated in Ethiopian occupational standards traced on qualification level, sector type and quantity of workers needed in the market or industry. All qualification and competency level has been expressed in Occupational standard document (TVET strategy, 2008, Occ. St. dev. & ass. directive, 2018). According to national qualification framework, Ethiopian Occupational standards are constructed in combinations of the competencies which are required by an individual to do certain job (TVET strategy, 2008). Ethiopian Occupational Standards (EOS) are the most important quality assurance documents for Knowledge, skill and attitude and also it is the bases of TVET training and occupational competency-based assessments according to Ethiopian Occupational Competency Assessment and Certification Directive (TVET Directive, 2018).

Now days in Ethiopia, All TVET outcome-based trainings are measured by the implementation of occupational competency-based assessment to measure the performance of trainees before joining the world of work. Some regions in the country have implementing competency based computerized assessment by qualification level and by unit/s of competence that is implementing in all occupations for all candidates, and the assessment starts from the lowest qualification level and proceeds to the highest qualification level of the occupation according to the National TVET Qualification Framework (NTQF) in order to improve and keep the quality of the outcome based TVET training system. According to national qualification framework, there are five qualification levels in TVET and competency based computerized assessment has started from level three up to five (TVET strategy, 2008, EOS & Assessment Directive 2018).

According to the statistical data collected from FTA five years report, the

performance of TVET regard to enrolment and assessment is: targeted enrollment of trainees in the GTP II plan were 2,590,201 in 2015/16; 2,711,287 in 2016/17; 2,861,785 in 2017/18; 3,048,395 in 2018/19; 3,277,980 in 2019/20. However, the actual enrolment of trainees during GTP II were, 2,019,805 in 2015/16; 1,987,901 in 2016/17; 2,007,684 in 2017/18; 2,657,345 in 2018/19 and 2,673,989 in 2019/20.

When we compare the values targeted to be enrolled with the values actually accepted enrolment, the target met was only 77.98 % in 2015/16, 73.32 % in 2016/17, 70.17 % in 2017/18 and 87.17 % in 2018/19 and 81.57 % in 2019/20.On the other hand the Assessed and competent work forces which have been taking occupational competency based computerized assessment among actual trainees were 857,905 in 2015/16; 900,786 in 2016/17; 987,645 in 2017/18; 1,009,803 in 2018/19 and 589,787 in 2019/20. And when we compare the competent work forces with actually enrolment trainees were 42.47 % in 2015/16, 45.31 % in 2016/17, 49.19 % in 2017/18 and 38 % in 2018/19 and 22.05 % in 2019/20.

The Assessed and competent work forces which have been joining the market were 456,787 in 2015/16; 598,207 in 2016/17; 478,654 in 2017/18; 689,865 in 2018/19 and 278,653 in 2019/20. When we compare the assessed and competent workforces with the work forces that have been joining the market were 53.2 % in 2015/16; 66.4 % in 2016/17; 48.5 % in 2017/18; 68.3 % in 2018/19 and 47.2 % in 2019/20.This result shows that there is a problem on the implementation of occupational competency based computerized assessment system (FTA, 2019) because the industry has not accepted the assessed and competent work force due to their competences.

In this numerical data, all numbers of competent work force did not join the market. The industries say TVET graduates who have competency certificates are not performing well (TVET Industry Forum, 2018/19). Due to this FTA discuss in depth about the reasons in three consecutive years. The main gap of the rejection of competent trainees by the industries is the assessment modality (FTA Report, 2019).

In particular case, Addis Ababa city administration Occupational competency assurance authority has started the implementation of occupational competency based computerized assessment since 2018 through eight branches of assessment centers. The branch of Yeka sub city assessment center has implementing competency based computerized assessment in different occupations to improve the quality of occupational competency-based assessments. The implementation of competency based computerized assessment in Addis Ababa city administration is currently using regional assessment encoding model system. This has its own advantage and disadvantage. This study had assessed the impact of competency based computerized assessment & model type on the quality of occupational competency-based assessment system in the assessment center and in the city in general.

1.3. Statement of the Problem

The implementation of TVET training quality assurance standard system in Ethiopia has been started since 2010 (ECBP, 2014). Even though it has helped a lot in improving quality and relevance of technical and vocational education and training delivery, there is a visible drawbacks on quality of institutional infrastructure and training supplies for project based training, on the improvement on knowledge, skill & right attitude of trainers & trainees, institution leadership commitment and flexibility of trainings based on Ethiopian market driven occupational standards (FTA reports, 2018). Professional confidence of training completers have faced a challenges after gaining the competency certificates to be accepted from employer side due to lower performance of TVET completers skill on the actual working area. The main causes of lower performance of TVET graduate that could not be accepted by the employers are the problems of occupational competency based computerized assessment model system that is implemented currently in Ethiopia (MOE, 2016; GTP II, 2019; FTA, 2018).

The implementation of TVET occupational competence based computerized assessment in Ethiopia and specifically in Addis Ababa city administration, is straggling with several obstacles and challenges which have different natures in practices. According to the annual accomplishment reports of Federal TVET

Agency (2018), the obstacles and challenges facing to the implementation of competence based computerized assessment system are increasing and getting complex from time to time. The major constraints in the implementation of occupational competency based computerized assessment is the deviation of implementation against the principles and standard procedures of occupational competency based computerized assessment principles (FTA, 2018).

Hence, based on the above problems, the researcher has been conducting the study on the impacts of current computerized assessment model on the quality of occupational Competency based assessment in Addis Ababa city administration Occupational competency assurance authority and developed new model for computerized assessment implementation improvement and also the findings will be utilized as inputs in the design of solutions to the particular challenges and therefore improve the TVET competency based computerized assessment system effectiveness and enhancing the satisfaction of industries and citizens in general.

1.4. Basic Research Questions

The study will explore and seek answers to the following research questions:

1. What are the impacts of current competency based computerized assessment model on the quality of occupational competency-based assessment system?
2. What will be the new model of occupational competency based computerized assessment system?
3. What are the other proposed solutions (rather than computerized assessment remodeling) to the specific challenges of implementation of competency based computerized assessment for improvement and effectiveness?

1.5. Objectives of the Study

1.5.1. General Objective

The general objective of this study is to investigate the impacts of the current competency based computerized assessment on quality of occupational competency assessment and certification system and remodel the current competency based computerized assessment implementation model.

1.5.2. Specific Objectives

The specific objectives of this study are intended to:

1. To identify the impacts of current competency based computerized assessment on the quality of occupational competency-based assessment system
2. To remodel the current competency based computerized assessment implementation model.
3. To propose solutions to the specific challenges of implementation of competency based computerized assessment for improvement and effectiveness.

1.6. Significances of the Study

It is highly believed that the output of this research study will have great significance to improve effectiveness of occupational competency based computerized assessment implementation system in Addis Ababa city administration. The findings of the study will be utilized by the Addis Ababa occupational Competency Assurance authority and Federal Technical and Vocational Education and Training Agency as major input to revise and prepare the system implementation documents for occupational competency based computerized assessment and certification. Other researchers can also use the result of this study for further study. The following are the specific significances of this research study:

- The study will create awareness on international and national trends and experiences on implementation of occupational competency based computerized assessment.
- It will inform to different stakeholders about the purpose, principles, inputs and procedures of conducting occupational competency based computerized assessment and certification.
- It will aware the national policy makers or developers of system documents at Federal TVET Agency, Ministry of science & Higher education, and Addis Ababa City Administration occupational Competency Assurance authority on

the practices and challenges of implementing occupational competency based computerized assessment and certification so that they will use it as input while revising and setting out implementation strategies and related documents.

- The potential improvement model of Competency based computerized assessment will be utilized by the Addis Ababa City Administration Occupational Competency Quality Assurance Authority as a means to mitigate the challenges to be figured out and other regional Occupational competency assurance agencies & Center of Competencies (CoCs) may also benefit the same.

1.7. Scope of the Study

There are eight branches of Center of Competencies in Addis Ababa City Administration servicing candidates from all sub cities from different categories. They have performed operational activities in connection with occupational competency-based assessment such as certifying assessors, accrediting assessment centers and manage actual competency assessment and make certification. System implementation documents and implementation procedures of occupational competency-based assessment and certification are standardized and uniform across the country since they are developed at national level (FTA, 2018).

Occupational competency based computerized assessment procedures are the same across all branches. All categories of candidates are found in eight branches and the study population does not differ in type and also no significant difference in numbers. Therefore, there is no need to put all branches under study and hence this study is delimited to one branch which has greater numbers of workers when the researcher compares with other eight branches and the other reason is because of the cost, time and manageability.

Farther more, the type of occupations which the research study will focus need to be delimited since there are more than 500 occupations whereby occupational competency based computerized assessment is being offered. Taking all 500 will be not manageable. Therefore, the study will delimit to textile and garment, metal

manufacturing and lather occupations from level three up to five.

The other delimitation of this research is that the researcher will deal mainly on the impacts of current computerized assessment model on the implementation of occupational competency-based assessment system and new model development, and it doesn't deal on practices and quality factors of the competency-based training provision in TVET institutions.

1.8. Limitation of the Study

Even though, there are literatures related to computerized assessment in elementary, high schools and higher education institutes in the globe, not only in Ethiopia that researches are not done directly in the area of TVET occupational competency based computerized assessment system but it is also across the globe. There are no adequate journals and empirical studies in the areas of occupational competency based computerized assessment. Because of this, the researcher will be faced a challenge of getting directly related documents in adequate number, however, there are many in areas of outcome based TVET system which is more of about training.

1.9. Structure and Content of Thesis

The study is organized in five chapters. Chapter one begins with an introduction, background of the research, statement of problem, objectives of the study, significance and scope of the study. Chapter two is a literature review that discussed the conceptual framework of competency based computerized assessment and related studies. The third chapter will be about different methodological approach of the study. In the fourth chapter focuses on data analysis and interpretation, finally chapter five discussed about conclusion and recommendation of the study.

CHAPTER TWO

2. Literature Review

2.1. History of Occupational Competency Based Assessment

In world experience, acknowledgment to quality of education and training as a pivotal means for recognizing sustainable development and poverty reduction has increased over the years since the 1990s (King, 2009, Tarabini, 2010, Wallenborn, 2009 in Atakilt, 2016). Recent works (Wittek and Kvernbekk, 2011, Dennis, 2012) also repeat that the concept of education and training quality is an inherently vague concept and continues to be an item of conversation over time. Different scholars like Harvey and Green (1993) grouped the widely differing conceptualizations of quality like quality as exceptional, quality as perfection (or consistency), quality as fitness for purpose, and quality as change. This involves 'enhancing the trainees' in terms of knowledge, practical skills and right attitudes (Harvey and Green, 1993 in Atakilt, 2016).

Respect to Assessment, the vocational education and training has experienced a change in the emphasis from curriculum content to outcomes or competencies. There is a general agreement that at a minimum, competency assessment should clearly define the purpose of the assessment; use appropriate methods to gather evidence of competence; interpret the evidence against the competency standards; make a judgment to conclude competence; and record and report the outcomes of the assessment to key stakeholders (Gillis & Griffin, 2008). According to Javid, (2009), Assessment labeled as the outcome of the 20th century, has been defined variously in the literature. Assessment defines as a measurement of performances of the trainees respect to a given standard.

According to Ibrahim & Ahmad (2014), Assessment Practice in TVET provides information that can help to improve trainees' performance and help to also trainers in order to improve training system. The implementation of the Competency Based Assessment (CBA) in vocational schools requires trainers to practice Assessment for Learning**.**

According to Teshome (2015), Assessment is one of the professional competences with which trainees need to be acquainted and through which the problems of training programs and reliable data about the status of a training system can be obtained.

Before the implementation of new restructuring Ethiopian TVET system, Technical and Vocational Education and Training was challenged by quality in most TVET programs and systematic and independent assessment and recognition of competences had not system (MoE, 2008). To address this and other problems, the government issued the national TVET strategy in 2008 (MoE, 2008) under the backings of the 1994 Education and Training Policy of Ethiopia (FDRE, 1994) and the 2004 TVET proclamation (HoPR, 2004). With respect to assessment, the national TVET strategy visualizes that occupational competency-based assessment has conducted internally by TVET institutions and externally by accredited assessors in accredited assessment centers in job-related qualifications at all levels of the ETQF. The Ethiopian TVET strategy requires that TVET Agency at Federal level are responsible for designing and regulating the system while CoC authorities at regional state level are responsible for ensuring proper implementation of the system (MoE, 2008).

2.2. Concept of Occupational Competency Based Computerized Assessment

2.2.1. Occupational Competency

People are considered to be competent when they are able to apply their knowledge, skills and attitudes/work values to successfully complete work activities in a range of situations and environments, in accordance with the standards of performance expected in the workplace (Assessment directive, 2018). High level realization of competency contributes for better performance of workforce in the work place (Getachew, Atakilt, 2016). This view of competency emphasizes outcomes, focuses on what is expected of an employee in the workplace, highlights the application of skills and knowledge to workplace tasks and also focuses on what people are able to do and the ability to do this in a range of contexts (Offshore Petroleum Industry Training Organization, 2016).

Different countries have different views and approaches to the competency (Stan & Jolanta, 2016). American approach to competency is behavioral approach which focuses on the importance of the individual characteristics and the behavioral competence as a means to develop better performance. UK functional approach is another approach to competency which is focusing on the functional analysis and developing occupational standards which are firmly rooted on the unit of competencies reflecting the reality in world of work. UK is one of the earliest countries to develop comprehensive system of competency standards (Stan & Jolanta, 2016). The France multidimensional, which focuses on knowledge, functional and behavioral competencies and the German holistic approach which defines competency as the capacity of a person to act holistically ; comprising not only content or subject knowledge and ability, but also core and generic abilities (Getachew, 2014), Competency involves successful work performance (Offshore Petroleum Industry Training Organization, 2016). As such it is usually seen to comprise four dimensions, namely:

1) Task skills – this involves undertaking a specific workplace function.
2) Task management skills – this involves managing a number of different tasks to complete a whole work activity.
3) Contingency management skills – this involves responding to problems and irregularities when undertaking a work activity. This could be potentially responding to breakdowns, changes in routine, unexpected or a typical results or outcomes, and difficult or dissatisfied clients.
4) Job/role environment skills – this involves dealing with the responsibilities and expectations of the work environment when undertaking a work activity. This may involve working with others, interacting with clients and suppliers, complying with standards operating procedures, observing enterprise policy and procedures (FTA, 2018).

2.2.2. Occupational Competency Based Computerized Assessment

Computerized assessment is not a new idea; it has been around in some form since 1959, when the very first computer-based training (CBT) system was built. However, like CBT, computer-based assessments didn’t get much recognition until a few decades ago, and it only started becoming really influential in the past

few years, as online technologies have greatly advanced what is possible. Because computer-based assessment has changed so much since its inception, it isn't always clear what people are talking about when they use the term. At its broadest, the definition of computer-based assessment is this: "the use of digital tools for assessment-related activity." Notice the use of the term "digital tools" rather than "computers" this is because today computer-based assessments can also be both created and taken using laptops, tablets, and even smartphones. Any type of testing/assessment that involves the use of these technologies, as opposed to paper and pencils can be considered under the umbrella of computer-based assessment (Daly & Waldron, 2002; Paterson, 2002)

Through computerized assessment the trainees to be competent, individuals must provide evidence that they have the required experiences, applicable knowledge and practical skills understanding and behavior to perform a given task according to occupational standard and that they apply them consistently, safely and in accordance with relevant procedures and Standards. The purpose of the assessment process is to ensure that individuals should be competent to undertake a given task (Michael Crawford, 2010; Reid, 2002). Competency assessment is one of the most important measuring tools of the quality of competency-based training (Getachew, 2016).

2.2.3. Certification

Certification is the process of issuing certificates, formally confirming that a set of learning outcomes (knowledge, skills and attitudes) acquired by an individual has been assessed and validated by a responsible body against a predefined standard (Cedefop, 2011, cited in UNESCO, 2017).

Occupational assessment and subsequent certification are the main feature of the outcome based TVET system to verify individual occupational competences (Baraki, Worku, Melesse, 2016). For all defined occupational qualifications at all levels, occupational competency based assessment and certification should be offered (FTA, 2017). Occupational qualification certificates should be awarded upon passing the occupational assessments.

According to TVET strategy (MOE, 2008), contrary to past practice in Ethiopia,

access to occupational qualifications is no longer be dependent on attending a formal TVET program. Graduates from any formal and non-formal TVET program have access to occupational assessment and certification, as well as those who have learned informally (i.e. on the job, through traditional apprenticeship or through self-learning) (MoE, 2008). According to Michael Crawford (2010), occupational assessment is the major tool to integrate different TVET delivery modes and recognize prior learning, significantly increasing access to the TVET system and its qualifications for a greater section of the society.

In order to improve the employability of TVET graduates, occupational qualifications and Certificates need to be recognized by employers, Federal TVET institute (FTI, 2014) & European Training Foundation (ETF, 2014). As far as possible, relevant business or employers' associations should be integrated into the management of assessment.

According to the FTA assessment directive, responsibility for establishing and facilitating a national occupational assessment and certification system rests with the Federal TVET Agency (FTA, 2018). It requires rules and procedures for assessment item development for conducting assessments, and making facilitation, supervision and regulation the system. Responsibility for implementing the occupational assessment, i.e. ensuring that assessment is properly conducted and certificates issued rests with regional authority/agencies (FTA, 2014). In connection with this, regional TVET centers of competence were established under the state authorities as core institutions for implementing and facilitating occupational competency based computerized assessment (MoE, 2008). In order to ensure that assessment is accessible to all citizens, including those in remote areas, further assessment venues will be accredited to implement occupational competency based computerized assessment in specified fields (FDRE, 2016). For those who successfully pass occupational competency based assessment, a National Occupational Qualification Certificate will be issued by the regional state authorities upon delegation and on behalf of the Federal TVET Agency (MoE, 2008).

2.3. Occupational Competency Based Computerized Assessment in Ethiopian Context

According to Ethiopian TVET Strategy (MoE, 2008), TVET vision is to create a competent, motivated, adaptable and innovative workforce that plays pivotal roles in the poverty reduction and socio- economic development efforts of the country. This is achieved through the implementation of demand-driven, self-employment oriented, relevant and outcome-based TVET training system at all levels.

Outcome based TVET training system and occupational competency based assessment in Ethiopia lacks consultation with stake holders before implementation and this has resulted in being less effective (Baraki el al, 2016). In connection with this, Getachew (2016), in his dissertation mentioned that integration and proper contextualization lacks in Ethiopian TVET system and this has to be improved; consultations with stake holders should be considered. In outcome based system, identified competences of the labor market that are described in the occupational standards are the final benchmarks not only for training and learning activities but also for the assessment of the competences as well (MoE, 2008). Building an outcome based TVET system creates access for equal recognition of competences acquired through whatever the means and ways of being competent by checking through assessment (Georgeta, 2013).

The Ethiopian TVET strategy (MOE, 2008) maintains that TVET quality and relevance should be enhanced through making the system outcome based and checking through competency based computerized assessment. By "outcome based" the strategy implies that the training received in TVET should be measurable according to the skill assessment based on the occupation standards.

Occupational competency based computerized assessment takes place in designating or accredited public or private centers (MOE, 2008). The TVET training completers have been taking the occupational competency based computerized assessment through official assessment program. Currently the competency based computerized assessment is done for all competencies started from level three up to five of TVET qualification framework through assessment centers in five regions including Addis Ababa city administration. Assessment

can provide a framework for sharing education and training objectives with trainees and for mapping their progress and performances. For these reasons there is strong support for occupational competency-based assessment to be part of the learning process.

The current model of occupational competency based computerized assessment in Ethiopia is; Federal TVET Agency with representatives of industries have been agreed to prepare the assessment tools based on occupational standards. From FTA technical experts are assigned to coordinate tool preparation and professional experts are assigned from responsible industries and then the tools have been prepared but before preparing the assessment tool, the coordinators have discussed about the objective of the tool. After preparation, all assessment tools are distributing to all regions officially through FTA and to be ready for assessment. But in case of competency based computerized assessment, all tools should be encoding at regional competency assurance authority through data encoding experts. The encoding tools are distributed to Brach office by supervisors and also to the assessment center (FTA, 2018)

Current model of competency based computerized assessment system.

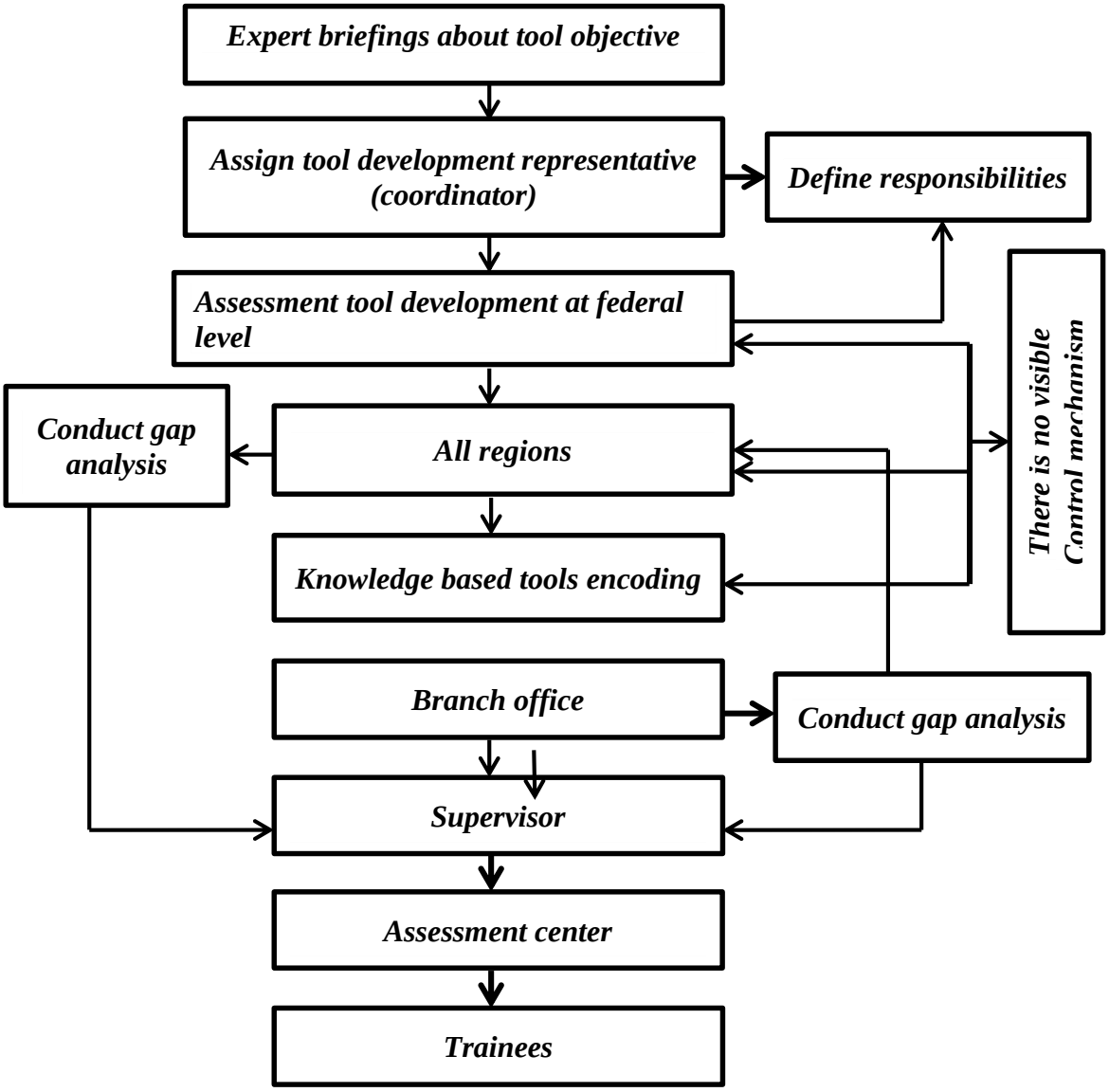

Figure 2. 1 Current model of occupational competency based computerized assessment

Source: TVET Occupational assessment implementation manual

In this model, assessment tool encoding is performed at CoC authority levele and the supervisors are also the responsible person during assessment (CoC's annual report, 2019).

This procedure is affecting the quality of computerized assessment by opening

rent seeking activity (FTA, 2019).

The other activity that is deviate from the standard implementation is all assessment tools have been sending to all regions from federal TVET agency by the CoC leaders and at CoC level the tools are administered by database administration Experts.

2.4. TVET Qualification Framework (TQF)

Ethiopian Qualification framework is a tool for categorization of qualifications, at a national level, according to a set of standards (e.g. using descriptors) appropriate to specified levels of learning outcomes (Cedefop, 2011). A TVET Qualifications Framework (ETQF, 2008) is developed in order to define the value of qualifications, confirm that different qualifications are comparable, and facilitate horizontal and vertical mobility within the TVET system. The qualification framework defines the different occupational qualification levels; devise level descriptors, i.e. define the scope and composition of qualifications and the level of responsibility a qualified person can assume in the workplace (Quality Council for Trades and Occupations-South Africa, 2013).

According to the assessment and certification directive of Ethiopia (FTA, 2018), the occupational assessment and certification system is in support to the provisions of the Article 11 of the "Technical and Vocational Education and Training (TVET)" Proclamation No. 954/2016 authorizing the Federal TVET Agency to design, innovate and adopt processes suited for the development of occupational standards, and the proper implementation of the assessment and certification System. The NTQF allows national, comprehensive and flexible certification system for the TVET sector as well as the lower and middle-level manpower of the industry.

The overall frame and structure of the outcome-based TVET system is described in the National TVET Qualifications Framework (NTQF) (MoE, 2008). The TVET Qualification Framework rationalizes all TVET provisions into a single nationally recognized qualification (Estriyanto et al., 2017). Qualification framework defines the different occupational qualification levels to be awarded and the levels detail the scope and composition of qualifications and degree of responsibility a qualified person would assume in the workplace (MoE, 2008).

Table2.1: Ethiopian NTQF descriptors and qualifications

NTQF	LEVEL DESCRIPTORS			
	Problem Solving Capability / Information Processing	Level of Accountability, Responsibility & Autonomy	Level of Knowledge & Skills	Level of Tasks/ Operational Environment
1	Carry out simple tasks	Work under direct supervision	• Basic general knowledge • Ability to apply basic skills	• Competence to work on a defined range of activities under routine and predictable conditions • Low value of complexity, interconnection, in-transparency and dynamics; high degree of stability
2	Use relevant information; solve routine problems using simple rules & tools	Some autonomy; work under supervision	• Basic factual knowledge of a field of work • Ability to apply basic cognitive and practical skills	• Competence to work on a range of varied activities in a clearly defined context • Average value of interconnection; low value of dynamics
3	Solve problems by selecting & applying basic methods, materials & information	Responsibility for completion of work tasks; some leadership in solution of specific problems	• Knowledge of facts, principles, processes and general concepts in a field of work • Ability to apply a range of cognitive and practical skills	• Competence to adapt own behavior to circumstances in solving problems; competence to work in a range of roles in a variety of contexts • High value of interconnection, in-transparency and dynamics

NTQF	LEVEL DESCRIPTORS			
	Problem Solving Capability / Information Processing	Level of Accountability, Responsibility & Autonomy	Level of Knowledge & Skills	Level of Tasks/ Operational Environment
4	• Generate solutions to specific problems in a field of work	• Supervise the routine work of others; some responsibility for evaluation and improvement of work activities; leadership and guidance in organizing activities of self & others	• Factual and theoretical knowledge in broad contexts within a field of work • Ability to apply expertise in a range of cognitive and practical skills	• Competence in self-management within the guidelines of work contexts which are usually predictable, but subject to change; competence to work on a broad range of varied activities and in a wider variety of contexts, most of which are complex and non-routine • Considerably high degree of interconnection, in-transparency and dynamics
5	• Develop creative solutions to abstract problem	• Review and develop performance of self and others	• Comprehensive, specialized, factual & theoretical knowledge within a field of work; awareness of limits of this knowledge • Ability to apply expertise in a comprehensive range of cognitive & practical skills	• Management and supervision in contexts of work where there is unpredictable change; self- directed application of knowledge and skills • Very high degree of complexity, interconnection, in-transparency and dynamics

Source: Ethiopian occupational standard development manual (FTA, 2018)

The outcome of training delivered in the system is measured through a process of verification of a candidate's achieved competences, known as occupational competence assessment (Technical Education and Skills Development Authority, 2003). When we say assessment, it is not only a TVET graduate's competence that is to be measured but also that of anyone who wants his/her competences be recognized (MoE, 2008). A candidate, no matter what way s/he achieved the competence, who has proven competent through assessment and has fulfilled the requirements of the certification applied for, is awarded a certificate. This certificate is an official and nationally recognized proof of the person's competence in the respective level or unit/s of competence (MoE, 2008).

2.5. Occupational Standards

An "occupation" is a cluster or group of similar jobs that share many common occupational tasks of similar complexity and require similar performance across different processes and industries (Stan & Jolanta, 2016). An Occupational Standard defines the expected level of performance, knowledge and understanding an individual must achieve when carrying out job roles/functions in the workplace (Offshore Petroleum Industry Training Organization, 2016). Occupational standards therefore act as benchmarks for assessing on-the-job competence and can be used to monitor the performance of the workforce on an on-going basis to maintain a safe and productive workforce (Estriyanto et al., 2017). Occupational standards must be assessed in the workplace in accordance with operational requirements and procedures (Offshore Petroleum Industry Training Organization, 2016). According to Ethiopian TVET strategy (MoE, 2008), occupational standards are the base documents for the occupational assessment and competency-based training. Occupational standards define the competences of a worker according to requirements in the labour market. OSs comprehensively describes the competence a person who has to achieve in order to be considered "qualified" in a certain field. Competence includes the entire range of skills, knowledge and attitudes necessary to perform a specific job

(Offshore Petroleum Industry Training Organization 2016). Occupational standards are developed for all occupational fields at all relevant qualification levels attainable within the TVET system. Each occupational standard can be broken down into units that describe a set of "employable" competences (Michael Crawford, 2010). Occupational standards are described in the same, nationally approved, format and are publicly available (MoE, 2008). This has enhanced transparency about occupational qualifications among employers, trainees and TVET providers. Responsibility for organizing, facilitating and endorsing occupational standards rests with the Federal TVET Agency (MoE, 2008) & (FTA, 2014). However, as occupational standards reflect the competence requirements of the world of work, stakeholders from the world of work particularly employers are the major actors in the development of the standards, as they are in the developed and emerging countries. According to Getachew (2016), best experiences which could be potentially benchmarked from other countries need to be well contextualized and integrated with the Ethiopian system and consensus should be reached among stakeholders. The TVET Agency forms expert panels for standard setting, comprised mainly of experts with a profound knowledge of workplace requirements (MoE, 2008).

Occupational standards must be based on the needs of the labour market (ILO, 2015). Therefore, the identification and clustering of occupations for which occupational standards are developed with reference to the needs of the national labour market demand. A labour market analysis will be instrumental in identifying the need for new occupations as well as indicating the need for revision and adaptation of existing national standards once technological and/or economic developments bring about changes to the qualification needs (ILO, 2015).

Identification and clustering of occupations will be made in close cooperation with the Ministry of Labour and Social Affairs and the Civil Service Agency as well as other concerned bodies to ensure that the TVET occupational standards take into account the defined occupational titles from the National Occupational Classification System.

Occupational qualifications should be designed so that they are internationally

compatible in order to ensure the international competitiveness (National Skills Development Council- New Delhi- India 2013). Thus, occupational standards should reflect as far as possible international standards of competence, while at the same time be based on workplace requirements within the nation (Getachew, 2016). In order to facilitate this, procedures for standard setting should also include methods to adapt or adopt existing standards from other countries (MoE, 2008).

2.6. Assessment Tools

Assessment tools are ultimately used to gather the evidence on candidate's performances during assessment process (Ismail et al., 2017). In the Philippines TVET system, TVET quality assurance is ensured through assessment and certification process and assessment tools are considered as the most important instruments and need to be developed properly (Technical Education and Skills Development Authority, 2003). Well-designed assessment tools must comply with the rules of evidence (FTA, 2018), i.e. the tool must facilitate the gathering of evidence that is: validity (covers all requirements of the unit of competency), sufficient (enables the assessor to make a decision about competency over time and in different situations, all dimensions of competency are addressed; competency in different contexts is demonstrated), current (competent performance is contemporary or the evidence demonstrates the candidate's current knowledge and skills) and authentic (evidence is the candidate's own work).

According to the directive (FTA, 2018), principles of assessment should be met while developing assessment tools. The assessment principles require that assessment tools need to be valid, reliable, flexible and fair. Flexibility refers to the opportunity for a candidate to negotiate certain aspects of their assessment (for example, timing) with their assessor (Offshore Petroleum Industry Training Organization, 2016).

In current practice of the occupational competency assessment, there are knowledge and practical assessments approaches in Ethiopia. Knowledge assessment tools are encoding and deliver through computerized assessment

system. According to the assessment directive (FTA, 2014), while conducting assessment in actual industry setting/on-site assessment, the actual projects/ tasks to be done by the candidates on the scheduled dates should be determined. According to the Manual on Skills Testing and Certification of Jordan developed by International Labour Organization (2015), observation is an important method for competency-based assessment, which requires candidates to demonstrate not only what they know, but also what they can do.

2.7. Assessors and Supervisors

Assessors' main responsibilities related to assessment are to Plan and manage the assessment process, carry out assessments of candidates' performance against the relevant standard(s), ensure that candidates' evidence is relevant, valid, authentic, reliable, current and sufficient, make a judgment as to the competence of the candidates and record assessment decisions(Offshore Petroleum Industry Training Organization, 2016). Assessors must be competent and qualified to carry out the assessment process (Offshore Petroleum Industry Training Organization, 2016).

Supervisors need to hold a recognized assessor qualification and be operating to the requirements of the current standards for trained assessors. They fully know the desires defined in the Standard(s) for which they are carrying out the assessment process and comply with the required assessment and internal verification processes and quality procedures for the Standards (FTA, 2014).

2.8. Assessment Centers

Occupational assessment takes place in designated or accredited public or private assessment centers (Offshore Petroleum Industry Training Organization, 2016). An establishment/facility in industry may be accredited as an assessment center, when it meets the requirements upon inspection and recommendation of the representatives from industry (FTA, 2014). Assessments will be conducted by accredited assessors, possibly experts from the world of work or industry base trainers (MoE, 2008). According to the occupational competency directive (FTA, 2014), the requirements for accreditation of an AC may include the following: Personnel of the establishment who is assigned to manage assessment activities,

Coordinator to facilitate the flow of communication between the CoC, the assessors and the management of the center. Assessment clerk, cashier and supply officer, to handle administrative responsibilities in the center; such as processing of applications for assessments, procurement of materials for assessments, coordination of preparations of workshops, financial transactions, reports preparations and records keeping. According to the ISO/IEC: 17024:2012, assessment centers are one of the critical factors that affect the quality of the personnel certification and assessment centers need to fulfill all the requirements stated on the standard. As stipulated in occupational competency assessment directive (FTA, 2014), technical personnel trained and accredited as assessors with occupational qualification/ competencies, Shop-in-charge and/or shop assistant, who prepares workshop facilities, equipment, tools and materials, safety provisions, supply of power and water as well as maintain machineries for assessments are very important to be fulfilled and organized for standardized AC. Moreover, availability of resources required for assessments: sufficient size of workshop that can accommodate specified number of candidates, equipped with the required ventilation and lighting facilities, OHS facility and easily accessible entrance and exit points, sufficient number of functional equipment, tools, instruments, and materials for the practical projects included in the assessment activities, sufficient supply of electric power and water (if necessary). According to FTA guideline (2014), training Institutions can be appointed as assessment venues by the CoC in consultation with the Industry, to respond to the needs of assessment.

2.9. Literature Findings

In world experience, acknowledgment to quality of education and training as a pivotal means for recognizing sustainable development and poverty reduction has increased over the years since the 1990s (King, 2009, Tarabini, 2010, Wallenborn, 2009 in Atakilt, 2016).

There is a general agreement that at a minimum, competency assessment should clearly define the purpose of the assessment; use appropriate methods to gather evidence of competence; interpret the evidence against the competency standards; make a judgment to conclude competence; and record and report the outcomes of

the assessment to key stakeholders (Gillis & Griffin, 2008). According to Ibrahim & Ahmad (2014), Assessment Practice in TVET provides information that can help to improve trainees' performance and help to also trainers in order to improve training system.

The Ethiopian TVET strategy requires that TVET Agency at Federal level are responsible for designing and regulating the system while CoC authorities at regional state level are responsible for ensuring proper implementation of the system (MoE, 2008).

People are considered to be competent when they are able to apply their knowledge, skills and attitudes/work values to successfully complete work activities in a range of situations and environments, in accordance with the standards of performance expected in the workplace (Assessment directive, 2018).

Any type of testing/assessment that involves the use of these technologies, as opposed to paper and pencils can be considered under the umbrella of computer-based assessment (Daly & Waldron, 2002; Paterson, 2002) In order to improve the employability of TVET graduates, occupational qualifications and Certificates need to be recognized by employers, Federal TVET institute (FTI, 2014) & European Training Foundation (ETF, 2014). As far as possible, relevant business or employers' associations should be integrated into the management of assessment.

According to the FTA assessment directive, responsibility for establishing and facilitating a national occupational assessment and certification system rests with the Federal TVET Agency (FTA, 2018). It requires rules and procedures for assessment item development for conducting assessments, and making facilitation, supervision and regulation the system. Responsibility for implementing the occupational assessment, i.e. ensuring that assessment is properly conducted and certificates issued rests with regional authority/agencies (FTA, 2014).

The current model of occupational competency based computerized assessment in Ethiopia is; Federal TVET Agency with representatives of industries have

been agreed to prepare the assessment tools based on occupational standards. From FTA technical experts are assigned to coordinate tool preparation and professional experts are assigned from responsible industries and then the tools have been prepared but before preparing the assessment tool, the coordinators have discussed about the objective of the tool. After preparation, all assessment tools are distributing to all regions officially through FTA and to be ready for assessment. But in case of competency based computerized assessment, all tools should be encoding at regional competency assurance authority through data encoding experts. The encoding tools are distributed to Brach office by supervisors and also to the assessment center (FTA, 2018)

2.10. Research gap

Even though, there are literatures related to computerized assessment in elementary, high schools and higher education institutes in the globe, not only in Ethiopia that researches are not done directly in the area of TVET occupational competency based computerized assessment system but it is also across the globe in my searching. Therefore, the literature that the researcher reviewed is talking more of the TVET training and paper-based assessment problems.

But I haven't got literatures related to TVET occupational competency based computerized assessment. However, in actual implementation of occupational competency based computerized assessment faces challenges regard to quality according to FTA reports and regional Quality assurance agencies'/authority (GTP II reports, 2018). Therefore, the researcher incites to conduct the research on the impact of computerized assessment on the quality of occupational competency-based assessment and remodeling of the system.

CHAPTER THREE

3. Research Methodology

3.1. Research framework

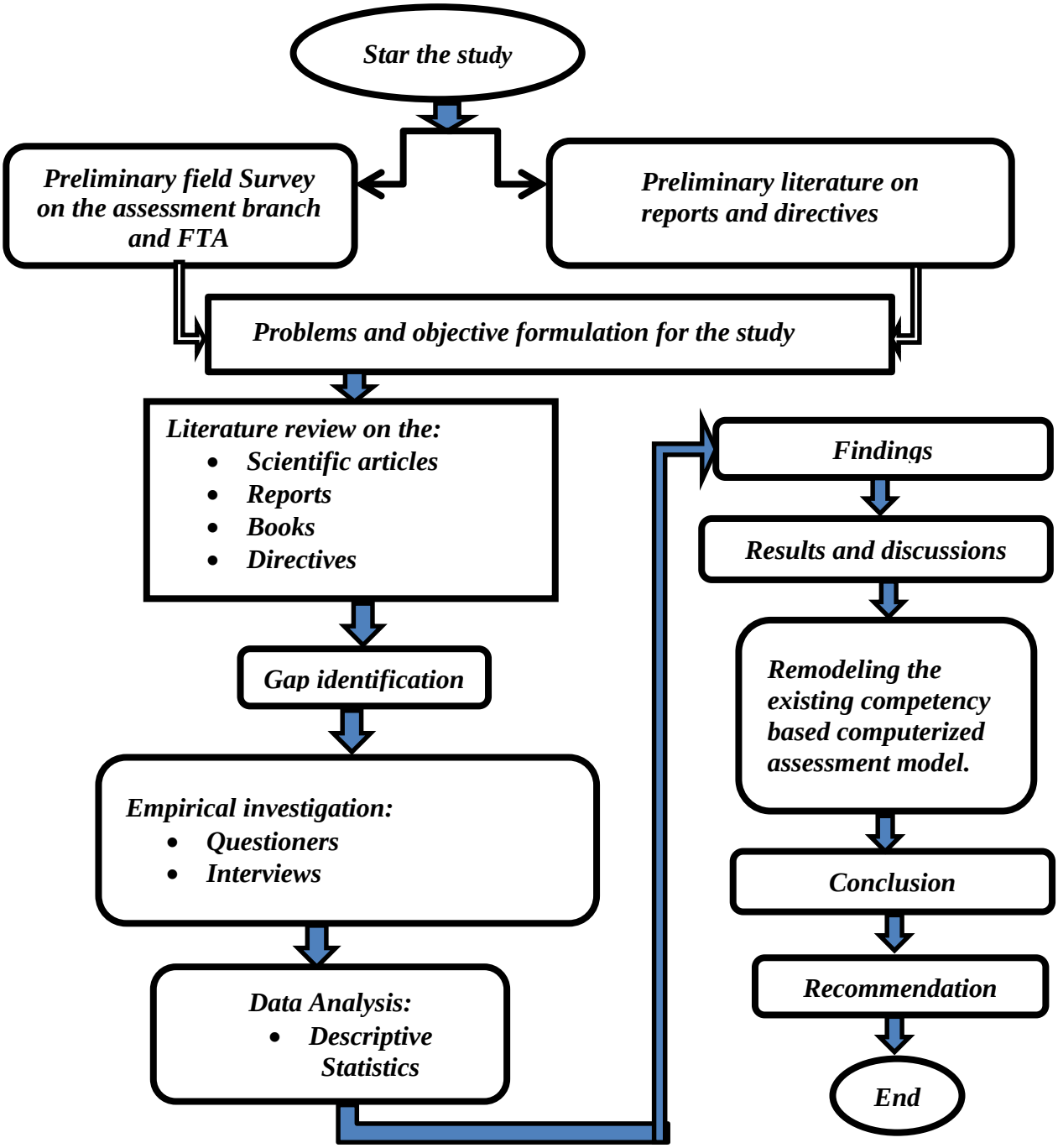

Figure3. 1 Research framework

Source: researcher's own

3.2. Research Approach and Design

A mixed approach was followed in this study in which quantitative and qualitative research approaches were used for triangulation purpose. A quantitative research requires that data express in numbers and qualitative approaches involves in order to get detail information from the selected respondents. The research is descriptive research as it is describing the impacts of computerized assessment model on the quality of occupational competency-based assessment system implementation in case of Addis Ababa City Administration particularly yeka sub city assessment center.

3.3. Methods and Sources of Data Collection

There are two types of sources of data were used in this research. These are primary sources and secondary sources. The primary sources of data in this research was questionnaires collected from FTA's, CoC quality assurance Authority's and Branch office's management members and experts; and also, supervisors and assessors. In addition to these interviews were also collected from FTA'S CoC Authority's and Branch office's management members and Experts. Assessors and supervisors were among primary data sources. The tools were used to collect data were interviews and questionnaires to get primary data and also for secondary data sources; documents like policies, proclamations, strategies, guidelines, directives, manuals, reports, books, research documents, broachers etc. that is found from FTA's proclamation, No.954/2016; Ethiopian Educational policy,1994; Ethiopian TVET strategy, 2008; FTA's, CoC's authority reports, 2017,2018,2019; TVET GTP II's compiled report, TVET assessment guide line,2017; Occupational standard development manual, 2019; Assessment directive, 2017.

3.4. Instrument Development

Basically, the instruments were developed based on the objectives of the study and research questions. The principles of questionnaires such as, use simple and clear languages, statements should not be too long and use of appropriate punctuations was also considered when developing the instrument. The instruments were designed in English language.

3.4.1. Instrument Validity

There are two types of sources of data were used in this research. These are primary sources and secondary sources. The primary sources of data in this research include interviews and questionnaires with respondents from Federal TVET Agency and Addis Ababa City Administration Competency Assurance Agency and also from one branch offices under it. And also, assessors and supervisors were among primary data sources. The tools used to collect data are unstructured in-depth interviews and questionnaires to get primary data and for secondary data sources; documents like policies, proclamations, strategies, guidelines, directives, manuals, reports and research documents that have used for more clarification and cross checking of the primary data specially the interviews.

3.4.2. Instrument Reliability

Instruments were developed based on research questions and objectives; it is possible to collect necessary data from respondents. Then, instruments were consistent with the objectives of the study.

3.5. Sampling Design

The sampling techniques were employed to this research is probability sampling (Simple Random Sampling) and non-probability sampling techniques such as purposive sampling and expert sampling. Purposive and expert sampling were used to ensure data are collected from well experienced and right person in right position. Experienced experts in the area were participated in this research.

There are eight branches of Center of Competencies under Addis Ababa City Administration Competency Assurance Authority. For this study, the study population under the selected CoC branch was selected using purposive sampling technique. All eight CoC branches are operating more or less under similar conditions and therefore, there is no implication of taking the one among the eight branch offices. That is why the researcher selects one branch which is yeka sub city. The researcher can also select any one of the eight branches but due to transportation cost, branch of yeka sub city has been lower transportation cost

when comparing to the others.

All eight CoC branches are operating more or less under similar conditions regard to numbers of occupations that are provided competency based computerized assessment and their no. of workers when observed the table below.

Table3. 1 list of Addis Ababa city administration CoC branches

R.N	CoC Branch Offices	No. of occupation that have assessed through computerized	No. workers without assessors
1	Yeka branch	600	87
2	Gulele branch	600	81
3	Kolefie branch	600	69
4	Bole branch	600	75
5	Lideta and addis ketema branch	600	72
6	Arada and kerkos branch	600	86
7	Nifas silk branch	600	73
8	Akaki branch	600	45

Source: Addis Ababa city administration CoC authority

The base line data on population size is collected primarily and the study sample size is determined in consultation with experts in the field of area and the representatives from organizations which are the ultimate beneficiaries of this research which are FTA, Addis Ababa CoC Authority and branches. Using scientific method of sample size calculation from the pre-identified target population as a minimum sample size number and taking experts' suggestions into consideration in a sense that the sample size was leading the researcher to reliable conclusion.

The required sample size for the purpose of this study was determined using the formula developed by Yamane (1967) with 93% level of confidence.

$$n = \frac{N}{1+N(e)2}$$

Where: n = sample size

N = total number of households

e= level of precision

So, the total sample size of the study will be:

$n = \frac{90}{1+90(0.07)2} \approx 62$

To calculate sample size for each respondent:

For Management members $= \frac{\text{total numbers of Management members in FTA}}{\text{Total numbers of management members of respondent}}$x62

$= \frac{24}{90}$x62 ≈ 16

For Higher experts = $\frac{25}{90}$x62 ≈ 17

For supervisors = $\frac{20}{90}$x62= 14

And final, for Assessors = $\frac{20}{90}$x62= 14

Table3.2: Study population and sample size

No.	Study population	Population size	Sample	Sampling technique
1.	Management members of Federal TVET Agency, Addis Ababa City Administration Competency Assurance Authority and branch office	24	16	Simple Random Sampling
2	Higher Experts from Federal TVET Agency, Addis Ababa City Administration Competency Assurance Authority and branch office	25	17	Purposive and expert sampling
3	Supervisors	20	14	Purposive and expert sampling
4	Assessors	20	14	Availability sampling
5	Total respondents	90	61	

3.6. Procedure for Data Collection

The researcher collected data using data collection tools which were prepared, evaluated and pre-tested to make sure that they are relevant. The evaluation of all the instruments has been done by the experts from FTA and the pre-test has been done sample category by two leaders from FTA. These were all done to make sure the researcher collects data that would lead him answer the research questions properly. In connection with this, the researcher has maintained and kept in mind the ethics of the research during data collection and the entire process. Major tools which were used are questionnaires, interviews and secondary sources due to covid-19.

3.6.1. Questionnaires

Questionnaires and interviews were used to collect primary data. The questionnaires were prepared and distributed to FTA, CoC authority and CoC branch management members and experts; supervisors and assessors. The questionnaires contained closed ended questions with two sections, demographic data and major data pertinent to the research issue. The questionnaires were distributed to the respondents and collected back within two weeks. Sixteen (16) questionnaires were distributed randomly to the FTA, CoC authority and branch office management members and seventeen (17) questionnaires were distributed purposively to FTA, CoC Authority and branch office Experts. Out of that 16 (100%) of the questionnaires were filled and returned from FTA, CoC authority and branch office management members; 17 (100%) of the questionnaires were filled and returned from FTA, CoC authority and branch office Experts. Sixteen (16) questionnaires were distributed to assessors based on Availability sampling. 16(100%) of the questionnaires were filled and returned back. sixteen (16) questionnaires were distributed to the supervisors purposively and 16(100%) of the questionnaires were filled and returned back.

3.6.2. Unstructured in-Depth Interview

Unstructured in-depth interview was very good to gather information that helped the researcher to triangulated data with what was collected using other tools. It helped also to gather additional information. The interview was done with FTA

and CoC and branch office management members and experts; assessors and supervisors. The interview with each category has taken averagely half an hour and some interviews were done through phone calling in cases of difficulty to get respondent physically due to covid-19. During the interview, as the data collected was qualitative, the researcher quit further continuation when the data reached saturation point i.e. no more new ideas coming.

3.7. Data Analysis Techniques

3.7.1. Data Processing and Analysis

3.7.1.1. Data Processing

The data analysis in this research has depended on qualitative and quantitative methods. The qualitative data was analyzed using content analysis, whereas quantitative data was analyzed using descriptive statistics.

The method of data processing in this study was computerized system. In the data processing procedure editing, coding, classification and tabulation of the collected data had used. Data processing had two phases namely: data clean-up and data reduction. During data clean-up the collected raw data was edited to detect anomalies, errors and omissions in responses and checking that the questions are answered accurately and uniformly. The process of assigning numerical or other symbols come next which was using to reduce responses into a limited number of categories or classes.

3.7.1.2. *Data Analysis*

To make the collected data ready for analysis, the obtained data were checked for completeness. The data were also classified and tallied carefully. The assembled data were arranged and organized in tables and the Microsoft excel was used to analyze descriptive data. Finally, by using descriptive method the organized data were interpreted and analyzed quantitatively as well as qualitatively.

3.8. Ethical Considerations

All the research participants included in this study were appropriately informed

about the purpose of the research and their willingness and consent to secure before the commencement of distributing questionnaire and asking interview questions. Regarding the right to privacy of the respondents, the study was maintained the confidentiality of the identity of each participant. In all cases, names are kept confidential thus collective names like ‘respondents’ were used.

CHAPTER FOUR

4. Data Processing, Interpretation and Analysis

The main objective of this study was to analysis the impacts of computerized assessment model on the quality of occupational competency-based assessment system and remodeling the current computerized assessment system. This chapter presents the data analysis, presentation and analysis of data collected through questionnaires, interview and observing secondary sources of data. To this end, the researcher used research tools which are questionnaire and interviews. The data collected from primary and secondary sources have been processed (edited, coded, and tabulated) and analyzed using appropriate analysis techniques such as Excel and tables; which have been used and descriptive analysis was applied as a major analysis method.

4.1. Characteristics of the respondents

Different groups of respondents were included in the study to diversify the sources of information. The characteristics/ demography of the respondents was represented in the following tables.

Table4. 1: Characteristics/demography of the respondents (FTA and CoC management members and experts)

S.N	Item	Category	Respondent									
			Management members of FTA, CoC authority and branch office		Higher Experts of FTA, CoC authority and branch office		Supervisors		Assessors		Total	
			N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
1	**Sex**	M	12	75	13	76.5	9	64.3	10	71.4	44	72.1
		F	4	25	4	23.5	5	35.7	4	28.6	17	27.9
2	**Age**	25<	-	-	-	-	-	-	4	28.6	4	6.6
		26-36	3	18.8	8	47	7	50	6	42.8	24	39.3
		37-47	8	50	7	41.2	4	28.6	2	14.3	21	34.4

S.N	Item	Category	Respondent									
			Management members of FTA, CoC authority and branch office		Higher Experts of FTA, CoC authority and branch office		Supervisors		Assessors		Total	
			N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
		>48	5	31.2	2	11.8	3	21.4	2	14.3	12	19.7
3	**Education back ground**	BSc/BA/BED	6	37.5	10	58.8	10	71.4	12	85.7	38	62.3
		MSc/MA	10	62.5	7	41.2	4	28.6	2	14.3	23	37.7
		PHD	-	-	-	-	-	-	-	-	-	-
4	**Work experiences**	1-5	2	12.5	3	17.6	-	-	-	-	5	8.2
		6-10	6	37.5	8	47.1	4	28.6	6	48.9	24	39.3
		More than 10	8	50	6	35.3	10	71.4	8	57.1	32	52.5

As we observed form Table 4.1 above, 72.1% of the majority respondents were male whereas 27.9% were female. Age wise, 6.6% of the respondents were below 25; 39.3% of the respondents were in the age range of 26-36; 34.4% of them were in the age category of 37-47 and 19.7% of them were in the age category of above 48. Regarding to educational level 62.3% of the respondents were in degree (BSc/BA/BED) level and 37.7% of them were in master degree (MSc/MA) level. The work experience, 8.2% of them were have between 1-5 year work experiences, 39.3% of them were have work experience in the interval of 6-10 and 52.5 % of them were have work experience more than 10 years.

4.2. **Response Related to Standard Procedures in Occupational Competency computerized Assessment**.

Table4.2. 1: Response from FTA's, CoC Authority's and branch office's management members and Experts on standard procedures in occupational competency computerized assessment system

Respondents	**Item**	**No.**	**%**

Respondents	Item	No.	%
Management members of FTA, CoC authority and branch office	How do you see current deviation of actual implementation of Occupational competency computerized assessment modality against standard procedures?		
	Very high	8	50
	High	4	25
	Medium	2	12.5
	Low	1	6.25
	Very low	1	6.25
	Total	16	100
Higher Experts of FTA, CoC authority and branch office	How do you see current deviation of actual implementation of Occupational competency computerized assessment modality against standard procedures?		
	Very high	7	41.2
	High	5	29.4
	Medium	3	17.6
	Low	1	5.9
	Very low	1	5.9
	Total	17	100

As can be seen on table 4.2.1, the data collected related to standard procedures in occupational competency computerized assessment from FTA, CoC authority and branch management members of respondents using questionnaires show that there is deviation of actual implementation of occupational competency computerized assessment modality against standard procedures required in the occupational competency assessment and certification directive. Among the sixteen (16) FTA's, CoC authority's and branch office's management members, 8 (50%) have said the deviation is Very high and 4 (25%) have said that deviation is high and 2(12.5%) have said the deviation is medium. 1(6.25%) have said the deviation is low and 1(6.25%) has said the deviation is very low at all.

From the experts' respondent using questionnaires show that there is deviation of actual implementation of occupational competency computerized assessment modality against the standard procedures required in occupational competency

assessment and certification directive and standards. Among the seventeen (17) FTA's, CoC authority's and branch office's higher experts, 7(41.2%) have said the deviation is Very high and 5(29.4%) have said that deviation is high and 3(17.6%) have said the deviation is medium. 1(5.9%) have said the deviation is low and 1(5.9%) has said the deviation is very low at all.

During the interview with FTA management members, one of the FTA management members said that "As one of the member in supervision team who conducted monitoring and evaluation in Addis Ababa city administration CoC in 2019, I have observed that the CoC authority is not properly following the standard procedures in the computerized assessment implementation like assessment tool handling and encoding security and assessment tool data encoder and supervisors do not keep security of the tool due the result of losing ethics . One of the reasons why the assessors lack proper competency and ethics is because of the CoC not following the standard procedures of assessor development seriously and the current modality of computerized assessment system which means Assessment tool encoding is not performed at federal level".

During the interview with the FTA experts, the experts have said that actual practices of the occupational competency computerized assessment has deviations from what is supposed to be according to the FTA assessment and certification directive and ES ISO: 17024 standards. The experts said that the deviation starts from the miss handling and encoding of occupational competency assessment tools at regional level; there is no system established to control the security of the assessment tools and to know which assessment tools' versions are on use in each region and each assessment centers.

Table4.2. 2: Response from supervisors and Assessors on standard procedures in occupational competency assessment and certification

Respondents	**Item**	**No.**	**%**
Assessors	Have you ever observed any deviation of standard procedures in actual Implementation of occupational competency computerized assessment?		
	Yes	8	57.14
	No	6	42.86

Respondents	Item	No.	%
	Total	14	100
	Do you think the level of adequacy of necessary materials for occupational competency computerized assessment at assessment center?		
	Yes	5	35.7
	No	9	64.3
	Total	14	100
Supervisors	Have you ever observed any deviation of standard procedures in actual Implementation of occupational competency computerized assessment?		
	Yes	10	71.43
	No	4	28.57
	Total	14	100
	Have you been given training on how to supervise conduct of Occupational competency computerized assessment?		
	Yes	6	42.86
	No	8	57.14
	Total	14	100

As can be seen from table 4.2.2 above, among the assessors who filled and returned the questionnaires, eight (8) which are 57.14% assessors among those who gave responses on questionnaires have said that they have observed deviation of standard procedures in actual implementation of occupational competency computerized during their work experience as assessors. Nine (9) which are 64.3 % of respondents have said that the level of adequacy of necessary materials for occupational competency computerized assessment at assessment centers is not satisfactory. This implies that there is practice where by the occupational competency computerized assessment could take place without supply of required assessment materials like computers. This will have direct impact of the quality of occupational competency computerized assessment and may potentially lead to the improper judgment of assessor on the result of the candidate.

Supervisors are the key actors in the process of the assessment and very close to the

occupational competency computerized assessment practice. Ten (10) which are 71.43% of supervisors have said that there is deviation from standard procedures in actual implementation of occupational competency computerized assessment. Eight (8) which are 57.14% of them have said they haven't received proper training on how to supervise the conduct of competency based computerized assessment process. This will have very serious implication on the quality and effectiveness of supervisors' job.

4.3. Responses Related to Autonomous Operation of Occupational Competency computerized Assessment

Table4.2: Responses related to autonomous operation of occupational competency computerized assessment

Respondent	Item	No.	%
Management members of FTA, CoC authority and branch office	Do you think that CoC is operating no independently without interference of the training provider?		
	Yes	12	75
	No	4	25
	Total	16	100
Higher Experts of FTA, CoC authority and branch office	Do you think that CoC is operating no independently without interference of the training provider?		
	Yes	11	64.7
	No	6	35.3
	Total	17	100
Supervisors	Have you ever seen the interference of TVET institutions on the decision of the assessor during assessment?		
	Yes	9	64.3
	No	5	35.7
	Total	14	100
Assessors	Have you ever seen the interference of TVET institutions on the decision of the assessor during assessment?		
	Yes	11	78.57
	No	3	21.43
	Total	14	100

As can be seen on the table 4.3 above, the data collected through questionnaires show that twelve (12) which are 75% of FTA, CoC authority and branch management members and eleven (11) which are 64.7% of FTA, CoC authority and branch office Higher Experts have said that there is no independency of assessment and certification operation and it is under interference of the training regulator respectively. During the interview, one of the CoC authority management members has disclosed that as assessment result reveals the status of quality of training, low assessment result is not need to be reported and hence quality assurance part or CoC authority has not been given equal emphasis and autonomy at city administration level and is not needed to be strong even at federal level. Therefore, federal TVET agency should make implementation of computerized assessment that must be encode at federal level. One of the FTA experts has mentioned on the interview that there is high cross interference at the federal level and the quality assurance is not playing vital role as it is expected to be. The Federal TVET agency is regulating both the training provision and external quality assurance at the same box which is completely not in line with international standard ISO/IEC: 17024. Because of the reason that they are being regulated by the same body being on the same box, there is high tendency of interference.

Eleven (11) which are 78.57% of assessors have said that there is interference of TVET institutional leaders or trainers on the decision of the assessor during assessment and this response of the assessors also strengthens what the trainees said. Nine (9) which are 64.3% of supervisors have also said that there is interference of TVET institutional leaders or trainers on the decision of the assessor during assessment.

4.4. Response Related to Trends of Acceptance of Occupational Competency computerized Assessment through Understanding of Importance

Table4.3: Response from FTA and CoC authority and branch management members, experts and assessors on trends of acceptance of occupational competency computerized assessment through understanding of importance

Respondents	Item	No.	%
FTA, CoC and	In your opinion, how do you see the trend of acceptance of occupational		

Respondents	Item	No.	%
branch management members	Competency based computerized assessment among the industry competitiveness?		
	Very high	3	18.75
	High	9	56.25
	Medium	4	25
	Low	0	0
	Very low	0	0
	Total	16	100
FTA, CoC and branch Higher experts	In your opinion, how do you see the trend of acceptance of occupational Competency computerized assessment among the industry competitiveness?		
	Very high	5	29.4
	High	8	47
	Medium	4	23.6
	Low	0	0
	Very low	0	0
	Total	17	100
Assessors	How do you see the importance of the occupational competency computerized assessment for industry competitiveness?		
	Very high	6	42.86
	High	7	50
	Medium	1	7.14
	Low	0	0
	Very low	0	0
	Total	14	100

As can be seen on the table 4.4 above, among the FTA, CoC authority and branch management members who filled and returned the questionnaires, 3 (18.75%) have said that the trend of acceptance of importance of occupational competency

computerized assessment is very high; 9(56.25%) have said that high; 4(25%) have said that medium and non-have said that it is low and very low. And also, FTA, CoC and branch higher experts; 5 (29.4%) of them have said the trend and acceptance of occupational competency computerized assessment is very high; 8(47%) have said the trend and acceptance of occupational competency computerized assessment is high; 4(23.6%) have said medium and non-have said it is low and very low. Six (6) (42.86%) of assessors have said the trend and acceptance of occupational competency computerized assessment is very high; seven (50%) of them have said the trend and acceptance of occupational competency computerized assessment is high; 1(7.14%) of them have said medium and none of them have said it is low and very low.

4.5. Responses Related to What Extent Rent Seeking is Affecting Occupational Competency Computerized Assessment Implementation

Table4. 4: Responses related to what extent rent seeking is affecting occupational competency computerized assessment

Respondents	Item	No.	%
FTA, CoC and branch office management members	To what extent do you think rent seeking is affecting the effectiveness of occupational competency computerized assessment implementation?		
	Very high	0	0
	High	2	12.5
	Medium	4	25
	Low	4	25
	Very low	5	31.25
	Total	16	100
FTA, CoC and branch office higher experts	To what extent do you think rent seeking is affecting the effectiveness of Occupational competency computerized assessment implementation?		
	Very high	0	0
	High	1	5.9
	Medium	4	23.5
	Low	5	29.4

Respondents	Item	No.	%
	Very low	7	41.2
	Total	17	100

According to the data collected from FTA, CoC authority and branch office management members through questionnaires (table 4.5 above) show that 2 (12.5%), 4 (25%), 4 (25%), 5 (31.25%) of the respondents have said rent seeking is affecting the effectiveness of occupational competency computerized assessment implementation at the rate of high, medium, low and very low respectively.

During interview, one of the interviewed members from CoC branch said, "Rent seeking has been affecting the entire system of occupational competency assessment and the impact is very high. But it doesn't affect computerized assessment system if assessment tools are encoding and managing at federal level.

Data collected from higher experts through questionnaires also show that 1 (5.9%),4 (23.5%), 5(29.4%) and 7(41.2) of the respondents have said rent seeking is affecting the effectiveness of occupational competency computerized assessment implementation at rate of high, medium, low and very low respectively.

4.6. Responses Related to More Challenges and Mitigations in Occupational Competency computerized Assessment System Implementations

Table4.6. 1: Responses from FTA, CoC and authority management members and experts on more challenges and mitigations in occupational competency computerized assessment system implementations

Respondents	Item	No.	%
FTA, CoC and branch management members	How do you see current implementing capacity of Federal TVET Agency on occupational competency based computerized assessment?		
	Very high	6	37.5
	High	5	31.25
	Medium	4	25
	Low	1	6.25
	Very low	0	0

Respondents	Item	No.	%
	Total	16	100
	How do you see current implementing capacity of Addis Ababa City Administration CoC authority on occupational competency based computerized assessment?		
	Very high	2	12.5
	High	4	25
	Medium	4	25
	Low	6	37.5
	Very low	0	0
	Total	16	100
FTA, CoC and branch experts	How do you see current implementing capacity of Federal TVET Agency on occupational competency based computerized assessment implementation?		
	Very high	5	31.25
	High	6	37.5
	Medium	3	18.75
	Low	2	12.5
	Very low	0	0
	Total	17	100
	How do you see current implementing capacity of Addis Ababa City Administration CoC authority on occupational competency based computerized assessment?		
	Very high	1	6.25
	High	3	18.75
	Medium	6	37.5
	Low	6	37.5
	Very low	0	0
	Total	17	100

As can be seen on the table 4.6 above, regarding the challenges related to current implementing capacity of Federal TVET Agency on occupational competency computerized Assessment; FTA's, CoC authority's and branch office's management

members responded like 6 (37.5%) of the 16 respondents have said it is very high, 5(31.25%) of respondents have said that it is high, 4 (25%) of respondents have said that it is medium and 1(6.25%) have said it is low. The same respondents have also given their saying on the current implementing capacity of Addis Ababa city administration CoC authority focusing on occupational competency computerized assessment implementation capacity. 2(12.5%) of the 16 respondents have said it is very high, 4(25%) of respondents have said that it is high, 4(25%) of respondents have said that it is medium and 6(37.5) of the respondents have said it is low.

FTA's, CoC authority's and branch office's experts point of view, 5(31.25%) of the 17 respondents have said it is very high, 6(37.5%) of respondents have said that it is high, 3(18.75%) of respondents have said that it is medium and 2(12.5%) have said it is low. The same respondents have also given their saying on the current implementing capacity of Addis Ababa city administration CoC authority focusing on occupational competency computerized assessment implementation capacity. 1(6.25%) of the 17 respondents have said it is very high, 3(18.75%) of respondents have said that it is high, 6(37.5%) of respondents have said that it is medium and 6(37.5) of the respondents have said it is low.

During the interview, the experts have said that occupational competency computerized assessment at federal level is organized at directorate level and it is expected to regulate the regional independent CoCs in 2 city administrations and 9 regional states. According to experts' view, the challenges encountering the occupational competency computerized assessment raises from the current occupational competency computerized assessment modality that is leading by the region. The federal TVET Agency in charge of occupational competency computerized assessment is supposed to establish new modality of computerized assessment system for properly control actual implantation of the system and make sure standard implementation procedures are followed, challenges like rent seeking is mitigated and hence system reliability is ensured, however, the current actual practice of computerized assessment is not to the required level. The experts during the interview have raised that the problems related to the quality of occupational competency assessment implementation is because of the current modality that means the assessment tools encoding, tools handling and controlling activity is

managed by the experts of data administrator at the CoC authority level.

Table4.6. 2: Responses supervisors on more challenges and mitigations in occupational competency computerized assessment implementations

Respondents	**Item**	**No.**	**%**
Supervisors	What do you say the frequency of errors that is happening on occupational competency computerized assessment?		
	Very high	3	21.43
	High	3	21.43
	Medium	5	35.71
	Low	3	21.43
	Very low	0	0
	Total	14	100

According to the data collected from supervisors (table 4.8) using questionnaire regarding the frequency of the errors in the occupational competency computerized assessment, 3(21.43%) have said that it is very high; 3(21.43), have said that it is high; 5(35.71%) have said that it is medium and 3(21.43%) have said that it is low. The data shows that occupational competency computerized assessment tool encoding and managing should be seriously taken and the quality has to be improved otherwise the negative impact is very high. This could be realized when the current modality of computerized assessment implementing system should be changed and re-structured so that the federal body could have better implementing system.

4.7. Document Review and Analysis

4.7.1. Organizational Structures on the Management of Occupational Competency Assessment and Certification

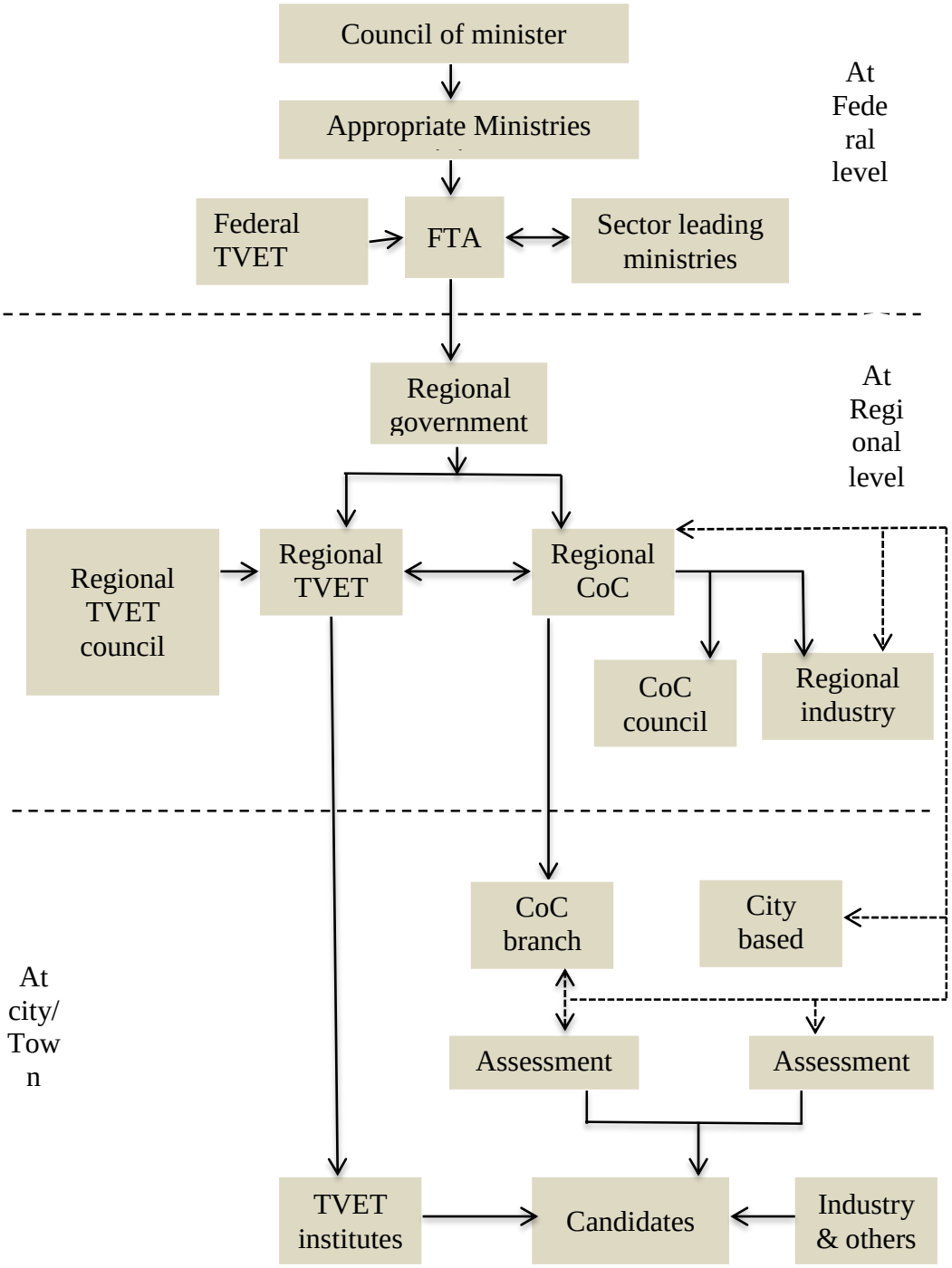

Figure4.1: Over all functional structure for Assessment and Certification

Source: Occupational Assessment and certification directive 2020

1. **Ministry** is the Ministry which is directly responsible for all higher education and vocational training in the country. This ministry is literally ministry of science and higher education by now. It serves as the secretariat of the Federal TVET Council for implementing policies and guidelines issued by the Council for the TVET programs.
2. **Federal TVET Council** is composed of representatives of Ministries in government which provides assistance to the Federal TVET Agency in the formulation of policies and guidelines that have set and will set the direction of the TVET Strategy to assure the success of TVET programs.
3. **Federal TVET Agency (FTA)** is the implementing body for occupational competency computerized assessment and certification program of the government, as a component of the TVET Reform. It shall translate the direction from the Council of Ministers into policies and guidelines/ Directives. The Agency shall take in charge of key functions such as provide oversight functions in the implementation of assessment and certification by conducting regular monitoring of assessment-related activities to assure adherence to the provisions of the directive. Along this context, the FTA is tasked to undertake measures that will correct practices which are NOT in accordance with this Directive. It is also in charge of the moderation procedures for the assessment tools developed and properly validated. It implements the issuance of certification through the CoCs. It consolidates and analyzes computerized assessment- related reports to determine the effectiveness of the TVET training delivery. It also capacitates the CoCs in the implementation of assessment-related activities, which might potentially include development of assessment tools, calibration of the training and accreditation of assessors, procedures on the conduct of assessments and other important aspects of assessments as per guideline.
4. **Sector-leading ministry** is in charge of a sector, for example ministry of agriculture facilitates the creation of the industry sector body/ association

which represents industry in the region. It translates the direction from the Council of Ministers into policies and guidelines that will assure the success of not only computerized assessment but also assessment in general and certification of workers to improve the productivity of its manpower. Specifically, it takes the lead in the development, review and revisions of the occupational standards, facilitates the creation of the Regional Industry Body/ Professional Associations in the respective sector in the regions and takes the lead in facilitating the development of first version assessment tools for the occupational qualifications in the sector, which are implemented by the Regional Industry Associations with their assessors Panel.

5. **Regional Government** as a policy-making body in the region, it ensures that the guidelines and implementation of the occupational competency computerized assessment and certification system are in support to the development plans of the region.
6. **Regional TVET Council** is composed of the representatives from the various bureaus to advise the regional TVET body on the implementation of TVET strategy at the regional level.
7. **CoC Board** is a body organized by regional governments to administer/manage the CoC on their behalf. The major functions of the board; approves assessment fees in consultation with the respective regional industry body, initiates establishment of regional industry bodies in cooperation with the respective regional sector bureaus, associations, etc and coordinates with the regional industry body to guarantee fulfillment of assessors and assessment centers for proper implementation of computerized assessment and certification within that specific sectors. It approves financial and physical plan of the CoC, oversees the implementation of the functions and responsibilities of the bodies in the region, implementing the system, to assure that such implementation is done according to the approved Directive and Manuals. It implements measures to correct system deficiencies that erode the quality of the output and provides information on the development and success of the assessment and certification system to the Regional Government.
8. **Regional Industry Body** is supposed to assist the CoCs in accrediting assessors by identifying technical experts in the various occupations of the sector and organizes the assessors' panel for the occupations. I also assist the CoCs in

accrediting to Assessment Centers, identifying assessment venues, scheduling computerized assessments and assigning assessors and assessment centers accordingly. It collaborates with the CoC for the development and validation of additional versions of assessment tools at regional level and evaluates implementation of all types of assessments in the respective sector. It leads the assessment of workers in the sector and provides advice to the board on the assessment fees.

9. **Regional TVET Agency** is responsible to plan the assessments of TVET trainees/completers from the different TVET institutions of the region in consultation with the regional CoC, Prepares and makes trainees/completers available for assessment as per the plan. It utilizes assessment data from CoC to measure effectiveness of the delivery system by the TVET Institutions.
10. **Regional CoC** is responsible for capacitating the Regional Industry and Associations in assessment related activities, such as training of assessors, development of assessment tools, procedures of the conduct of assessments as indicated in the Directive. It facilitates the training of assessors with the Regional Industry/Associations and the assessors' panel, accredits assessors and assessment centers, from recommendations given by the Regional Industry / Associations, coordinates with the Regional Industry and Associations in the development of additional versions of assessment tools and the actual conduct of assessments, coordinates with the Regional TVET Agency on the assessment need of the TVET in various occupations and levels, for planning and proper executions, create awareness on assessment and certification to the community, provides prompt monthly reports of assessment-related activities and results according to the required formats, to the CoC Board and the Federal TVET Agency. It maintains data bank of assessment tools, candidate's data, and assessment reports. It issues the relevant certificate to the successful candidate as authorized by the FTA, (NQC or CC).
11. **CoC Branch Office** is the extension office of the CoC in the various cities/ towns under its jurisdiction. This is done to bring the services of assessment and certification closer to its clients, thereby reducing expenditures on the part of the candidates. Specifically, this office handles the following responsibilities: accepting and processing applications for assessments, coordinating with local industry bodies in the appointment of assessors and assessment centers,

managing assessment activities in the locality, in collaboration with its partners in industry and performing other functions delegated by the Regional CoC, for assessment- related activities.

12. **City-based industry bodies** are bodies initiated by the regional CoCs comprising of representatives of local industries and professional associations. These are responsible for functions and responsibilities similar to the regional industry body in their respective cities.
13. **Assessment Centers** are accredited by unit/s of competence or by qualification level and it does the following functions; holds assessments according to the capacity of its resources as recommended by the assessors' panel and the CoC, accepts and process applications for assessments, along the occupations or competencies accredited. It makes full use of the self- assessment guide to advice the candidate on the assessment applicable. It provides the candidate a copy of the article in this Directive that describes his/her responsibilities. It makes the assessment resources available according to the assessment requirement, at least 5 days before the assessment schedule, which shall be ready for inspection by the CoC and the assessors.
14. **Assessment Venue** is a venue identified and arranged by the assessors' panel or the Regional Industry/ Association outside the assessment center to handle assessment of specialized competencies, or to augment the assessment center due to greater number of candidates.
15. **Assessors' Panel** is responsible for developing assessment tools under the facilitation of the Regional Industry/ Association and the CoC, inspecting assessment centers/ venues for readiness in implementing assessments, providing advice on the selection of assessment tools to be used, the assessment center or venue and the assessment arrangement (whether on-site or simulated), and the schedule of assessment. It implements assessment activities, under the supervision of the Regional Industry/ Association, and the CoC and recommend measures that will improve the assessment system, including improvement of the occupational standards.
16. **TVET Institution** is potentially a Public, Private or Non-Government Organization (NGO) establishment approved by the appropriate government body to offer formal and/or non-formal TVET programs in various levels, of occupations. In particular, it clearly plan assessment of its trainees in

consultation with the regional TVET, prepares and makes trainees/completers available for assessment as per the plan, may assist CoCs in development of assessors and assessment centers as per their agreement and makes analysis of the results of assessment of its trainees to measure effectiveness of its training delivery.

17. **Candidates** can be TVET trainees, industry workers or any individual who applied for assessment. In order to be considered as a candidate for assessment they are expected to fulfill all requirements for application, abide by the rules and regulations of the assessment process. They are expected to perform assessment tasks/projects according to the instructions stated in the assessment package.

4.7.2. Addis Ababa City Administration Competency Assurance Authority

Currently, Addis Ababa city administration competency assurance authority has more than 729 full time staff including those working in eight branches according to the annual report (2019). The branches are established under the city administration competency assurance authority. According to the annual report of Addis Ababa city administration competency assurance authority (2019), the authority has 1500 assessors and 295 assessment centers. The branches operating under the city administration CoC are eight and all branches have more or less same operating capacity and conditions. The total numbers of the candidates, form different categories, who have passed through occupational competency computerized assessment, are put on the table below.

Table4.5: Data on the trend of number of assessed and competent candidates since 2010

year	Number of assessed	Competent	Percent %
2010	123,613.00	71,939.00	58.2
2011	134,678.00	75,657.00	56.2
Total	258,291.00	147,596.00	57.14

Source: Federal TVET agency's report (2011)

Notice: computer-based assessment is started since 2010.

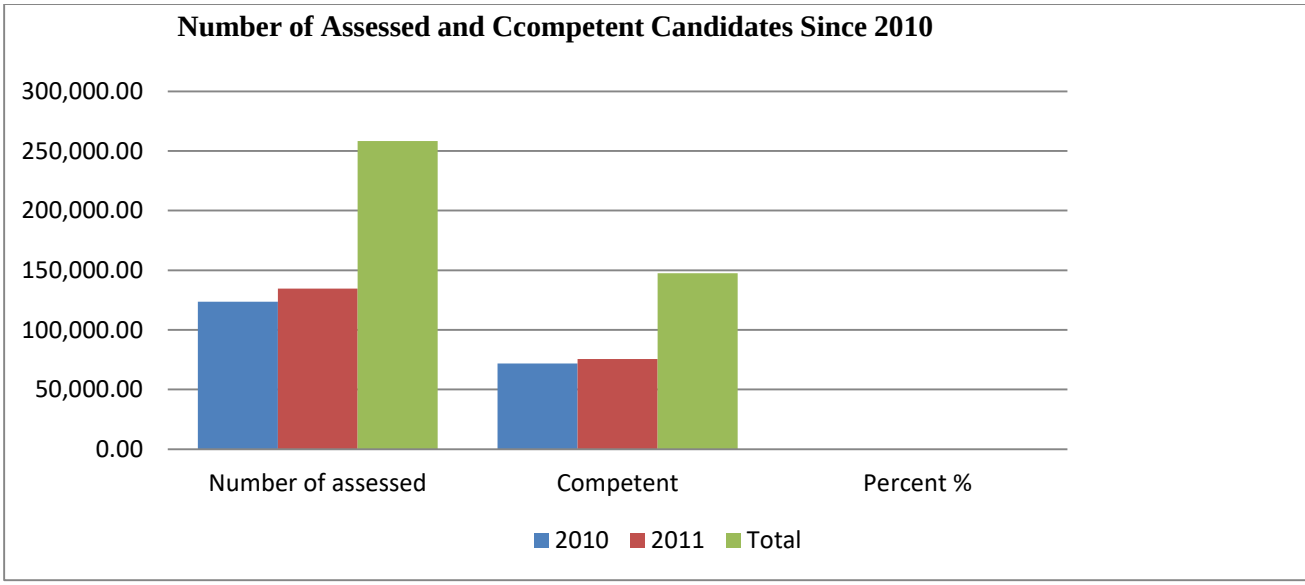

Figure 4. 2 Number of Assessed and Competent Candidates Since 2010

4.7.3. Procedures of Occupational Competency computerized Assessment

Assessing competence must include observation of Candidates performing tasks in the workplace to a specified Standard(s). Observations are ideally expected to be carried out by a trained Assessors and supervisors wherever possible. Observation of Candidates must be supported by questioning to ensure that Candidates have, and can apply, relevant knowledge and understanding for the specified Standard(s). Relevant workplace documents and job records can be used to support the assessment process. Additional supporting evidence could include witness testimony from individuals who are in a position to provide informed feedback on the performance of Candidates. All assessments must be subject to a valid verification process conducted by competent Internal Verifiers. Internal Verifiers must sample evidence across all Assessors, Candidates and assessment sites. All Candidates must have access to fair and equitable computerized assessment opportunities and have a right to appeal against any decision made by their Assessors or supervisors. Where formal qualifications are to be achieved this must be in accordance with the requirements of the relevant awarding bodies/audit organizations (Offshore Petroleum Industry Training Organization, 2016). Following standard procedures highly matters the smooth implementation of occupational competency computerized assessment implementation system.

4.8. Summary of the Major Findings

4.8.1. Summary on the Extent that Occupational Competency computerized Assessment Practice Follow the Standard Procedures

The findings of the study show that actual practice in implementation of the occupational competency computerized assessment has shown serious deviation from the standard procedures and principles. During the interview with the FTA experts, the experts have said that actual practices of the occupational competency computerized assessment has deviations from what is supposed to be practiced according to the FTA assessment and certification directive. They said that the deviation starts from the miss handling of occupational competency computerized assessment tools at CoC authority level; there is no system established to control the security of the assessment tools and the encoding system to the software; and also the transferring method of the tools to the assessment center through the supervisors.

Among the sixteen (16) FTA's, CoC authority's and branch office management members, 8 (50%) have said the deviation is very high, 4(25%) have said that deviation is high, 2(12.5%) have said that deviation is medium and 1 (6.25%) have said the deviation is low and 1 (6.25%) have said the deviation is very low.

From the experts' respondent using questionnaires show that there is deviation of actual implementation of occupational competency computerized assessment modality against the standard procedures required in occupational competency assessment and certification directive and standards. Among the seventeen (17) FTA's, CoC authority's and branch office's higher experts, 7 (41.2%) have said the deviation is Very high and 5 (29.4%) have said that deviation is high and 3 (17.6%) have said the deviation is medium. 1 (5.9%) have said the deviation is low and 1(5.9%) has said the deviation is very low at all.

During the interview with FTA management members, one of the FTA management members said that "As one of the member in supervision team who conducted monitoring and evaluation in Addis Ababa city administration CoC in 2019, I have observed that the CoC authority is not properly following the standard procedures in the computerized assessment implementation like assessment tool handling and

encoding security and assessment tool data encoder and supervisors do not keep security of the tool due the result of losing ethics. One of the reasons why the assessors lack proper competency and ethics is because of the CoC not following the standard procedures of assessor development seriously".

During the interview with the FTA experts, the experts have said that actual practices of the occupational competency computerized assessment has deviations from what is supposed to be according to the FTA assessment and certification directive and ES ISO: 17024 standards. The experts said that the deviation starts from the miss handling and encoding of occupational competency assessment tools at regional level; there is no system established to control the security of the assessment tools and to know which assessment tools versions are on use in each region and each assessment centers.

4.8.2. Summary on the Extent that Autonomous Occupation of Competency based computerized Assessment System

The findings of the study show that there is interference of the training regulator and operator on the functions of the occupational competency computerized assessment implementation. The data collected through questionnaires show that 12 (75%) of FTA, CoC authority and branch office management members 11 (64.7%) FTA's, CoC authority's and branch office's experts have said that independency of assessment and certification operation is not to the required level and it is under interference of the training regulatory. During the interview, one of the CoC management members has disclosed that as assessment result reveals the status of quality of training, low assessment result is not needed to be reported and hence quality assurance part or CoC authority has not been given equal emphasis and autonomy at city administration level and is not needed to be strong even at federal level. Therefore, federal TVET agency should make implementation of computerized assessment that must be encode at federal level. One of the FTA experts has mentioned on the interview that there is high cross interference at the federal level and the quality assurance is not playing vital role as it is expected to be. The Federal TVET agency is regulating both the training provision and external quality assurance at the same box which is completely not in line with international standard ISO/IEC: 17024. Because of the reason that they are being regulated by the

same body being on the same box, there is high tendency of interference.

Eleven (11) which are 78.57% of assessors have said that there is interference of TVET institutional leaders or trainers on the decision of the assessor during assessment and this response of the assessors also strengthens what the trainees said. Nine (9) which are 64.3% of supervisors have also said that there is interference of TVET institutional leaders or trainers on the decision of the assessor during assessment.

4.8.3. Summary on the Trend of acceptance of Occupational Competency computerized Assessment through understanding of importance

The findings of the study revealed that the trend of occupational competency computerized assessment in terms of being accepted by the society through understanding importance is increasing from time to time. Among the FTA's, and CoC authority's management members who filled and returned the questionnaires, 3 (18.75%) have said that the trend of acceptance of importance of occupational competency computerized assessment is very high, 9(56.25%) have said that high; 4(25%) have said medium and non-have said it is low and very low. And also, FTA, CoC and branch higher experts; 5 (29.4%) of them have said the trend and acceptance of occupational competency computerized assessment is very high; 8(47%) have said the trend and acceptance of occupational competency computerized assessment is high; 4(23.6%) have said medium and non-have said it is low and very low. On the assessors side; 6 (42.86%) of assessors have said the trend and acceptance of occupational competency computerized assessment is very high; 7(50%) of them have said the trend and acceptance of occupational competency computerized assessment is high; 1(7.14%) of them have said medium and none of them have said it is low and very low.

The data above shows that it is very clear that the acceptance of occupational competency computerized assessment has been growing and the importance is also being well understood by the industries/citizens.

4.8.4. Summary on the Extent That Rent Seeking Affects the Implementation of Occupational Competency computerized Assessment

According to the data collected from FTA, CoC authority and branch office management members through questionnaires (table 4.5 above) show that 2 (12.5%), 4 (25%), 4 (25%), 5 (31.25%) of the respondents have said rent seeking is affecting the effectiveness of occupational competency computerized assessment implementation at the rate of high, medium, low and very low respectively.

During interview, one of the interviewed members from CoC branch said, "Rent seeking has been affecting the entire system of occupational competency assessment and the impact is very high. But it doesn't affect computerized assessment system if assessment tools are encoding and managing at federal level.

Data collected from higher experts through questionnaires also show that 1 (5.9%),4 (23.5%), 5(29.4%) and 7(41.2) of the respondents have said rent seeking is affecting the effectiveness of occupational competency computerized assessment implementation at rate of high, medium, low and very low respectively.

4.8.5. Summary on General Challenges in Occupational Competency computerized Assessment Implementations System and Mitigations

Regarding the challenges related to current implementing capacity of Federal TVET Agency on occupational competency computerized assessment; FTA's, CoC authority's and branch office's management members responded like 6 (37.5%) of the 16 respondents have said it is very high, 5(31.25%) of respondents have said that it is high, 4 (25%) of respondents have said that it is medium and 1(6.25%) have said it is low. The same respondents have also given their saying on the current implementing capacity of Addis Ababa city administration CoC authority focusing on occupational competency computerized assessment implementation capacity; 2(12.5%) of the 16 respondents have said it is very high, 4(25%) of respondents have said that it is high, 4(25%) of respondents have said that it is medium and 6(37.5) of the respondents have said it is low.

FTA's, CoC authority's and branch office's experts point of view, 5(31.25%) of

the 17 respondents have said it is very high, 6(37.5%) of respondents have said that it is high, 3(18.75%) of respondents have said that it is medium and 2(12.5%) have said it is low. The same respondents have also given their saying on the current implementing capacity of Addis Ababa city administration CoC authority focusing on occupational competency computerized assessment implementation capacity. 1(6.25%) of the 17 respondents have said it is very high, 3(18.75%) of respondents have said that it is high, 6(37.5%) of respondents have said that it is medium and 6(37.5) of the respondents have said it is low.

During the interview, the experts have said that occupational competency computerized assessment at federal level is organized at directorate level and it is expected to regulate the regional independent CoCs in 2 city administrations and 9 regional states. According to experts' view, the challenges encountering the occupational competency computerized assessment raises from the current occupational competency computerized assessment modality that is leading by the region. The federal TVET Agency in charge of occupational competency computerized assessment is supposed to establish new modality of computerized assessment system for properly control actual implantation of the system and make sure standard implementation procedures are followed, challenges like rent seeking is mitigated and hence system reliability is ensured, however, the current actual practice of computerized assessment is not to the required level. The experts during the interview have raised that the problems related to the quality of occupational competency assessment implementation is because of the current modality that means the assessment tools encoding, tools handling and controlling activity is managed by the experts of data administrator at the CoC authority level.

4.9. Proposed improvement model of occupational competency based computerized assessment

Before modeling the competency based computerized assessment system, we shall see each component briefly with the current situation of assessment as follows.

4.9.1. Management Responsibilities

The top management of FTA and CoC authority should always try to create an environment/system where people are fully involved and in which their quality management of implementation of computerized assessment can operate effectively. The management should demonstrate their commitment for the implementation of computerized assessment by: conducting regular management reviews, establishing organizational objectives and its implementation policy, ensuring the availability of necessary assessment resources, ensuring everyone is aware of the importance of implementation of computerized assessment, assessment tool handling and data encoding requirements.

4.9.2. Required Resources for computerized assessment

FTA, CoC authority and branch office of yeka sub city need to identify and make available all the resources (such as computers, supervisors, assessment infrastructure, work environment, finance, and support) required to implement and improve their computerized assessment system. The CoC branch office is responsible for ensuring that all resources are fulfill, personnel are trained and experienced to the extent necessary to undertake their assigned activities and responsibilities effectively.

4.9.3. Competency based computerized assessment quality improvement

Competency based computerized assessment quality improvement refers to all efforts directed to increase effectiveness and efficiency in meeting accepted assessment requirements based on the standard set. It is a continuous process to achieve a better understanding of the implementation; to implement the system according to the given processes; to manage and control the computerized assessment processes. The success of quality improvement in the computerized assessment implementation system is based on the understanding of every member of the implementers of the system concerning the needs of their responsibility for the assessment activity.

4.9.4. Competency based computerized assessment implementation Quality assurance

Quality assurance involves prevention of quality problems through planning and systematic implementation action. It takes a wider view than quality control. Quality should not be about fixing a problem but preventing it. Quality assurance, therefore, includes the whole computerized assessment implementation system starting from the program setting through the internal management to the assessment venue. The current process should be revised with reference to international standards and local regulations. During Computerized assessment implementation system, CoC authority should implement ISO/IEC 17024 standards. This will help the CoC authority to fulfill the international standards.

4.9.5. Assessment tool encoding

Occupational competency-based assessment tool could be encoding at federal TVET Agency level to enhance the quality and relevance of occupational competency computerized assessment implementation system. This encoding also helps to control rent seeking activity at branch office and assessment centers level.

4.9.6. Quality auditing and Review of computerized assessment implementation

When developing competency based computerized assessment model, the CoC authority must develop a systematic audit of all quality related activities to ascertain whether quality procedures and instructions meet the requirements of the standard in computerized assessment. Quality audits and reviews are fundamental for any quality management system to function properly. Quality reviews are systematic and periodical activities carried out to check whether the computerized assessment system achieved the required standard and quality auditing is an official examination of the functions in CoC authority and branch office against a standard document. Review must use audit findings and ultimately lead to system improvement.

4.9.7. Competency based computerized assessment quality system documentation

After developing the model of computerized assessment system, the CoC must establish and maintain a documented quality system as a means of ensuring that the implementation of computerized assessment conforms to specified requirement based on the standard. In effect, it implies an overall scheme of quality assurance institutionalized in documentation issued in the form of manuals, procedures and instructions. Documentation is one of the main areas that the CoC must focus.

The remodeling of occupational competency based computerized assessment is:

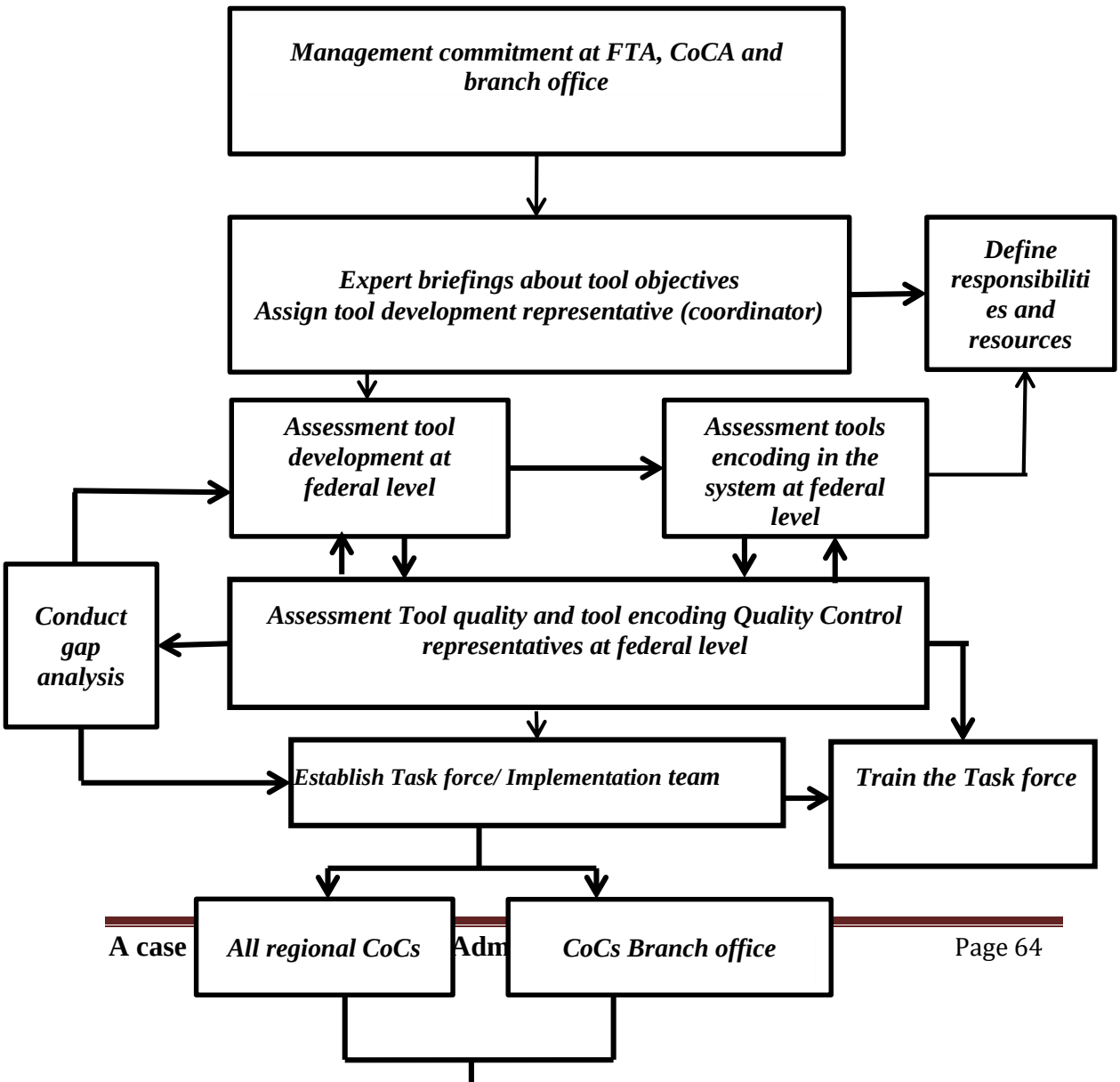

Figure4. 3: Occupational competency computerized assessment model (researcher's own)

According to the respondents, regional assessment tool encoding system has three persons contact and there is no assessment tool encoding quality control body. Due to this it is highly opened to rent seeking activity but the new model design has performed assessment tool encoding at federal level with assessment tool quality and tool encoding quality control representatives and also assessment tool distribution is directly from federal TVET agency to branch office and CoC authority. Therefore, rent seeking activity is minimized.

The finding of this research is mentioned under 4.8 and the successful one among the five is the deviation of competency based computerized assessment from the standard procedures and principles in 4.8.1.

4.9.8. Recommendation based on new computerized assessment model.

The results of the questionnaires distributed and the researcher's observation indicates that Addis ababa city administration CoC authority is too back to implement the competency based computerized assessment implementation system against the ISO 17024 standard. This CoC authority will start from the initial of the Competency based computerized assessment implementation steps based on the standard and the assessment tool encoding activity could be implementing at federal level to minimize rent seeking activity and improve the quality and effectiveness of computerized assessment. The top management of Addis Ababa city administration CoC authority should wake up and assess

overall activities of the authority genuinely based on the assessment implementation standards. The quality related problems discussed above through the study of this thesis and other obstacles that expose the CoC for loss should be eliminated from their origin.

The proposed competency based computerized assessment model gives a quality framework for the implementation of occupational competency based computerized assessment system. It only guides the activities of the FTA and CoC authority towards achieving better implementation of competency based computerized assessment system. The main problems of the computerized assessment implementation systems of TVET have been identified in this study. Hence, the FTA and CoC authority shall focus on occupational competency based computerized assessment problems elimination. Generally, this occupational competency based computerized assessment model will help the assessment and certification system to a better assessment implementation in the national and international standard based, if FTA and CoC authority implements this model genuinely.

CHAPTER FIVE

5. Conclusions and Recommendations

5.1. Conclusion

On this research study, it has been tried maximum to investigate the current practices and impacts of occupational competency computerized assessment implementation on the quality of occupational competency assessment system in Addis Ababa city administration. The researcher has tried to answer the research questions scientifically.

The study has shown that actual practice in implementation of the occupational competency computerized assessment has encountered serious deviation from the standard procedures and principles. The handling of assessment tools, assessment tool encoding, and other important system data is not following the standard procedures and not using appropriate technologies like software and hence this has resulted inefficient service provision. The findings of the study revealed that there is interference of the training regulator and operator on the functions of the occupational competency computerized assessment implementation. Therefore, federal TVET agency should make implementation of computerized assessment that must be encoded at federal level; and the regulatory body at federal level should be independent from the training provision.

The findings have also revealed that the trend of occupational competency computerized assessment in terms of being accepted by the industries/society through understanding importance is increasing from time to time, however, unless the current challenges are overcoming, the increasing trend may not continue. Rent seeking has been affecting the entire system of occupational competency assessment and the impact is very high. But it doesn't affect computerized assessment system if assessment tools are encoding and managing at federal level. The challenges encountering the occupational competency computerized assessment raises from the current occupational competency computerized assessment modality that is leading by the region. The federal TVET Agency in charge of occupational competency computerized

assessment is supposed to establish new modality of computerized assessment system for properly control actual implantation of the system and make sure standard implementation procedures are followed, challenges like rent seeking is mitigated and hence system reliability is ensured, however, the current actual practice of computerized assessment is not to the required level.

5.2. Recommendations

Based on question number three from research questions and also from the findings and the conclusion, the researcher provides the following recommendations for the policy makers and implementers of the system so that the current impacts that are affecting the effectiveness and reliability of occupational competency based computerized assessment in Addis Ababa city administration and perhaps across the country could be sustainably mitigated.

1. The leading and implementing capacity of the federal TVET agency particularly occupational competency computerized assessment body has to be well organized by ICT infrastructure due to occupational competency assessment tools encoding in the system at federal level. This could happen when the current small certification and assessment data administration directorate with incapacitated and insufficient staff could be replaced by the new structure, separate and autonomous entity staffed with adequate and competent human resource.
2. The standard procedures of occupational competency computerized assessment have to be seriously followed and implemented accordingly. Code of ethics has to be prepared and implemented for the competency based computerized assessment implementation for accountability. When standard procedures are deviated knowingly by any implementer from federal to city administration or regions, to be accountability for that deviation to be implemented by code of ethics. In connection with this, the FTA and CoC authority should move seriously towards fulfilling requirements of ES ISO 17024 and when this happens, most problems will be solved and the practice will get international recognition.
3. The utilization of computers and data security control soft-wares (idoo file encryption, folder protection and secret folder) in handling and managing of

assessment tools should be given high emphasis. This will save trainees who are victims of the illegal brokers who cheat and collects money from trainees and other potential candidates saying they have got assessment tools and they could give to the trainees and make trainees pass the assessment as if trainees can be competent without demonstrating their performance.

4. The supervisors of the CoC should also be ethical and committed to their work and this could happen with continuous capacity building, regular monitoring and evaluations; and feed backing system implementation.
5. Following proper procedures in development and renewal of the assessment centers has also big impact on improvement of occupational competency computerized assessment implementation effectiveness and need to be given big focus by the CoC authority and branch office.
6. Ensuring the quality of the training is the milestone and could not be replaced by some other option as long as training providers need to produce competent workforce. Occupational competency computerized assessment is an instrument to check the quality of training, just like a weighing balance, it doesn't make trainees competent by itself. Providing quality training is responsibility of training provider engaged in TVET. Producing trainees with poor quality of training and blaming them after they are exposed for rent seeking options is quite big. It has to be properly underlined that training providers need to make sure that minimum quality of training is achieved and trainees are confident enough to sit for national occupational competency computerized assessment.

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Appendixes

Appendix 1

ADDIS ABABA UNIVERSITY
ADDIS ABABA INSTITUTEE OF
TECHNOLOGY SCHOOL OF MECHANICAL
AND INDUSTRIAL ENGINEERING

Questionnaires to be answered by the FTA CoC authority and branch office management members

Dear respondents,

I am a graduate student in the school of mechanical and industrial engineering (Industrial Engineering stream) in Addis Ababa University, institute of technology. Currently, I am undertaking a research entitled 'The Impacts of Computerized Assessment model on the Quality of Occupational Competency Based Assessment and Propose Improvement Model in Addis Ababa City Administration'. The collected data will be processed and analyzed and hence the impacts will be identified and potential solutions will be proposed by researcher so that the information could be utilized by concerned bodies (implementing bodies, policy makers and potential beneficiaries) to enhance the implementation of occupational competency based digital assessment system. You are one of the respondents selected to participate on this study. Therefore your honest answers for each and every question will make the research reliable and hence, I request you kindly to provide answers with honesty. No individual's responses will be identified as such and the identity of persons responding will not be published or released to anyone. Finally, I confirm you that the information that you share to the researcher will be kept confidential and only used for the academic purpose. Thank you for your cooperation and serious commitment.

Sincerely,

Mihret Tigabie

Brief instruction

- No need to write your name
- Please mark "√" for questions with alternatives
- Write full text for open end questions.

Section I

1. Name of Organization: _____
2. Position: _____ ears of experience: _____
3. Sex: ☐ male ☐ female
4. Age: below 25 ☐ 26-36 ☐ 37 - 47 ☐ above 48 ☐

Section II

S.N	Question items. After you read each of the following questions and then put a tick mark (√) under the choices below. Where, 5 = Very high, 4 = high, 3 = Medium, 2 = Low and 1= Very low	5	4	3	2	1
5	How do you see current deviation of actual implementation of Occupational competency computerized assessment modality against standard procedures?					
6	How do you see current implementing capacity of Federal TVET Agency on occupational competency based computerized assessment?					
7	How do you see current implementing capacity of Addis Ababa City Administration CoC authority on occupational competency based computerized assessment?					
8	In your opinion, how do you see the trend of acceptance of occupational competency based digital assessment among the industry competitiveness?					
10	To what extent do you think rent seeking is affecting the effectiveness of occupational competency computerized assessment implementation?					
		Yes	No			
11	Do you think that occupational competency assurance authority is operating no independently without					

	interference of the training provider?		

Appendix 2

ADDIS ABABA UNIVERSITY
ADDIS ABABA INSTITUTEE OF
TECHNOLOGY SCHOOL OF MECHANICAL
AND INDUSTRIAL ENGINEERING

Questionnaires to be answered by the FTA, CoC authority and branch office higher experts

Dear respondents,

I am a graduate student in the school of mechanical and industrial engineering (Industrial Engineering stream) in Addis Ababa University, institute of technology. Currently, I am undertaking a research entitled 'The Impacts of Computerized Assessment model on the Quality of Occupational Competency Based Assessment and Propose Improvement Model in Addis Ababa City Administration'. The collected data will be processed and analyzed and hence the impacts will be identified and potential solutions will be proposed by researcher so that the information could be utilized by concerned bodies (implementing bodies, policy makers and potential beneficiaries) to enhance the implementation of occupational competency based digital assessment system. You are one of the respondents selected to participate on this study. Therefore your honest answers for each and every question will make the research reliable and hence, I request you kindly to provide answers with honesty. No individual's responses will be identified as such and the identity of persons responding will not be published or released to anyone. Finally, I confirm you that the information that you share to the researcher will be kept confidential and only used for the academic purpose. Thank you for your cooperation and serious commitment.

Sincerely,

Mihret Tigabie

Brief instruction

- No need to write your name
- Please mark "√" for questions with alternatives
- Write full text for open end questions.

Section I

4. Name of Organization: _____
5. Position: _____ ears of experience: _____
6. Sex: ☐ male ☐ female
4. Age: below 25 ☐ 26-36 ☐ 37 – 47 ☐ above 48 ☐

Section II

S.N	Question items. After you read each of the following questions and then put a tick mark (√) under the choices below. Where, 5 = Very high, 4 = high, 3 = Medium, 2 = Low and 1= Very low	5	4	3	2	1
5	How do you see current deviation of actual implementation of Occupational competency computerized assessment modality against standard procedures?					
6	How do you see current implementing capacity of Federal TVET Agency on occupational competency based computerized assessment?					
7	How do you see current implementing capacity of Addis Ababa City Administration CoC authority on occupational competency based computerized assessment?					
8	In your opinion, how do you see the trend of acceptance of occupational competency based digital assessment among the industry competitiveness?					
9	To what extent do you think rent seeking is affecting the effectiveness of occupational competency computerized assessment implementation?					
		Yes			No	
10	Do you think that occupational competency assurance authority is operating no independently without interference of the training provider?					

Appendix 3

ADDIS ABABA UNIVERSITY
ADDIS ABABA INSTITUTEE OF
TECHNOLOGY SCHOOL OF MECHANICAL
AND INDUSTRIAL ENGINEERING

Questionnaires to Be Answered by the Occupational Competency Assessment Supervisors

Dear respondents,

I am a graduate student in the school of mechanical and industrial engineering (Industrial Engineering stream) in Addis Ababa University, institute of technology. Currently, I am undertaking a research entitled 'The Impacts of Computerized Assessment model on the Quality of Occupational Competency Based Assessment and Propose Improvement Model in Addis Ababa City Administration'. The collected data will be processed and analyzed and hence the impacts will be identified and potential solutions will be proposed by researcher so that the information could be utilized by concerned bodies (implementing bodies, policy makers and potential beneficiaries) to enhance the implementation of occupational competency based digital assessment system. You are one of the respondents selected to participate on this study. Therefore your honest answers for each and every question will make the research reliable and hence, I request you kindly to provide answers with honesty. No individual's responses will be identified as such and the identity of persons responding will not be published or released to anyone. Finally, I confirm you that the information that you share to the researcher will be kept confidential and only used for the academic purpose. Thank you for your cooperation and serious commitment.

Sincerely,

Mihret Tigabie

Brief instruction

- No need to write your name
- Please mark "√" for questions with alternatives
- Write full text for open end questions.

Section I

1. Name of Organization: .....
2. Position:..... years of experience :.....
3. Sex: ☐ male ☐ female
4. Age: below 25 ☐ 26-36 ☐ 37 - 47 ☐ above 48 ☐

Section II

S.N	Question items After you read each of the following questions and then put a tick mark (√) under the choices below. Where, 5 = Very high, 4 = high, 3 = Medium, 2 = Low and 1= Very low	5	4	3	2	1
5	What do you say the frequency of errors that is happening on occupational competency computerized assessment?					
		Yes		No		
6	Have you ever seen any deviation of standard procedures in actual implementation of occupational competency computerized assessment?					
7	Have you been given training on how to supervise conduct of Occupational competency computerized assessment?					
8	Have you ever seen the interference of TVET institutional on the decision of the assessor during assessment?					

Appendix 4

ADDIS ABABA UNIVERSITY
ADDIS ABABA INSTITUTEE OF TECHNOLOGY SCHOOL OF MECHANICAL AND INDUSTRIAL ENGINEERING

Questionnaires to be answered by the **Occupational Competency Assessors**

Dear respondents,

I am a graduate student in the school of mechanical and industrial engineering (Industrial Engineering stream) in Addis Ababa University, institute of technology. Currently, I am undertaking a research entitled 'The Impacts of Computerized Assessment model on the Quality of Occupational Competency Based Assessment and Propose Improvement Model in Addis Ababa City Administration'. The collected data will be processed and analyzed and hence the impacts will be identified and potential solutions will be proposed by researcher so that the information could be utilized by concerned bodies (implementing bodies, policy makers and potential beneficiaries) to enhance the implementation of occupational competency based digital assessment system. You are one of the respondents selected to participate on this study. Therefore your honest answers for each and every question will make the research reliable and hence, I request you kindly to provide answers with honesty. No individual's responses will be identified as such and the identity of persons responding will not be published or released to anyone. Finally, I confirm you that the information that you share to the researcher will be kept confidential and only used for the academic purpose. Thank you for your cooperation and serious commitment.

Sincerely,

Mihret Tigabie

Brief instruction

- No need to write your name
- Please mark "√" for questions with alternatives
- Write full text for open end questions.

Section I

1. Name of Organization: .....
2. Position:..... name of occupation:.....
3. Sex: ☐ male ☐ female
4. Age: below 25 ☐ 26-36 ☐ 37 - 47 ☐ above 48 ☐

Section II

S.N	Question items. After you read each of the following questions and then put a tick mark (√) under the choices below. Where, 5 = Very high, 4 = high, 3 = Medium, 2 = Low and 1= Very low	5	4	3	2	1
5	How do you see the importance of the occupational competency computerized assessment for industry competitiveness?					
		Yes			No	
6	Have you ever observed any deviation of standard procedures in actual Implementation of occupational competency computerized assessment?					
7	Do you think the level of adequacy of necessary materials for occupational competency computerized assessment at assessment center?					
8	Have you ever seen the interference of TVET institutional on the decision of the assessor during assessment?					

Appendix 5

ADDIS ABABA UNIVERSITY
ADDIS ABABA INSTITUTEE OF
TECHNOLOGY SCHOOL OF MECHANICAL
AND INDUSTRIAL ENGINEERING

Interview questions for FTA, CoC authority and branch office management members and Experts; and supervisors and assessors

1. What have you observed as major deviations in practice against standard procedures of occupational competency computerized assessment implementation? please focus on ;
    - Assessment tool management, encoding and controlling system
    - Assessment tool handling and security
    - Computerized assessment processes operations
    - Supervisors role
    - adequacy of materials required for occupational competency computerized assessment
2. Have you ever observed any interference of training regulator body on the decision of occupational assessment regulating body? If yes, how?
3. Are there any progressive attitudinal changes towards accepting the importance of occupational computerized assessment among the industry?
4. What do you think could be solutions to mitigate rent seeking in occupational competency computerized assessment sustainably?

Appendix 6

Interview schedule

R.N	FTA management And Experts		CoC management and Experts		Branch management, Experts and supervisor		Assessors	
	Participant	Time	Participant	Time	Participant	Time	Participant	Time
1	5	May 3-7 E.C	5	May 10-14 E.C	5	May 17-21E.C	3	May 24-28 E.C