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**ENHANCING QUALITY OF OUTCOME BASED TECHNICAL
AND VOCATION EDUCATION AND TRAINING DELIVERY:
THE CASE OF POLYTECHNIC COLLEGES IN ADDIS
ABABA**

By

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This is to certify that the thesis prepared by Hailemichael Asrat Kassa, entitled: *Enhancing the Quality of Outcome Based Technical and Vocational Education and Training Delivery; The case of Polytechnic Colleges in Addis Ababa* and submitted in partial fulfillments of the requirements for the degree of Master of Science in Mechanical Engineering (Industrial Engineering) complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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I hereby declare that the work which is being presented in this thesis entitled “Enhancing the Quality of Outcome Based Technical and Vocational Education and Training Delivery; The Case of Polytechnic Colleges in Addis Ababa” is original work of my own and has not been presented for a degree of any other university and all the resources of references used for the thesis have been duly acknowledged.

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This is to certify that the above declaration made by the author is correct to the best of my knowledge.

Dr. Kassu Jilcha (Associate Prof.)

Date

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ABSTRACT

This research study has dealt with enhancing the quality of Outcome Based Technical and Vocational Education and Training Delivery. The major problem which calls for the need to improve and enhance the quality of the outcome based TVET is the lower passing rate of the graduates (57.7% in 2019) against national competency assessment. Prioritizing quality challenges based on the degree of their significance, setting respective scientific solutions and designing sustainable & continuous quality improvement modes through the process of conducting in-depth root cause analysis for prioritized quality challenges were core matters. The research approach is descriptive. It is case study type as well and has taken into consideration the case of six polytechnic colleges found in Addis Ababa City Administration. The study used a mixed research design, employing both quantitative and qualitative data. The target population which has been taken for this study were 42 TVET manager /policy makers/ from Federal, City and college levels, 36 private sector representatives/practitioners associated to the case study, 56 TVET experts and advisors, 36 trainers, 270 regular trainees from level 3 a total of 440. Stratified sampling was employed to determine the particular sample size for each category of population and hence, total actual sample size was 210. Purposive sampling, expert sampling, quota sampling and simple random sampling techniques have been used. The data have been collected using survey questionnaires, interviews, and focus group discussions. The secondary sources such as reports, publications and policy documents have been also utilized in addition to primary data sources. Both qualitative and quantitative data analysis techniques were applied. SPSS and SQC tools were extensively applied to process and analyze data. The Pareto chart analysis, fishbone diagram analysis, process flow charts, frequency distribution and percentage were some of statistical tools and descriptive analysis techniques mainly used. The qualitative data obtained through interview and focus group discussion were analyzed using qualitative analysis mainly deductive, inductive and interpretative analysis methods whereby the sustainable quality improvement model development process has based on. The study finding has revealed that the quality challenges which have been highly affecting the outcome based TVET delivery (based on professional rating) were basically five top ones such as less equipped workshops (12.29%), poor quality of trainers (12.28%), poor quality of managers (12.16%), poor quality of TTLMs (11.65%) and poor quality of cooperative training (12.62%) while the impact of other challenges in the system have been rated 4.44% in average. The respective scientific solutions have been set for prioritized challenges based on root cause analysis and the solutions have been validated whereby the result showed the solutions are fairly relevant (mean of 4.3-4.8). The study has also revealed that a single model could not be adequate for sustainable and continuous quality improvement. Instead, complementary model which has comprised of the three different models such as internal TVET process quality improvement model, strategic private sector engagement model and national TVET quality award assessment model in a complementary way could be sustainable solution. The models could be taken as a contribution to the body of knowledge as far as outcome based TVET is considered. In order to ensure the process of establishing high quality and strong TVET system in Ethiopia, the leading and implementing actors in the system need to focus on the prioritized quality challenges and implement solutions for strategic maximization of the outcomes and also optimize the resource constraints such as finance, human resource, and time. The study basically recommends proper implementation of complimentary model shall be considered to ensure sustainable and continuous quality improvement of outcome based TVET delivery.

Key Words: *Outcome based TVET, quality tools, prioritization of challenges, root cause analysis, Quality improvement, and sustainable model*

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ACRONYMS

| | |
|--------|---|
| AC | Assessment Center |
| AACATA | Addis Ababa City Administration TVET Agency |
| CB | Capacity Building |
| CC | Competence Certificate |
| CoC | Center of Competence |
| CT | Cooperative Training |
| DAC | Distinctive Areas of Competence |
| FDRE | Federal Democratic Republic of Ethiopia |
| FNG | Federal Negarit Gazette |
| FTA | Federal TVET Agency |
| LMS | Labour Market Study |
| HR | Human Resource |
| IWT | Industry Wide Training |
| KSA | Knowledge, Skills & Attitude |
| NCC | National Certificate Competence |
| NQC | National Qualification Certificate |
| NTQF | National TVET Qualifications Framework |
| MSE | Micro & Small Enterprise |
| M & E | Monitoring and Evaluation |
| OHS | Occupational Health and Safety |
| OS | Occupational Standard |
| PPE | Personal Protective Equipment |
| PPP | Public Private Partnership |
| RCC | Recognition for Current Competency |
| RPL | Recognition of Prior Learning |
| PPP | Public Private Partnership |
| SDG | Sustainable Development Goals |
| TTLM | Teaching, Training & Learning Material |
| TVET | Technical and Vocational Education and Training |

CHAPTER ONE

1. INTRODUCTION

Education is considered as the key for effective economic development strategies, and it has significant power to transform economy. TVET is the master key that can alleviate poverty, promote peace, conserve the environment, improve the quality of life and help to achieve sustainable development(UNESCO, 2017)

Traditional skills development as a part of the TVET in Ethiopia has long history which goes back to Axumait kingdom. Those beautiful and indigenous historical Monuments and buildings such as Axum monument, Jegol buildings, Fasiledes palace, Lalibela rockheown churches and others were constructed by Ethiopian skilled work force. There was no organized TVET system in ancient times, however, there was skills development and skills transfer from one person to another through traditional apprenticeship model. This was the secret behind why Ethiopia was very much civilized country among few in the world in ancient times(GIZ, 2018).

Ethiopia made a big TVET reform in 2008 where the government shifted TVET system from input based to demand driven and outcome-based system(MoE, 2008b).Occupational standard development, competency based training delivery, assessment and certification are some of the manifestations of the outcome based TVET system (FTA, 2014b). Occupational competency assessment has been considered as very important activity to assure quality of training provision because assessment measures the quality of outcome of the training(Baraki, 2016)&(FDRE, 2016). Occupational assessment is conducted to collect evidence whether a person possesses competencies to do certain job as per defined in occupational standard or not. Those who proved that they can do a job as per occupational standard would be said competent and would be given certificate of competency(FTA, 2014a). Given the fact that the occupational competency assessment and certification system was introduced to assure the quality of outcome based TVET delivery in Ethiopian TVET system, the passing rate of the regular TVET students in Addis Ababa City Administration was still very low according to the annual reports (AACATA, 2019). Different scholars have indicated that there have been various quality challenges affecting the quality of outcome based TVET delivery, however, the quality challenges have not been scientifically analyzed using proper tools and prioritized based on degree of their impact on quality. It would

be difficult to solve all challenges at one time as the resource is always limited. Especially developing countries, like Ethiopia, need to prioritize challenges and intervention strategies via research based evidences for the very reason of resource optimization. Therefore, this research study was initiated to list out key quality challenges of outcome based TVET delivery through literature review and prioritize quality challenges from high impacting to low impacting through scientific method. Prioritization is very important to focus on those quality challenges with high impact while devising and implementing mitigation strategies need to be taken equally important as well for ultimate success.

1.1. Background of the Study

These days Technical and Vocational Education and Training (TVET), in many countries across the globe, is the most preferable educational track that prepares citizens for the world of work through imparting knowledge, skills and right attitude required to do certain job. The international community has set an ambitious 2030 Agenda for Sustainable Development. Education and Training is considered to be central to the achievement of the 2030 Agenda. Education 2030 devotes considerable attention to technical and vocational skills development, specifically regarding access to affordable quality Technical and Vocational Education and Training (TVET); the acquisition of technical and vocational skills for employment, decent work and entrepreneurship (UNESCO, 2016). In this context, TVET is expected to address the multiple demands of an economic, social and environmental nature by helping youth and adults develop the skills they need for employment, decent work and entrepreneurship, promoting equitable, inclusive and sustainable economic growth, and supporting transitions to green economies and environmental sustainability (UNESCO, 2016).

Many countries in the world have designed TVET system that fits to their context. TVET in Ethiopia has long history but there was no proper system in place for long time for better development of sector until 2008 when new outcome based and demand driven TVET system was introduced. A major shift has happened in TVET sector of Ethiopia in 2008; a shift from input based TVET system to outcome based and demand driven TVET system (MoE, 2008b). After launching of the 2008 TVET strategy (MoE, 2008b), an outcome based TVET has been practiced in Ethiopia and it is basically characterized by the occupational standards which are developed by practitioners who are representatives of the industries. In outcome based TVET system, training does not take place without considering the outcome and the inclusive

demand of industries or employers. The outcome is just the demand of industry on the qualification level, trade type and quantity of workforce needed in the labour market(MoE, 2008a). The qualification level or competency level of required workforce is expressed in the document called occupational standard (FTA, 2014b). Occupational standards are combinations of the competencies which are required by an individual to do certain job. According to the national qualification framework(MoE, 2008), the competencies need to be leveled at the same qualification level (from 1 to 5) to constitute occupational standard of specific level. Occupational Standards (OS) are the most important quality assurance documents and are bases for training, assessment and certification according to Occupational Competency Assessment and Certification Directive (FTA, 2014a). The training is provided based on the curriculum developed according to occupational standards. Whatever modality of training is followed, occupational standards are base documents for curriculum development, occupational competency assessment tool development and certification processes(FDRE, 2016). Occupational competency assessment and certification system, as the key quality assurance instrument, is open for anyone who believes he/she could demonstrate his/her knowledge, skills and right work attitude as per occupational standard regardless of the place and the methodology how he/she acquired the competencies. This also includes recognition of prior learning (RPL). Up on the evidence of demonstrating the required occupational competency, he/she would be given national competency certificate(FTA, 2014a).

Despite the fact that outcome based TVET system has been put in place in Ethiopia, different studies have disclosed that there is considerable quality problem and hence significant number of graduates are left unemployed or not able create jobs (CSA, 2018). According to the annual report of Addis Ababa City Administration TVET Agency (AACATA, 2019), the passing rate of the TVET trainees is lower than expected (only 57.7% in 2019) and that shows that the quality of the outcome based TVET delivery has faced serious quality challenges. The competency assessment passing rate is associated with the quality of the training and it is indeed the measuring instrument whether the quality of Technical and Vocational Education is to the expected quality or not. The lower the rate becomes the poor quality of TVET is evident.

1.2. Statement of the Problem

Despite the fact that TVET has been considered as the key building blocks of the economy, establishing quality TVET delivery system is challenging. Introducing outcome based and demand driven TVET in Ethiopian TVET system has been taken as paradigm shift to ensure quality and relevance of TVET provision (MoE, 2008b). Although the paradigm shift of TVET system from input based TVET to outcome based TVET system has contributed somehow for the improvement of relevance of TVET programs by itself, the expected training quality has not been ensured because of many challenges from which the low quality training inputs and training processes are predominantly mentioned (Mengistu, 2019). Studies have shown that improving the quality of TVET delivery will play significant role in ensuring the employability of the graduates. On the other hand, the poor quality of TVET delivery contributes a lot for the low employability of youth. According to the annual performance report of Addis Ababa City Administration TVET Agency and annual abstracts developed by Ministry of Education(AACATA, 2019)&(MoE, 2016), the average passing rate of the trainees on national competency assessment is very low as indicated on table 1.1.

Table 1-1: National competency assessment passing rate of TVET regular students in TVET colleges under AACATA

| | Academic Year | | | | | | | | |
|--|---------------|--------|--------|--------|--------|--------|--------|--------|--------|
| | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
| Total number of regular students in all TVET colleges under AACATA | 9,328 | 10,403 | 18,101 | 21,808 | 22,881 | 27,438 | 25,903 | 32,135 | 25,516 |
| Number of students passed national competency assessment | 1,329 | 1,983 | 8,012 | 13,456 | 13,957 | 15,854 | 16,083 | 18,703 | 14,723 |
| Average Passing Rate | 14.25 | 19.06 | 44.26 | 61.7 | 61 | 57.78 | 62.09 | 58.2 | 57.7 |

Source: Annual abstract (MoE, 2011-2016/17) & Annual report of Addis Ababa City Administration (AACATA, 2019)

Given the fact that other factors have contributions, the low quality of education and training generally contributes for the rise of unemployment considerably. The recent report of Ethiopian Central Statistics Agency has shown that unemployment rate has risen up in the urban areas(CSA, 2018).According to the UNESCO TVET strategy from 2016 - 2021 (UNESCO, 2016), technical and vocational education and training provision should be aiming at meeting 2030 agenda where by youth and adults need to get inclusive and equitable quality TVET provision ensuring maximum employability. However, in many developing

countries including Ethiopia, achieving quality technical and vocational education and training has become big challenge. The data show that the quality of technical and vocational education and training is very low in Ethiopia. According to Ethiopian TVET strategy (MoE, 2008b), the national occupational competency assessment is a vital instrument to measure the quality of outcome based TVET delivery. The average passing rate of TVET students from all TVET colleges under Addis Ababa City Administration has shown a trend whereby there was no improvement on the quality of training as indicated on the Figure 1.1.

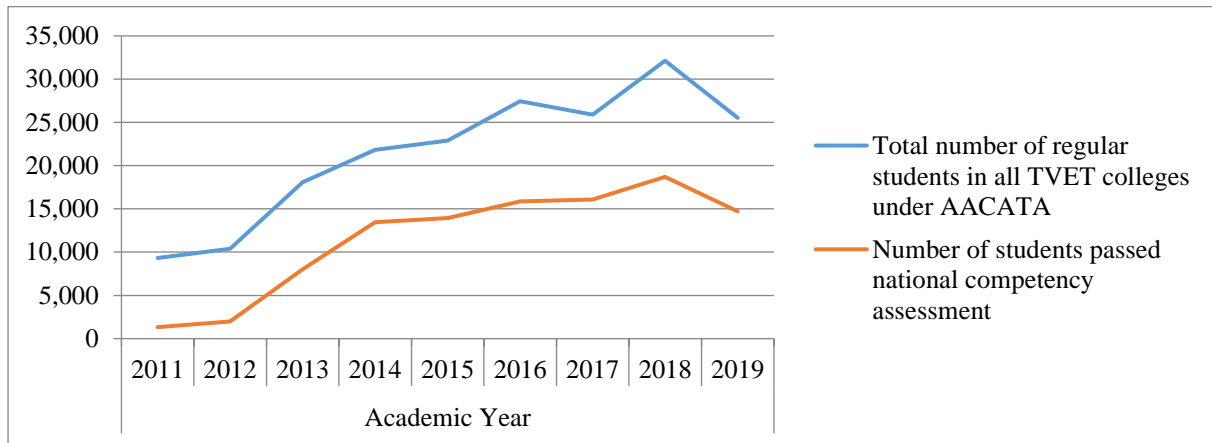


Figure 1-1: Trend of TVET regular students' national competency assessment passing rate

Some of the researchers have conducted to identify what are the quality challenges affecting the quality of outcome based TVET delivery. According to M. Mengistu(2019), the meager supply of training resources is highly affecting the training quality. As a result, the quality of training processes is also very low. According to Geressu(2014), lack of relevant and adequate labour market information, lack of training need assessment, lack of tracer study results, poor practical competence of TVET leaders and trainers and weak participation of stakeholders are affecting training quality in TVET Colleges and its sustainability. According to K. Likisa, the misalignment of curriculum with occupational standards, low involvement of industries and lack of proper engagement of trainers are the challenges affecting the quality of TVET delivery (Likisa, 2018). Even though different scholars have conducted studies to identify the challenges of attaining quality TVET programs and factors affecting the quality of outcome based TVET, there were no strategic solutions which were designed using quality analysis techniques and other scientific tools to solve the quality challenges. The study conducted in Nigeria has also revealed that the challenges affecting the quality of outcome based TVET delivery are lack of required TVET facilities, poor funding of TVET

programs, poor teaching methods employed by teachers, and poor assessment of TVET students' competency(Chinyere Shirley et al., 2015). Although the same study has tried to put solutions for the challenges, the solutions were not prioritized, validated and not designed based on root cause analysis. Lack of prioritization of challenges based on their effect and setting the respective mitigation strategies is actually a big problem. Without conducting root cause analysis and analyzing the cause and effect relationship, the particular quality challenge over the quality of TVET program, the solutions could not be simply set. It is evident that the quality of TVET delivery is not to the expected standard in the case of TVET colleges in Addis Ababa City Administration and yet the high impact quality challenges are not identified and prioritized. This makes the mitigation processes so difficult and one can't also solve all the challenges at same time as the resources and the capacities are always limited and this is the problem of most of developing countries in Africa. Therefore, this study works towards enhancing the quality of the outcome based TVET delivery to employment by answering questions of prioritizing the challenges based on the degree of their significance, analyzing the root causes of quality challenges, setting scientific solutions for particular quality challenges and designing sustainable and continuous quality improvement model by taking the case of six polytechnic colleges, Entoto PTC, Tegbare-id PTC, General Winget PTC, Misrak PTC, Nifas Silk PTC & Akaki PTC, which are lead cluster colleges under Addis Ababa City Administration TVET Agency.

1.3. Research Questions

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

1. What are the root causes of the top quality challenges that are highly affecting the quality of outcome based TVET delivery?
2. What are potential scientific solutions for the root causes of the top quality challenges in the outcome based TVET delivery?
3. What kind of model could be designed to improve the quality of TVET delivery sustainably?

1.4. Objectives of the Study

1.4.1. General Objective

The general objective of this research study is to identify highly affecting quality challenges of outcome based TVET delivery, prioritize the quality challenges based on the degree of their significance, conduct the root cause analysis for those quality challenges with high

impact and set respective scientific solutions and design sustainable & continuous quality improvement model.

1.4.2. Specific Objectives

The specific objectives of this study are intended:

1. To prioritize the quality challenges of outcome based TVET delivery based on the degree of their significance/impact.
2. To conduct the root cause analysis for those quality challenges with high impact and
3. To set respective scientific solutions for the top quality challenges
4. To design sustainable & continuous quality improvement model for the outcome based TVET delivery.

1.5. Significances of the Study

The output of this research study will have great significance to improve the quality of outcome based TVET delivery system to employment in the TVET colleges under Addis Ababa City Administration and in colleges of similar context across the nation, continent and the globe. The findings of the research will be ultimately utilized by the Polytechnic Colleges in Addis Ababa City Administration but could be also implemented in other colleges in country and also colleges of other countries in the world with comparable context. Moreover the policy makers, TVET practitioners, researchers, students and entire society around the globe could benefit out of it and hence the study will have significant importance.

The following are the specific significances of this research study

- The study could create awareness to decision makers and implementers on the key quality challenges of outcome based TVET delivery to employment
- The study supports policy makers and implementers on how to prioritize quality challenges and use the limited resources effectively and efficiently in the process of mitigation
- The study may also indicate sustainable quality improvement approach in the outcome based TVET delivery system
- It may inform different stakeholders about the purpose, principles, inputs and procedures of implementing quality management in TVET system
- It may aware the policy makers or developers of system documents at Ministry of Science and Higher Education, Federal TVET Agency, Federal TVET Institute, Addis Ababa City Administration TVET Agency, Polytechnic Colleges and other colleges on the key

quality challenges hampering the quality of TVET and hence the importance of working towards implementing quality alleviation mechanisms

- Researchers engaged in the area of improving the quality of TVET delivery and employability of youth in Ethiopia and around the world could benefit by gaining some additional knowledge

1.6. Scope and Limitation of the Study

1.6.1. Scope of the Study

This is exclusively case type research study delimited to six (6) polytechnic colleges in Addis Ababa City Administration such as Entoto PTC, Tegbare-id PTC, General Winget PTC, Misrak PTC, Nifas Silk PTC & Akaki PTC,. There are about 12 different departments providing training in different occupational areas in regular programs from level 1 up to 5, extension program and short term trainings in each college. For the sake of manageability, this study was delimited to three departments and three respective occupations; one from each departments. The specific departments are Department of construction, Industrial Manufacturing & Machining whereas the occupations are Plumbing, Industrial Mechanic and machining respectively. The departments and the occupations are mostly focused study programs and found across all polytechnic colleges. The private colleges are not directly included just because they don't offer such hard skills and therefore, the study has been also designed ad remained to consider similar context. The target population has been all the occupations at level three and leading to graduates to plumber, Industrial Mechanic and machinist jobs respectively. The two reasons for selecting level three (Level III) were; 1) it is not manageable to take all levels and 2) level III is basically the level of TVET qualification where maximum knowledge & technical skills could be completed according to the national TVET qualification framework (FDRE, 2016) and suitable for taking appropriate study target population. In six colleges, 36 trainers who are teaching in three occupations have been taken as target in one category of population. Generally, national and regional level TVET policy makers, managers, experts, advisors, top college management body (deans and deputy deans), specific department heads and teachers, support staff, students in particular level of regular training delivery and companies (managers and practitioners) which have experience with cooperative training of specific occupation-based trainees have been part of the study. The research study is ultimately focusing on the quality challenges of the technical and vocational education and training provision that hampers producing quality graduates for the world of work and the implication towards the employability of graduates. Other factors affecting

employability of graduates than quality of education and training are not under scope of the study. The research study is delimited to aforementioned context because of the complex nature of the study topic, the cost, time and manageability reasons.

1.6.2. Limitation of the Study

The global pandemic disease, COVID-19, has affected almost every sector in all countries around the world where by education and training sector has been part of the fate. Unfortunately, the time which COVID-19 hit Ethiopia was exactly time that the researcher was collecting the data and some of the data which were supposed to be collected through focus group discussions with physical presence were changed into one to one discussions and group discussions using micro soft teams (MS teams) and phone interviews. It was not easy to meet informants whom the researcher had to mandatorily meet. The problem while using digital solutions was considerable challenge of network connectivity as well.

1.7. Organization of the Paper

This thesis consists of six chapters with different sections and sub-sections. Chapter one presents the introduction for the main part of the thesis paper, and chapter two states the conceptual, theoretical and empirical literature review of study under consideration. Chapter three presents the research methodology applied and chapter four presents data presentation and analysis. Chapter five presents the models designed for the sustainable quality enhancement of the outcome based TVET delivery. The study has focused on application of conventional tools for practical benefits in the process of enhancing quality of outcome based TVET system and also brought in the new approaches of combining major quality improvement models in complementary way. Chapter six gives summary of the study, conclusion and recommendation.

CHAPTER TWO

2. LITERATURE REVIEW

2.1. Introduction

This chapter basically presents the in-depth review of the related literatures to the research topic. It primarily provides terms of definitions for the key and frequently used words in the study where by readers could easily understand the technical definitions of the terms. Secondly, the review encompasses the conceptual review of the outcome based and demand driven Technical and Vocational Education and Training (TVET) system. In this part, the key quality factors of outcome based TVET system from sectoral mapping and the skills demand identification up to actual training delivery and assessment & certification are discussed. The process quality of sectoral mapping, labor market information, occupational standard development Vs qualification framework, curriculum and TTLM development, teachers' development, cooperative training, assessment tool development and certification have been properly review with due emphasis to the national and international context. The strengths and weaknesses were identified. Thirdly, the literature review presents the theoretical framework of quality in a way revolving around the axis of research topic and finally the empirical studies which were related to the research topic were thoroughly reviewed whereby the contribution of the study has been also highlighted.

In Ethiopian TVET development history, quality has not been given serious emphasis until the outcome based TVET system was introduced properly in 2008. The TVET development journey in Ethiopia could be basically seen in three broad chapters. The first chapter encompasses the time of traditional skill development era which was basically there until the modern education and training was started in Ethiopia 1940s. During this era, the skills have been transferred through very traditional apprenticeship model where by usually skills of family transferred to the next generation. The father trained the son and so on. There has not been scientifically developed approach of quality assurance mechanism during this period and all the skills transfer approach was traditional. Lack of scientific and structured approach has made for the country not to benefit from the ancient endogamous knowledge for development of science and technology.

The second chapter encompasses the input based education and training system whereby training was given based on the resource which training facility had without considering the labour market demand. This was from 1940s up to 2008. The emphasis of TVET system in this period was basically increasing access of skills development (FDRE, 1994). The quality of education and training was not given emphasis. However, the government put tremendous efforts since development of education and training policy in 1994 and the first TVET strategy on same year and the first TVET proclamation in 2002. By the end of 20s, quality has got emphasis and by 2008 since when the third chapter of TVET started, the revised TVET strategy was developed and an outcome based TVET system was fully and practically introduced. The quality of TVET has been one of the guiding principles of the 2008 strategy and the core element of the 2016 TVET proclamation.

Quality in TVET has been mainly associated with the competency rate of graduates. Even though the end out of the quality training is competent graduate, the quality of TVET is basically beyond that. The competency rate is the passing rate of students on the national independent competency assessment and certification system. Each and every student in TVET sits for national competency assessment and proves that he or she is able to do certain job as per the occupational standards which the company has defined in that particular occupation. The lower passing rate indicated the low quality of the training delivery and vice versa. The tricky question is how the quality of training could be improved and many scholars around the world have conducted studies on factors affecting the qualities of the technical and vocational education and training in outcome based system. The low quality of the inputs and the process of training delivery have been basically the challenges. The poor workshop standard, low performance of trainers, lack of tools, training equipment and machines, low quality curriculum, low quality of TTLMs, poor linkage with industries, less committed and incapable TVET managers and other stakeholders and poor quality of actual training delivery including disorganized session plans etc are quality challenges among others, Given the context that the resource is always scares, how one could prioritize the quality challenges and mitigate accordingly to improve the quality of TVET has remained as key point to be investigated under this study.

2.2. Terms of definition

Assessment -The means of determining if a candidate possesses the required competencies of an occupational qualification as stated in the Occupational Standard (OS). It is a process of

collecting evidence/s and making judgment on whether competence has been achieved (FTA, 2014a)

Competence – The possession and application of knowledge, skills and attitude required to perform the job of an occupation as indicated in the occupational standard(FTA, 2014a)

Competence Certificate – A document issued to individuals who were assessed and found competent in a single unit or cluster of units of competence, but do not cover all that are required for a qualification(FTA, 2014a)

National Qualification Certification – A certification issued to individuals who are found competent in all units of competence of an occupational qualification level defined in the Occupational Standards(FTA, 2014a)

National TVET Qualifications Framework (NTQF) - An outline of the system of TVET qualifications defining qualification levels and rules for assigning levels to a qualification or part of a qualification(FTA, 2014b).

Occupation- the type of work, which an individual does to earn a living, often defined in terms of the broad range of competences or duties required to do it(FTA, 2014b).

Occupational Standard – A standard defined by experts of an industry sector indicating the competencies and their respective performance criteria that are required, for a worker to perform the various tasks of the occupation in industry(FTA, 2014b).

Qualification – A defined set or group of units of competence identified by the industry which meets workplace requirements(FTA, 2014b).

Qualification Levels – Details the scope and composition of qualifications and degree of responsibility a qualified person can assume in the workplace(FTA, 2014b).

Recognition of Prior Learning (RPL) – The acknowledgment of a person’s competence acquired through previous training, work or life experience, to award a TVET qualification upon proof of competence through assessment against occupational standard(FTA, 2014a).

2.3. Conceptual Literature Review of Outcome Based, and Demand Driven TVET System

2.3.1. What is “outcome” and “demand”?

People are 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 (FTA, 2014a). The TVET reform, which was introduced in Ethiopia in 2008, has brought major shift from input based TVET system to outcome and demand driven TVET system. The shift has been expected to ensure the quality and relevance of the TVET delivery, however, the quality of the outcome based TVET delivery has many challenges yet. High level realization of competency contributes for better performance of workforce in the work place (G.H.Solomon, 2016). The 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 (OPITO, 2016)

According to Ethiopian TVET Strategy (MoE, 2008b), TVET is supposed 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 facilitating demand-driven, self-employment oriented, relevant and outcome-based TVET at all levels. Competency based training in Ethiopia lacks consultation with stake holders before implementation and this has resulted in being less effective (Baraki, 2016). In connection with this, G.H. Solomon(2016)in his dissertation mentioned that integration and proper contextualization lacks in Ethiopian technical and vocational education and training system and this has to be improved. Consultations with all stake holders should be considered before interring into certain reform in education and training. In outcome based system, identified competences of the labor market that are described in the occupational standards are the important departure points not only for training and learning activities but also for the assessment of competences and certification as well (MoE, 2008b). Building an outcome-based TVET system creates access for equal recognition of competences acquired through whatever the means and ways of being competent(Pelcea, 2013). Given the very interesting fundamental concepts of the outcome based and demand driven TVET system, proper engagement of all the stakeholders particularly those who expresses demands in terms of expected outcomes are very important and this has not been properly put in place in more synchronized engagement model.

2.3.2. National TVET Qualification Framework (NTQF)

Qualification framework is an instrument for the development and classification of qualifications, at a national or sectoral level, according to a set of criteria (e.g. using descriptors) applicable to specified levels of learning outcomes (Cedefop, 2011b).

A TVET Qualifications Framework (MoE, 2008b) is developed in order to define the value of qualifications, ensure that different qualifications are comparable, and facilitate horizontal and vertical mobility within the TVET system. It defines the different occupational qualification levels; using level descriptors, i.e. define the scope and composition of qualifications and the level of responsibility a qualified person can assume in the workplace. The qualification framework has multiple benefits including its being base for occupational development, however, such an important documents has also lacked to involve the wider stakeholders in its development process.

However, 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 tries to mirror all TVET provisions into a single nationally recognized qualification. 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). According to the assessment and certification directive of Ethiopia (FTA, 2014a), 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 FTA 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.

2.3.3. Occupational Standards and Labour Market Demand

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 (Lester & Religa, 2017). 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 (OPITO, 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. Occupational standards must be assessed in the workplace in accordance with operational requirements and procedures (OPITO, 2016). As the occupational standards are very instrumental in defining the required competencies by a graduate, the quality problems in OS will have very much devastating effect and hence quality assurance mechanisms should be installed.

According to Ethiopian TVET strategy (MoE, 2008b), occupational standards are the base documents for the occupational assessment and competency based training. High level realization of competency based training will lead to the better performance of trainees in the workplace (G.H.Solomon, 2016).

Occupational standards define the competences of a worker according to requirements in the labour market. Occupational standards comprehensively describe the competence a person 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 (OPITO, 2016). Occupational standards are supposed to be developed for all occupational fields at all relevant qualification levels attainable within the TVET system with participation of industry practitioners, however, low level of participation of industry practitioners in the process has been affecting the quality. Structurally, each occupational standard can be broken down into units that describe a set of “employable” competences (Crawford, 2010). However, occupational standards would usually be described in the same, nationally approved, format and will be publicly available (MOE, 2008). This enhances transparency about occupational qualifications among employers, trainees and TVET providers.

In a context where industry didn't own occupational development process, there would be always a quality problem. In the Ethiopian case, responsibility for organizing, facilitating and endorsing occupational standards rests with the Federal TVET Agency (MOE, 2008). This has been a challenge for some many years on improving the quality of occupational standards. As occupational standards reflect the competence requirements of the world of work, stakeholders from the world of work particularly employers should be the major actors in the development of the standards. According to Solomon (G.H.Solomon, 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, 2008b)

Appropriate internationally recognized occupational standards shall be checked for compatibility with the participation of the industry and verified to be in conformity with the national vision (WIST, 2016). Consensus shall be obtained on the modality of identifying the pertinent standard setting from the internationally recognized ones. Occupational standards must be based on the needs of the labour market (ILO, 2015b). 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, 2015b). However, the trend of conducting labour market is very weak.

Occupational qualifications should be designed so that they are internationally compatible in order to ensure the international competitiveness (NSDC, 2004). 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 (G.H.Solomon, 2016). In order to facilitate this, procedures for standard setting should also include methods to adapt or adopt existing standards from other countries (MoE, 2008b). Given the efforts which are being made, low quality of occupational standards has continued to be a challenge in outcome based TVET delivery.

2.3.4. Teacher Training, Curriculum and TTLM Development

Teacher training has given due emphasis in Ethiopian TVET system (Geleto, 2018), however, the quality of the trainers/teachers is still believed to be very low. The Federal TVET Teacher Training Institute (TVET Institute) is a federal government higher education institute under the Ministry of Education. Proper training of teachers is very important in outcome based TVET system and the trainers should not be only good at core subject area but also need to know skills on how to transfer skills to others that is basically the so called methodology. In competency based training, the teachers need to focus on how trainees could apply what they learn rather than focusing on understanding the instructions to do something. Of course understanding procedures comes first but is not the end and required outcome. Therefore, there has been significant pedagogical and skill gap among the teachers and some of the contexts could be leveled as poor performance.

According to Ethiopian TVET strategy, outcome based training curricula are decentralized and expected to be developed by Polytechnic Colleges in collaboration with regional TVET Agencies and enterprises(MoE, 2008b). Initially, the FTA provides model curricula on sample base. The detailed curriculum development should be done at the colleges. The decentralized approach of curriculum development combined with other factors has, however, contributed to the low quality of the existing curriculum.

According to school managers involved in this process, the expertise of the team members together with the limited amount of time and tight deadlines did not allow the development teams to achieve the desired level of quality, however, there has been gradual improvements towards the curriculum and TTLMs. OS is the basis for the curriculum and TTLM development but decentralized approach in developing the curriculum and TTLM has resulted on not only variations but also less quality materials according to FTA annual report (FTA, 2018). It has been also found to be less resource efficient as there is duplication of efforts rather which would have been done in centralized or semi - centralized approach.

The TVET strategy stipulates that 70% of the training should consist of workplace experience and only 30% of school-based education(MoE, 2008b). Apart from the training plans being based on the OS, CT itself would form an additional feedback cycle between the employers and TVET(BIBB, 2014). The poor quality of curriculum contributes towards the low quality of the outcome based TVET delivery and therefore, this needs scientific intervention for necessary improvement.

2.3.5. Quality Assurance System in TVET Delivery

2.3.5.1. Accreditation of TVET Institutions and Programs

Program registration and accreditation of TVET programs and institutions is an important activity to assure the quality of TVET delivery (IIEP-UNESCO, 2019). The accreditation and program registration guideline (FDRE, 2016)is the guiding document which regional TVET bureaus use to do program registration and accreditation activities. According to the guideline, program registration is precondition for program accreditation. After the proposal is submitted to the regional TVET bureau to open certain TVET program along with trade license, in the case of private TVET providers, certification of program registration will be provided to client to start provision of training. However, program accreditation will be given to the client up on approval of certain criteria on the guideline directly related to how the client is successful with the first batch of graduates in terms of making graduates competent

as per national occupational competency assessment. Besides, tracer study is key criteria which will be used for accreditation of the certain program. If the number of employed graduates are less than the minimum level of employment expected, then program may not be accredited.

2.3.5.2. Occupational Competency Assessment and Certification **Occupational Competency Assessment**

To be competent, individuals must provide evidence that they have the required experience, technical skills, knowledge, understanding and behavior to perform a job role/function 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 are competent to undertake their job role or function (Crawford, 2010). Competency assessment is one of the most important measuring tool of the quality of competency based training (G.H.Solomon, 2016). Given the fact that occupational competency assessment is one of the measuring tool for quality of training, the compromised quality of the process of conduction competency assessment may potentially mislead. Therefore, the quality of occupational competency assessment itself is very important and it has been also found to be one of areas to be improved as far as quality of outcome based training is concerned (Kassa, 2018).

Assessment Tools

Assessment tools are ultimately used to gather the evidence on candidate's performances during assessment process (Mohamad 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 (TESDA, 2003). Likewise, assessment tools are very important in Ethiopian outcome based TVET system. Well-designed assessment tools must comply with the rules of evidence (FTA, 2014a), 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, 2014a), 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. Validity refers to the extent to which the interpretation and use of an assessment outcome can be supported by evidence. Reliability refers to the degree of consistency and accuracy of the assessment outcomes. Flexibility refers to the opportunity for a candidate to negotiate certain aspects of their assessment (for example, timing) with their assessor and fair refers to assessment does not disadvantage particular candidate or groups of candidates (OPITO, 2016).

In current practice of the occupational competency assessment, there are knowledge and practical assessments approaches in Ethiopia. Knowledge assessment tools may be in the form of written or oral question / structured interview. Both written items in the form of multiple choice and matching type questions and oral question/interview will have a passing score of 50% (FTA, 2014a). One of the quality challenges for outcome based TVET system in Ethiopian context is to have high quality practical and knowledge assessment tools which could be an important instrument to measure the performance of graduates against the predefined occupational standards.

When assessing work-related projects such as designing a product, writing a workplace document, solving a problem, conducting a presentation, developing a proposal for management, it is useful to design a project brief or instruction sheet.

According to the assessment directive (FTA, 2014a), 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. There has been significant irregularities in this case which has been contributing to the violations of standard of assessment.

According to the Manual on Skills Testing and Certification of Jordan developed by International Labour Organization (ILO, 2015c), 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. A number of tools can be developed to support this assessment method including: observation checklist and accompanying questions and also instructions to candidates and assessors. Lack of supporting the process with newly emerging technologies has been also expected to be one of the bottle necks towards successful occupational competency assessment.

Certification

It is the process of issuing a certificate, diploma or title of learning outcomes formally attesting that a set of learning outcomes (knowledge, know-how, skills and/or competences) acquired by an individual has been assessed and validated by a responsible body against a predefined standard (Cedefop, 2011a).

Occupational assessment and subsequent certification is the main feature of the outcome-based TVET system to verify individual occupational competences (Baraki, 2016). For all defined occupational qualifications at all levels, occupational assessment and certification will be offered (FTA, 2014a). Occupational qualification certificates will be awarded upon passing the occupational assessments.

According to TVET strategy (MOE, 2008), contrary to past practice in Ethiopia, access to occupational qualifications will no longer be dependent on attending a formal TVET program. Graduates from any formal and non-formal TVET program will 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 (Crawford, 2010), occupational assessment will be 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.

According to Federal Institute for Vocational Education and Training (BIBB, 2014) & European Training Foundation (ETF, 2014), occupational qualifications and certificates need to be recognized by employers in order to improve the employability of TVET graduates. It is therefore vital that experts from the enterprises are essential members of the groups of assessors. 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, 2014a). It stipulates rules and procedures for assessment item development, for conducting assessments and will facilitate, supervise and regulate the system. Responsibility for implementing the occupational assessment, i.e. ensuring that assessment is properly conducted and certificates issued, rests with the Regional authorities (FTA, 2014a). In connection with this, regional TVET centers of competence were established under the state authorities as core institutions for implementing and facilitating occupational 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 assessment in specified fields (FDRE, 2016). These will include enterprising and excelling TVET institutions in particular. For those who successfully pass occupational 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).

2.3.6. Private Sector Engagement in TVET

According to ILO (2016), effective and high quality skills development demands strategic and active engagement of private sector and organized private sectors. Private sector could be any privately owned business and organized private sectors could be usually the sectoral associations, sectoral skill council, chambers and etc. The TVET proclamation (2016) and TVET strategy (2008) are the key documents in TVET system indicating that the role of private sector engagement is very crucial for ensuring the quality and relevance of outcome based TVET delivery in Ethiopia. The development of occupational standards, managing occupational competency assessment and certification and cooperative training are some of the key private sector specifically companies' engagement areas among others. However, according to the assessment made by the Ethiopian Chamber of Commerce and Sectoral Association (2020), the engagement of private sector on development of competent and competitive skilled workforce is insignificant. The same study has indicated that the reason for the low engagement has been because of poor coordination among the public and private sectors. The modality of operand has not been clear and government has not been playing the leading role until it is ultimately taken over by organized private sector like skills development councils in many countries. Low trust in the efficiency and relevance of public sector training providers and limited interest among the private sector to partner with public institutions on TVET programs has been also identified as associated problem. Lack of mechanisms and models of functionality for the systematic inclusion of private sector representatives in the shaping of policies and priorities, as well as in the design, implementation and evaluation of training programs has been very important.

2.4. Theoretical Literature Review

2.4.1. Review of Total Quality Implementation Frameworks in Education and Other Sectors

As this study deals towards enhancing the quality of outcome based TVET delivery to employment, the theory and the concept somehow relates the total quality management

(TQM) and quality improvement instruments. TQM could be defined as a method in doing business that attempts to maximize organizational competitiveness through the continuous quality improvement of products, services, people, processes, and environment (Bahri, 2012). Total Quality Management (TQM) has become among the most commonly used management systems. In this respect, the growing adoption of various methods and techniques, such as business process reengineering (BPR), balanced scorecard, enterprise resource planning (ERP), lean management or Six Sigma, has shown the need to implement an integrated approach to business excellence at the organizational level (Haupt & Whiteman, 2003)

Education has always been facing the challenge in ensuring that the quality of teaching and learning takes place effectively. One possible path for improving the quality of education lies in the application of a Quality Management approach as has been used in industries, to the teaching and learning process. It is quite possible to adopt quality control tools and quality management methods, as the pedagogical methodology and improved framework in managing, scrutinizing and enhancing the quality of teaching and learning practices in any education and training environment (Luca et al., 2017). Implementation of adopted total quality management framework and SQC tools on managing the needs, expectations and problems of training quality and use them for designing sustainable and continuous improvement models in teaching and learning process and employing these quality management attributes into the education equation create values for educational institutions, employers, and students.

For the purpose of readers' more insights, the various frameworks proposed by researchers, consultants and experts in the field are reviewed in this section. A full coverage of all frameworks would be impractical, but as much as possible, the most widely published and relevant ones are presented. It is not intended to form exhaustive list of frameworks available, but rather a representative sample of the most common ones mentioned. From the various frameworks and models researched, they could be categorized into three broad types, namely:

1. Consultants/experts based
2. Awards based
3. Academic Based

Basically, consultants based frameworks are those derived from personal opinion and judgments through experience in providing consultancy to organizations embarking on the TQM journey. Academic based frameworks are those developed by academics and

researchers mainly through their own research and experience in the field. Although awards based frameworks are meant mainly for organizations seeking to be recognized as leaders in the quality management system field, some authors, such as Ghobadian and Woo (Lionis & Kougioumitzaki, 2008). Table 2-1 summarized some leaders in the field of quality management.

Table 2-1: Quality management Gurus source

| Pioneer | Year | Quality Management |
|----------------------|-------------|---|
| Ellias Whitney | 1900 | Traditional Approach à Product Inspection |
| F.W. Taylor | 1900 | Management Science |
| Walter Shewhart | 1924 | Control Chart à Product Inspection |
| W.E. Deming | 1950 | 14 Principles in Quality / PDCA (Plan, Do, Check, Action) |
| AV. Feigenbaun | 1961 | Concept: Make it right at the first time (One of Basic TQM) |
| Koaru Ishikawa | 1967 | Statistical Approach in Quality Control, Ishikawa Diagram (Fishbone Diagram) |
| YojiAkao | 1972 | QFD (Quality Function Deployment) |
| Philip B. Crosby | 1979 | Top Management in Quality |
| ShiegoShigo | 1979 | Product Quality Control à Total Quality Control |
| Genichi Taguchi | 1980 | Kaizen (Continuous Improvement), Robust Design, Taguchi Method |
| Garvin | 1987 | 8 Dimensions of Product Quality |
| Joseph M. Juran | 1988 | SPC (Statistical Process Control), Quality Planning, Quality Control, Quality Improvement |
| Zeithaml&Parasuraman | 1988 | 10 Dimensions of Service Quality |

Source:(Bahri, 2012)

The last two decades have witnessed the increasing application of business excellence models as more companies have learned how to use them and to obtain superior performances (Dahlgard et al., 2013). Several business excellence models have been created and developed since the end of the Second World War. In 1951, the Union of Japanese Scientists and Engineers (JUSE) launched the Deming Prize (Union of Japanese Scientists and Engineers, 2017), the first globally known model (Dahlgard et al., 2013). W. E. Deming,

one of the American quality gurus, was invited by JUSE in 1950 to conduct quality control seminars for Japanese engineers and top management (Ishikawa et al., 1993).

The European Foundation for Quality Management (EFQM) was founded by the presidency of 14 major European companies in 1988, to stimulate and assist organizations throughout Europe to participate in improvement activities leading ultimately to excellence in customer and employee satisfaction, influence society and business results, and to support the managers of European organizations in accelerating the process of making Total Quality Management (TQM) a decisive factor for achieving global competitive advantage. EFQM Model which is a non-prescriptive model has nine criteria and considered as the core of the model and the evaluating base of an organization. Five of these criteria are called Enablers; the factors strengthen the organization to reach the excellent results. Four other criteria are the results which the organization should receive them in different fields and the results are obtained by enablers and enablers are improved by the results from the feedback(Leticia et al., 2007).

The Baldrige Excellence Builder self-assessment helps to identify and improve what is critical to certain organization's success. By completing and acting on the assessment, it could be better positioned to accomplish the mission, improve results, and become more competitive. The Excellence Builder is based on the more detailed Baldrige Excellence Framework and its Criteria for Performance Excellence. The criteria are Leadership Strategy, Customers, Measurement, Analysis & Knowledge, Management Workforce and Operations Results. Baldrige's model could be applied in different kinds of organizations such as governmental organizations, production companies, small scale businesses, non-profit organizations, hospitals, public schools and etc.

The values are systems perspective, visionary leadership, customer-focused excellence, your customers are the ultimate judges of your performance and of product and service quality, Valuing people, organizational learning and agility, focus on success, managing for innovation, management by fact, Societal contributions, Ethics and transparency and delivering value and results.

The Deming Prize (DP), as the highest quality award model in the world, was established by the board of directors of the Japanese Union of Scientist and Engineers (JUSE) in 1951. The main purpose of the prize is to increase the knowledge and practice of Total Quality Control

(TQC) as a way of driving quality in Japan. The DP is awarded annually to both individuals and group organizations that demonstrate outstanding quality by implementing Total Quality Control (TQC) program using statistical control tools. It evaluates the operation of an organization against 10 criteria that are centered on the implementation of a set of principles and techniques such as process analysis, statistical methods, and quality circles (Union of Japanese Scientists and Engineers, 2019).

The Australian Business Excellence Framework (ABEF), which formerly called the Australian Quality Award framework, is another existing worldwide excellence model established independently in 1988. The framework provides a useful vehicle for organizations to assess their excellence against internationally recognized business principles. Australian Business Excellence Award (ABEA), which measures quality performance through seven categories of criteria, is Australia's premier business award presented yearly to high performing organizations in four categories namely large organizations, subsidiaries and divisions of large organizations, medium sized enterprises, and small sized enterprises (Grigg, 2009).

2.4.2. Ethiopian Quality Award (EQA)

Recognizing the needs for implementation and integration of quality concepts in the operations of Ethiopian manufacturing and service industries, Addis Ababa University (AAU) and Walta Information Centre (WIC) have initiated the EQA in 2007. The model attempts to look at all aspects of a company that the examiner will assess in granting the award. The model is based on two distinct features; the drivers (enablers) and the results. The enablers are what an organization must practice to achieve excellence. The enablers comprise: Leadership, Policy and strategy, Resource management, Processes, Customer focus, Business performance and Impact on the society (Birhanu & Daniel, 2014).

Despite the fact that different scholars and organizations have come up with different total quality management implementation models and frameworks, most of the principles are the same. Based on the context of certain organization, either of the frameworks or combined could be applied to improve the quality and enhance ensure competitiveness and excellence.

2.5. Empirical Literature Review

2.5.1. Application of SQC Tools on Education and Training Quality Improvement

As it was discussed by Mach &Guáqueta (2001), the primary goals of the quality tools are firstly to increase the communication between operators and managers and secondly to detect

the problems and decrease the recurrence of problems and thirdly to improve all kinds of processes including manufacturing, educational, and business processes. When we look at each quality tools; flow chart is a graphical representation of all the necessary and sequential steps to perform a process or activity and it contains standard figures each of them with a special meaning (Mach & Guáqueta, 2001). Pareto Diagram is the tool with principle of “The vital few and the little many”. A few of the process characteristics cause most of the quality problems on the line considering that most process characteristics account for very little of the quality problems on the manufacturing or service provision line. Scatter Diagram is necessary to have data of two variables in pairs, one dependent and the other one independent, and they will be plot on the x-axis and y-axis respectively and the diagram is useful to show the strength of the relationship between two variables. The cause & effect diagram which is fishbone or Ishikawa was developed by Kaoru Ishikawa in order to determine and divide the causes of a given problem on main fields of causes and the tool is recommended to use it when there is only one problem, and possible causes that can be classified based on several criteria(Luca et al., 2017). The fishbone diagram analyzes potential causes of a defect, error or problem of a process under identification. There are 4 major categories or causes, which influence the quality characteristics being studying: Man, Machine, Method and Material, called also the 4M’s of the manufacturing process. Besides of the main categories, sub categories will emerge also, which will guide to the team to discover the real causes of the effect. Luca (2017, p252) has mentioned that to improve the quality of education, the best decisions and the most appropriate measures that influence the educational process should be taken. The study has focused on improving the quality of education in a university and therefore, Luca (2017) agreed that all causes that determine the effect need to be identified and associated solutions or mitigation strategies should be designed to be solved in short, medium or long-term. As applied by Mach &Guáqueta (2001), histogram is a graphical representation of the data by magnitude; the observed frequency is represented by a rectangle, which has a height that symbolizes the frequency of each interval or cell. Control Charts are used to distinguish graphically between the two sources of variability especially in manufacturing processes (common and special causes). The chart contains upper control limit & lower control limit and by means of them can be identified the type of variation in the process (Mach & Guáqueta, 2001).The last but not least the check sheet and it is one of the seven quality control tools and it a form or template or document used to collect data in real time at the physical place or location where the data is generated.

The data which it captures could be quantitative or qualitative and when the data is quantitative, the check sheet is usually called a tally sheet.

2.5.2. Quality in TVET Delivery and the Research Contribution

Although the quality assurance system is in place in Ethiopian TVET system (MOE, 2008), the implementation at the ground level has challenges. The study by Nagashi has disclosed that CT implementation, which is in fact the heart of TVET delivery, is facing serious challenges and resulting in low quality of graduates (Negashi, 2019). Other researchers such as (G.H.Solomon, 2016) and (Baraki, 2016) have also indicated in their studies that TVET in Ethiopia has low quality. Different researchers have identified the challenges of outcome based TVET. The meager supply of training resources is highly affecting the training quality (Mengistu, 2019). The same study has revealed that the quality of training processes is also very low as a result of poor supply of training resources. According to Geressu, lack of relevant and adequate labour market information, lack of training need assessment, lack of tracer study results, practical competence of TVET leaders and trainers and weak participation of stakeholders are affecting training quality in TVET Colleges and its sustainability as well (Geressu, 2014). The misalignment of curriculum with occupational standards, low involvement of industries and lack of proper engagement of trainers are the challenges affecting the quality TVET delivery (Likisa, 2018). Even though different scholars have conducted studies to identify the quality challenges of TVET programs and factors affecting the quality of outcome based TVET, there were no strategic solutions set which were designed based on proper root cause analysis techniques and applying relevant scientific tools to solve the quality challenges. The study conducted in Nigeria has also revealed that the challenges affecting the quality of outcome based TVET delivery are lack of required TVET facilities, poor funding of TVET programs, poor teaching methods employed by teachers, and poor assessment of TVET students' competency (Chinyere Shirley et al., 2015). Although the same study has tried to put solutions for the challenges, the solutions were not prioritized, validated and not designed based on root cause analysis. Lack of prioritization of challenges based on their effect and no respective mitigation strategies being mindful of sustainable model have been basically critical gaps. The key challenges which have been come across by different researchers include poor quality of training workshops, incapability of trainers and managers, low quality of occupational standards, curriculum, TTLMs and assessment tools, poor quality of cooperative training, lack of labour market information etc.

All quality challenges would not have equal impact or effect on quality of outcome based TVET delivery or ultimately on quality of graduates. The challenges have never been prioritized based on their effect so that the intervention strategies could also be prioritized and made optimized. Therefore, the contribution of this study for the body of knowledge could be seen in such a way that prioritizing those quality challenges of outcome based TVET delivery using scientific approach for ultimate purpose of focus of leaders and implementers was significant. Moreover, bringing together the three different standalone models and introducing the complementary model for the sustainable quality improvement of outcome based technical and vocational education and training provision were important contributions.

CHAPTER THREE

3. RESEARCH METHODOLOGY

3.1. Research Approach and Design

A mixed approach has been followed in this study in which quantitative and qualitative research approaches were used for triangulation purpose. A quantitative research requires that data expressed in numbers and qualitative approaches involves open ended questions in order to get detail information from the selected respondents. The research is descriptive research as it is describing quality challenges of outcome based technical and vocational education and training, prioritizes the challenges based on the professional judgments from primary data sources, and tries to indicate mitigations based on root cause analysis and depict sustainable solutions and models for the challenges through scientific approach.

3.2. Research Study Area

This research is exclusively focusing on the polytechnic colleges, Entoto Polytechnic, Nifas Silk Polytechnic, Akaki Polytechnic, Misrak Polytechnic, Tegbare-id Polytechnic and General Winget Polytechnic Colleges which are found in Addis Ababa City Administration. The six (6) polytechnic colleges are lead cluster colleges found in Addis Ababa. Therefore, the study target groups are all situated within the colleges and in the surrounding.

3.3. Sources of Data Collection

There were two types of sources of data used in this research. These were primary sources and secondary sources. The primary sources of data include survey questionnaires, interviews, and focus group discussions with respondents from Federal TVET Agency, Addis Ababa City Administration TVET Agency and Polytechnic Colleges and Companies. TVET sector prominent regulatory body managers, TVET experts, private sector representatives/industry managers, advisors, directors, heads of agencies, Trainees and graduates (regular TVET program), deans, deputy deans, cooperative training coordinators, and TVET trainers were among primary data sources. The tools used to collect primary data were survey questionnaires, Semi-structured interviews, and focus group discussions. Secondary data were also collected from documents like education and training road map, annual education abstracts, policies, proclamations, strategies, guidelines, directives, manuals, reports, books, prior research studies/articles, brochures etc.

Sampling Design

In any research, the researcher is highly advised to identify appropriate sampling techniques that lead him/her to collect data in order to answer the research questions. The sampling techniques which were employed to this research study were probability sampling (Simple Random Sampling and stratified random sampling as shown in table 3.1) and non-probability sampling techniques such as purposive sampling and quota sampling. Purposive and expert sampling have been used to ensure data were collected from well experienced and right persons in right positions. Experienced experts in the area have participated in this research. Quota sampling was employed to ensure fair participation of female and male respondents in all aspects.

Given the aforementioned specific sampling techniques used, it is also important to mention how the sample size was determined from the target population. After the data on population size was collected, the study sample size was determined using the formula $n = \frac{N}{1 + N(e)^2}$; where n is the sample size, N is the population size, and e is the error margin and it is given by 1 minus confidence level (Yamane, 1967). Afterwards, the sample size for stratum (n_i) was calculated from the stratum population (N_i) using the formula below and the sample sizes for each stratum were calculated as shown on the table 3.1.

$$n_i = \frac{nN_i}{N}$$

Where n : total sample size, N : total population size, N_i : Stratum population size, n_i : sample size for stratum.

Table 3-1: Study population and sample size

| No. | Study population | Population size | Sample | Sampling technique |
|-----|---|-----------------|--------|--|
| 1. | Policy makers/ Directors/heads/deans/deputy directors/heads/deans in Agency/Institute/Bureau/college | 42 | 20 | Purposive sampling |
| 2. | Managers/heads in private sector/industry | 36 | 17 | Purposive sampling |
| 3. | TVET Experts/advisors | 56 | 27 | Expert sampling |
| 4. | Trainers | 36 | 17 | Simple Random sampling with quota sampling |
| 5. | Students | 270 | 129 | Simple Random sampling with quota sampling |

| | | | |
|-------|-----|-----|--|
| Total | 440 | 210 | |
|-------|-----|-----|--|

3.4. Procedure for Data Collection

The researcher has collected data using data collection tools which were prepared, evaluated and pre-tested to make sure that they were relevant. The evaluation of all the instruments were done by the experts from the TVET sector and the pre-test was done for all sample categories by at least two to four respondents from each category. These all has been 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. It has been articulated in detail how each and every data collection procedure was.

3.4.1. Document Review

The secondary data were collected from different relevant documents such as education and training road map, annual education abstracts, policies, proclamations, strategies, guidelines, directives, manuals, reports, books, prior research studies/articles, brochures etc.

3.4.2. Questionnaires

Two turns of survey questionnaires were applied in this study. The first level survey questionnaires were used to collect data regarding the professional views or judgments of different concerned stakeholders about the extent particular quality challenge is affecting the quality of outcome based TVET delivery. For this survey, the five point Likert scale was applied and the respondents had reflected their views regarding the degree of specific challenge affecting the quality. The data was very much helpful to see at the frequency of the particular responses on particular challenge and has been used ultimately to prioritize the key challenges using Pareto chart analysis. Based on the Pareto analysis, the top five quality challenges were prioritized and then root cause analysis was done using fish bone diagram. Semi-structured interviews and focus group discussions were conducted to gather data about root causes of the identified key challenges and design solutions for particular root causes. However after the solutions were designed, the researcher has collected views of stakeholders about the relevance of each and every solutions as part of validation for better confidence on relevance. Therefore, the second level survey was applied and the results were analyzed in depth. The second level survey was 5 minutes survey and the second was three minutes survey.

3.4.3. Semi-structured in Depth Interview

As it was aforementioned, Semi-structured in-depth interview was applied to gather information about the root causes of the particular quality challenge and also collect the solutions for those challenge. It has also helped the researcher to triangulated data which were collected using other tools like surveys. The semi-structured in depth interview with each category has taken averagely half an hour. The researcher has reduced number of interviews in cases where the data have reached saturation point i.e. no more new ideas coming regarding particular point from the interviewees.

3.4.4. Focus Group Discussion

As the data collection schedule was somehow affected by the COVID 19 pandemic disease, virtual focus group discussions were applied instead of physical focus group discussions, however, it could be said blended approach. In particular areas whereby the detail information were needed, the researcher has applied the focus group discussions supported by the digital solutions. Specifically the focus group discussions were conducted with TVET experts and advisors and teachers to collect data for the fishbone analysis that was literally root cause analysis and solution design. The data has been also used for triangulation purpose and the focus group discussion has taken averagely forty minutes.

3.5. Reliability and Validity Tests

3.5.1. Reliability Test

In order to test the internal consistency of variables in the research instrument with coefficient alpha between 0.6 and 0.7 indicates fair reliability (Eisinga & Pelzer, 2012). Thus for this study chronbach's Alpha score should be greater than 0.6 to indicate the reliability but should not be also greater that 0.95 as this shows redundancy(Ursachi et al., 2015). The reliability in this study assessed by coefficient alpha was found to be 0.65 (table3-2), as indication of acceptability of the scales for further research analysis. N stands for the number of variables whereby internal consistency was checked and literally they are quality challenges of the outcome based TVET delivery.

Table 3-2: Reliability Test Result

| Reliability Statistics | |
|------------------------|------------|
| Cronbach's Alpha | N of Items |
| 0.65 | 14 |

3.5.2. Validity Test

Validity basically determines whether the instruments truly measure what was intended to measure and ultimately how truthful the research results are. For the purpose of measuring the validity of the results and the instruments, we need to consider the theory and measuring instruments applied (Creswell, 2014). Therefore, the data collection instruments for this research study were developed based on the review of theoretical and empirical literatures and taking into consideration that the data collected would answer the research questions. This has been confirmed with pretesting of the instruments before actual data collection was commenced.

3.6. Data Presentation and Analysis

The data collected using proper techniques were processed (edited, coded, tabulated) and analyzed using the quantitative and qualitative analysis technique. After the data were properly processed, the Pareto chart analysis was applied to identify the quality challenges with high impact on quality of Outcome based TVET delivery to employment. The reason why Pareto analysis was applied was to answer the research question of identifying top five highly affecting quality challenges using the principle of Pareto chart which is “the vital few and the little many”. After the identification of the top five quality challenges which have high impact on quality of outcome based TVET, Fishbone analysis was applied in combination with other descriptive analysis techniques. In general, SPSS was applied as major data analysis software and SQC tools such as process flow chart, fishbone diagram and Pareto chart were extensively applied to analyze key challenges of quality of outcome based TVET delivery. Therefore, all those data analysis techniques with due synergistic effect contributed towards identifying highly influencing quality challenges and then enable the researcher to prioritize the challenges and conduct respective root cause analysis for ultimate design of solutions and mitigation strategies in general. The qualitative research analysis techniques such as deductive, inductive and interpretative analysis techniques were also utilized in order to analyze qualitative data. The qualitative data and associated analysis have been mainly utilized for sustainable quality improvement model design. The sustainable quality improvement models were validated at desk level in presence prominent sector experts and policy makers to make sure that the models were relevant. Generally the research process was depicted on Figure 3-1.

Research Process Flow

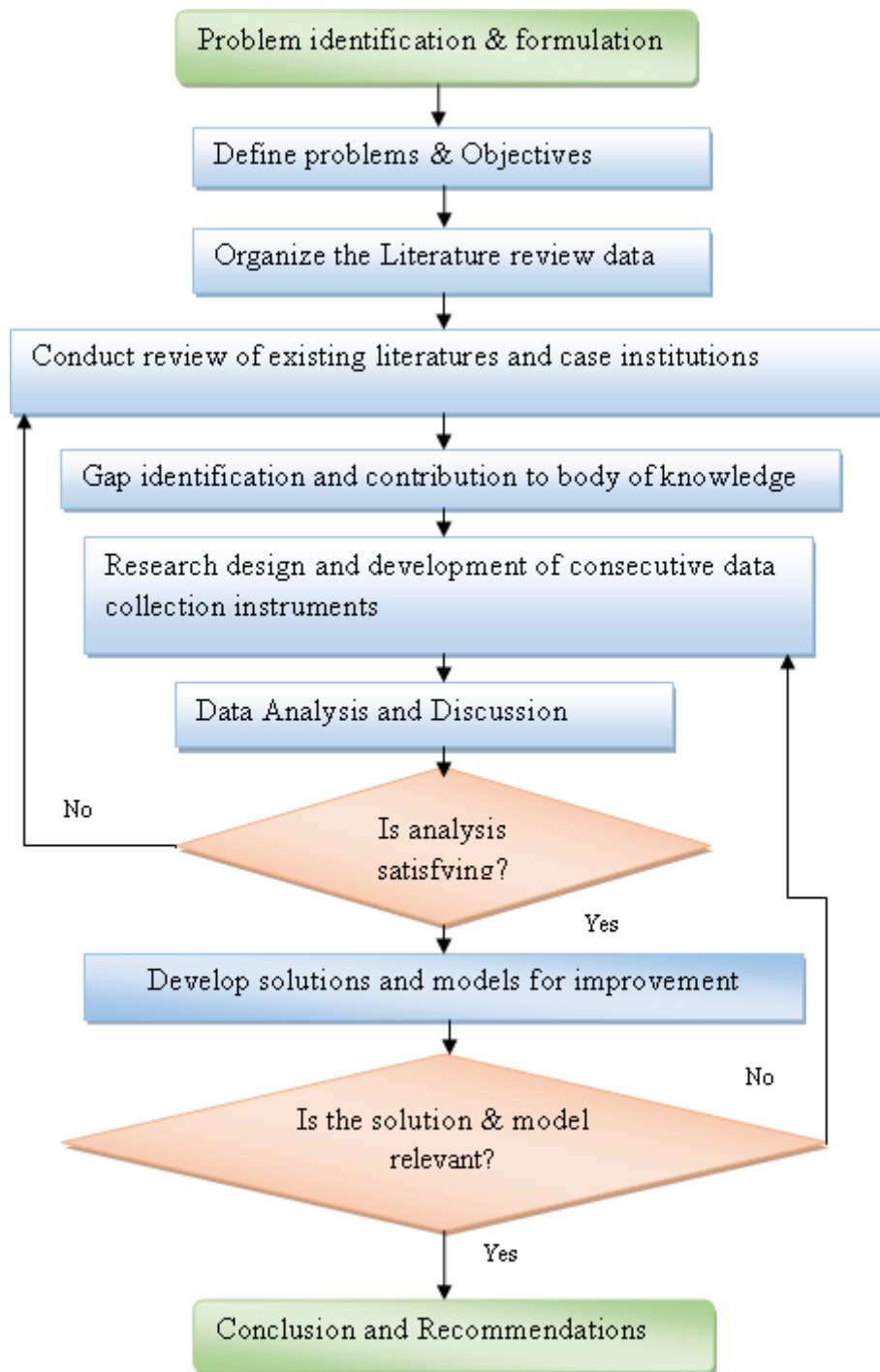


Figure 3-1: Research Process Flow

(Source: Adopted from Winston & Goldberg, 2004)

3.7. Research Output Dissemination

In practical sense, the research has attempted to contribute towards enhancing the quality of exiting outcome based TVET system in Addis Ababa particularly and in Ethiopia generally.

The study findings and recommendations need to be used and further developed by the responsible relevant authorities. Therefore, the output of the research would be disseminated to the different stakeholders. In particular, the research output would be availed to Federal TVET Agency and Federal TVET Institutes under Ministry of Science and Higher Education. The regional TVET bureaus and agencies and colleges are also expected to get the research outputs through the national authorities. The research document would be also published for the potential wider users of the document.

3.8. Ethical Considerations

There are reasons to maintain ethical norms in doing research and the primary issue could be that the main objectives of doing research is the acquisition of knowledge, promoting truth in research by avoiding errors that could arise due to providing false information, fabricating or misrepresenting information and Secondly, research involves great efforts which require the coordination, communication and cooperation among many people and researchers(Akaranga & Makau, 2016). Therefore, it is quite important for the researchers and consumers to trust each other and respect the views of other scholars as well as treat them fairly and is accountable to their research endeavors.

CHAPTER FOUR

4. DATA PRESENTATION AND ANALYSIS

4.1. Introduction

This chapter enlightens the data presentation and analysis process of the research study. The data collected from primary and secondary sources using the various techniques have been processed (edited, coded, and tabulated) and analyzed using appropriate analysis techniques.

4.2. Demographic Data of the Respondents

Survey questions were developed and distributed to 210 respondents from different categories and 201 respondents have responded as it could be seen from table 4-1. Table 4-1 shows that 10% (20) of respondents were those with the role of director or head of institution. Respondents from private sector or industry with role of management/ practitioners have been 8.5% or 17 respondents. TVET experts, trainers and students have been 27, 17 and 120 respectively.

Table 4-1: Data of respondents by current role

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|---|-----------|---------|---------------|--------------------|
| Valid | Director/head/dean/deputy director/head/dean in Agency/Institute/Bureau/college | 20 | 10.0 | 10.0 | 10.0 |
| | Manager/head/practitioner in private sector/industry | 17 | 8.5 | 8.5 | 18.4 |
| | TVET Experts/advisors | 27 | 13.4 | 13.4 | 31.8 |
| | TVET Trainers | 17 | 8.5 | 8.5 | 40.3 |
| | Students | 120 | 59.7 | 59.7 | 100.0 |
| | Total | 201 | 100.0 | 100.0 | |

The data regarding the educational back ground of respondents showed that 120 were TVET level/diploma certificate holders, 26 respondents were Bachelor degree holders, 54 respondents were Masters degree holders and 1 respondent was PHD holder. The respondents' educational background distribution majorly holds students which of course consistent with the target population and sample design.

Table 4-2: Data on Educational background of respondents

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|--------------------|-----------|---------|---------------|--------------------|
| Valid | TVET Level/Diploma | 120 | 59.7 | 59.7 | 59.7 |
| | Bachelors Degree | 26 | 12.9 | 12.9 | 72.6 |
| | Masters Degree | 54 | 26.9 | 26.9 | 99.5 |
| | PHD | 1 | .5 | .5 | 100.0 |
| | Total | 201 | 100.0 | 100.0 | |

Table 4-3 shows that 113 respondents were male respondents and 88 respondents were female ones. The data basically shows there has been gender balance in the study process.

Table 4-3: Data on the sex of respondents

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|--------|-----------|---------|---------------|--------------------|
| Valid | Male | 113 | 56.2 | 56.2 | 56.2 |
| | Female | 88 | 43.8 | 43.8 | 100.0 |
| | Total | 201 | 100.0 | 100.0 | |

Regarding the age of the respondents, Table 4-4 show that 120 respondents were below age of 30, 39 respondents were between 30 and 39, 34 respondents were from 40 up to 49 and 6 respondents were above 50.

Table 4-4: Data about the age of respondents

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|---------|-----------|---------|---------------|--------------------|
| Valid | <30 | 122 | 60.7 | 60.7 | 60.7 |
| | 30-39 | 39 | 19.4 | 19.4 | 80.1 |
| | 40 - 49 | 34 | 16.9 | 16.9 | 97.0 |
| | >50 | 6 | 3.0 | 3.0 | 100.0 |
| | Total | 201 | 100.0 | 100.0 | |

4.3. The Findings on Professional Judgments of Respondents on the Quality Challenges of Outcome Based TVET Delivery to Employment

The purpose of collecting the professional judgment of individuals on particular quality challenge whether it is key quality challenge or not is to prioritize the challenges so that the vital few could be identified and mitigation strategy implementation could be economically best optimized and made effective. Lack of prioritization and focus while implementing strategies is the major among many challenge of implementing and leading officials in the government endeavor especially in Ethiopia. As it has been indicated on literature review part, outcome based TVET delivery challenges are identified by the researcher and five Likert scale survey questions were distributed to 210 different respondents from categories whereby 201 have responded. The collected responses were processed and tabulated per each quality challenges. The five scales from highest value to lowest were as follows. Strongly agree (5), agree (4), neither agrees nor disagrees (3), disagree (2) and strongly disagree (1). The results basically show that the respondents have judged the quality challenges from the professional point of view. Some of quality challenges were obviously highly affecting the

quality of outcome based TVET delivery to employment and others would have relatively lower impact.

Table 4-5: Poor quality of occupational standard

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|------------------------------|-----------|---------|---------------|--------------------|
| Valid | Strongly disagree | 40 | 19.9 | 19.9 | 19.9 |
| | Disagree | 139 | 69.2 | 69.2 | 89.1 |
| | Neither agrees nor disagrees | 13 | 6.5 | 6.5 | 95.5 |
| | Agree | 6 | 3.0 | 3.0 | 98.5 |
| | Strongly agree | 3 | 1.5 | 1.5 | 100.0 |
| | Total | 201 | 100.0 | 100.0 | |

Occupational standards are documents that clearly define the competencies an individual is supposed to possess to do certain job to the required level of quality. They are usually defined by the industries and the industry practitioners are the ones who develop occupational standards. Given the fact that the quality of occupational standards of Ethiopia are still not at the level where the world has reached, it could be seen from the table 4-5 that the majority of respondents (139 or 69.2%) have disagreed to the statement “poor quality of occupational standard is the key quality challenge to the quality of outcome based TVET delivery”. This does not mean that occupational standards, which are the base documents for curriculum development and assessment development, are high quality document in Ethiopian TVET system rather the data has revealed that the current quality challenge in occupational standards has not been seen as significant cause for the low quality of outcome based TVET delivery. From this, it could be understood that there are more significant and high impact challenges as compared to the quality challenges that appeared because of low quality of occupational standards.

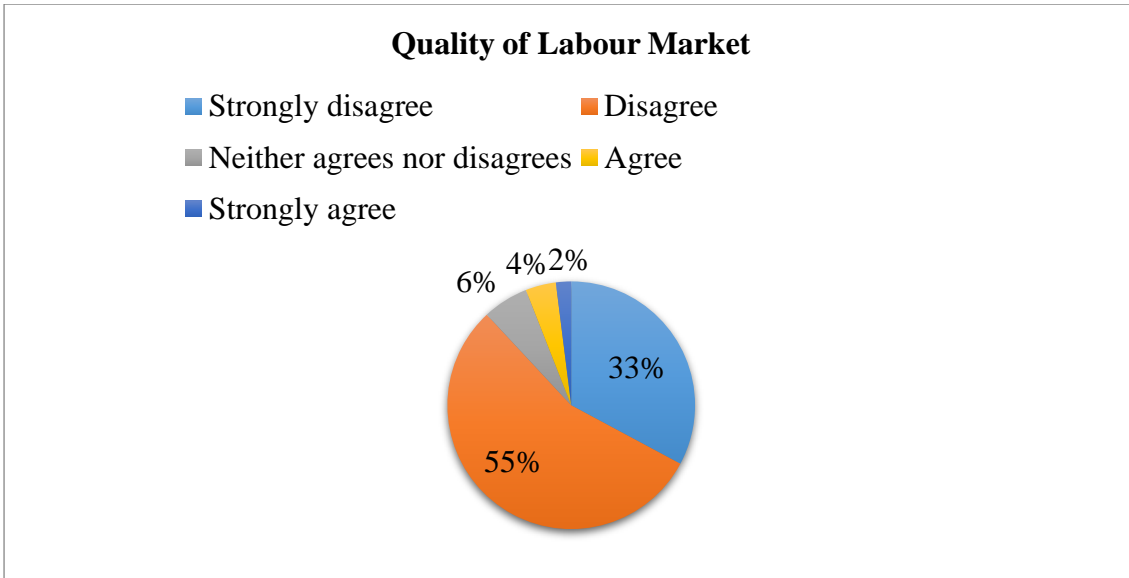


Figure 4-1: Quality of Labour Market

Labor market information is important information to balance the demand and supply of the workforce and hence the information is usually used by training providers to decide the number, type and level of qualifications or students to be trained. It is one of the factors affecting the relevance dimension of the outcome based TVET delivery directly and also affects the quality in general. Looking at its impact in current context, as it could be seen from the figure 4-1, majority of respondents (111 or 55.2%) have disagreed that the statement “poor quality of labour market information/non-availability is the key quality challenge to the quality of outcome based TVET delivery”. This actually indicates that the quality problem on labour market information or the inadequacy of the labour market survey has not impacted the quality of outcome based TVET delivery as seriously as others do.

Table 4-6: Poor quality of curriculum

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|------------------------------|-----------|---------|---------------|--------------------|
| Valid | Strongly disagree | 64 | 31.8 | 31.8 | 31.8 |
| | Disagree | 124 | 61.7 | 61.7 | 93.5 |
| | Neither agrees nor disagrees | 5 | 2.5 | 2.5 | 96.0 |
| | Agree | 4 | 2.0 | 2.0 | 98.0 |
| | Strongly agree | 4 | 2.0 | 2.0 | 100.0 |
| | Total | 201 | 100.0 | 100.0 | |

Ensuring the quality of curriculum is very crucial element of quality of education and training system. As it could be seen from the Table 4-7, majority of respondents (124 or 61.7%) have

disagreed that the statement “poor quality of curriculums are the key quality challenge to the quality of outcome based TVET delivery”. The “poor quality” refers the quality status of the current curriculum in Ethiopian TVET system and it has been basically characterized by its content in a way that the content of the curriculum is not adequate enough to produce high quality workforce who plays significant role for competitiveness of companies/employers.

Table 4-7: Poor quality of teaching, training and learning materials (TTLMs)/non-availability of TTLMs

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|----------------|-----------|---------|---------------|--------------------|
| Valid | Agree | 52 | 25.9 | 25.9 | 25.9 |
| | Strongly agree | 149 | 74.1 | 74.1 | 100.0 |
| | Total | 201 | 100.0 | 100.0 | |

Table 4-8: Poor quality of trainers/teachers in college

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|----------------|-----------|---------|---------------|--------------------|
| Valid | Agree | 1 | .5 | .5 | .5 |
| | Strongly agree | 200 | 99.5 | 99.5 | 100.0 |
| | Total | 201 | 100.0 | 100.0 | |

Table 4-9: Less equipped workshop (machines/tools, equipment, consumables)

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|----------------|-----------|---------|---------------|--------------------|
| Valid | Strongly agree | 201 | 100.0 | 100.0 | 100.0 |

Table 4-10: Poor quality of cooperative training

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|----------------|-----------|---------|---------------|--------------------|
| Valid | Agree | 55 | 27.4 | 27.4 | 27.4 |
| | Strongly agree | 146 | 72.6 | 72.6 | 100.0 |
| | Total | 201 | 100.0 | 100.0 | |

Table 4-11: Poor quality of TVET managers at different level (national/regional/college)

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|----------------|-----------|---------|---------------|--------------------|
| Valid | Agree | 11 | 5.5 | 5.5 | 5.5 |
| | Strongly agree | 190 | 94.5 | 94.5 | 100.0 |
| | Total | 201 | 100.0 | 100.0 | |

From the Table 4-7, Poor quality of teaching, training and learning materials (TTLMs)/non-availability of TTLMs implies the context where technical and vocational education and

training colleges/institutions do not have properly developed teachers' guide, students' guide and learning materials including electronic or digital text books. The poor quality basically may also include the total unavailability of the TTLMs. From the Table 4-8, the poor quality of trainers implies the extreme missing of expected professional competency on TVET trainer. This includes lack of practical skills and knowledge on the subject, lack of pedagogical skills and professional ethics and commitment. The poor quality of TVET managers from Table 4-11 implies also that the significant capacity missing among the TVET managers who are mainly the deans and deputy deans of the colleges. TVET managers are expected to have leadership/management competency and professional commitment for ultimate assurance of an outcome based TVET delivery in a particular training institution.

It has been described in different TVET system documents including education and training road map (2018) that TVET quality challenges need to be tackled so that TVET sector could produce quality workforce for competitiveness of Ethiopia's economy. This is because TVET is less emphasized but an important building block of socio-economic substance of a certain country.

Different respondents have provided their views towards the quality challenges in a way that how key is a particular challenge given the current context of TVET. As it could be seen from the Table 4-7, majority of respondents (149 or 74.1%) have strongly agreed that Poor quality of teaching, training and learning materials (TTLMs)/non- availability of TTLMs is the key quality challenge to the quality of outcome based TVET delivery in deed. It could be seen from the Table 4-8, majority of respondents (200 or 99.5%) have strongly agreed that poor quality of trainers/trainers in college is the key quality challenge to the quality of outcome based TVET delivery. The low quality of trainers is basically being in a position where they lack practical skills on how to run machines and use tools and equipments and demonstrate for trainees. For example, a teacher/trainer who trains machining level three should be able to run machines like CNC, milling, drilling etc machines. It is not only s/he should be able to run a machine, but also s/he shall be competent on how to transfer skills which we call methodology of training. The teachers also lack motivation and aspirations towards producing self reliant and competent citizens. The study has revealed that trainers' quality is one of the challenges significantly affecting the ultimate quality of outcome based TVET delivery.

From the table 4-9, it could be seen that all of respondents (201 or 100%) have strongly agreed that less equipped workshop (machines/tools, equipment, consumables) is the key

quality challenge to the quality of outcome based TVET delivery. The result of data analysis showed that the condition in which the workshops actually exist needs serious attention. Technical and vocational education and training is hands on training and needs well equipped workshops to provide quality training. The tools, equipment and machines including consumable materials should be adequately available for quality training to take place. TVET by its nature is resource intensive and needs tremendous investment.

As it could be seen from the table 4-10, majority of respondents (146 or 72.6%) have strongly agreed that poor quality of cooperative training is the key quality challenge to the quality of outcome based TVET delivery. Poor cooperative training implies the cooperative training which is supposed to happen between two cooperating parties, college and company, is not almost happening. It also indicates that the companies are not accepting the trainees to have workplace training or the trainees won't be exposed to actual work during the training. According to the TVET strategy (2008), 70% of the training is supposed to be cooperative training and therefore, the poor quality of cooperative training significantly affects the quality of graduates. The less the students are exposed to the actual workplace, the less they are found to be competent.

From the table 4-11 one can see that majority of respondents (190 or 94.5%) have said that they strongly agree to the statement "poor quality of TVET managers at different level (national/regional/college) is the key quality challenge to the quality outcome based TVET delivery". The management competence, motivation and commitment of TVET managers especially deans and deputy deans is very crucial towards ensuring the quality of technical and vocational education and training. Competent managers play significant role in managing resources like workshops, industry linkages and human resources towards strategic investment and ultimate quality of outcome based TVET provision.

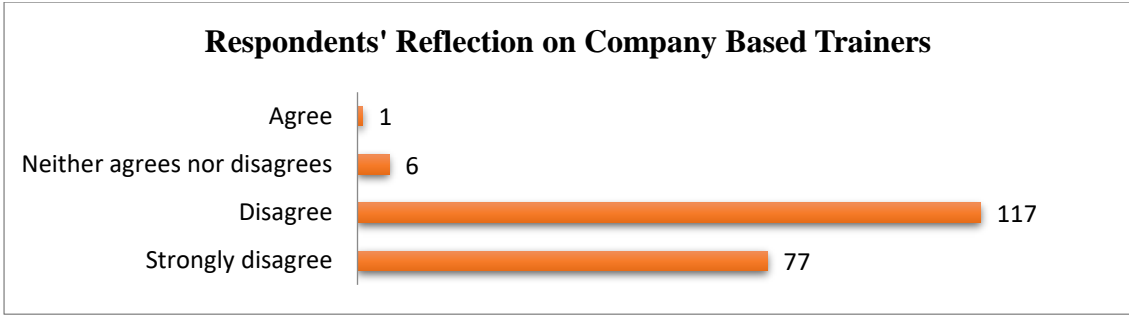


Figure 4-2: Respondents' Reflection on Company Based Trainers

Company based trainers are those trainers who provide workplace training for the TVET trainees during the cooperative training in the company. By quality of company based trainer, it is meant that the company based trainers have right skills of coaching trainees in actual work place. The skills required to be owned by company based trainers are the hands on skills on actual work, underpinning knowledge and also the methodology of training. As it could be seen from the Figure 4-2, majority of respondents (117 out of 210 or 58.2%) disagreed to the statement “poor quality of company based trainers is the key quality challenge to the quality of outcome based TVET delivery”. This implies that the quality challenge with respect to company based trainers is not as such highly impacting challenge for quality of outcome based TVET as compared to others.

Table 4-12: Poor training plan

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|------------------------------|-----------|---------|---------------|--------------------|
| Valid | Strongly disagree | 75 | 37.3 | 37.3 | 37.3 |
| | Disagree | 115 | 57.2 | 57.2 | 94.5 |
| | Neither agrees nor disagrees | 9 | 4.5 | 4.5 | 99.0 |
| | Agree | 2 | 1.0 | 1.0 | 100.0 |
| | Total | 201 | 100.0 | 100.0 | |

During the actual conduct of technical and vocational education and training, there has to be very clear training plan developed by a subject trainer. This contributes the trainer how to manage the training process in a planned way and has effect on quality of training. The sessions for college based knowledge & practical and cooperative training need to be clearly mapped for better quality of training offer. Regarding how impactful the poor quality training plan on overall quality an outcome based training was reflected by respondents and as it could be seen from the table 4-12, majority of respondents (115 or 57.2%) disagreed and 75

(37.3%) have strongly disagreed that Poor training plan is the key quality challenge to the quality outcome based TVET delivery. This has implied that even though the training plan is one of quality factors, it is not a key quality challenges as far as the current context is considered. There reflection of respondents on how high the quality challenges related to institutional competency assessment, national competency assessment, back ground of students coming from general education and the admission of students without considering their occupational/trade choice affects the ultimate quality of outcome based technical and vocational education and training and hence the competency of graduates was captured. The pie-charts below basically indicate the percentages of respondent reflection frequencies in each scale.

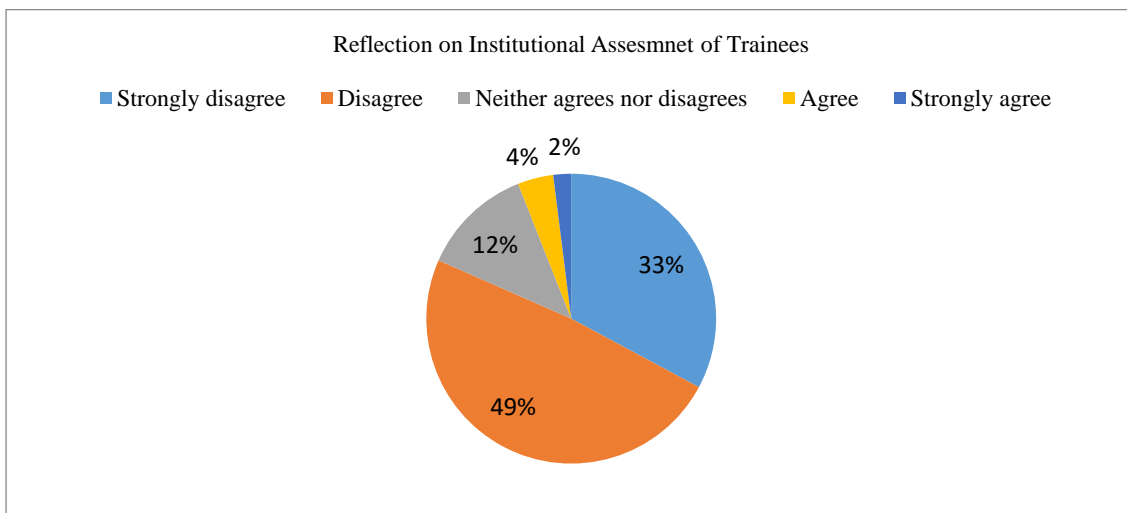


Figure 4-3: Reflection on Institutional Assessment of Trainees

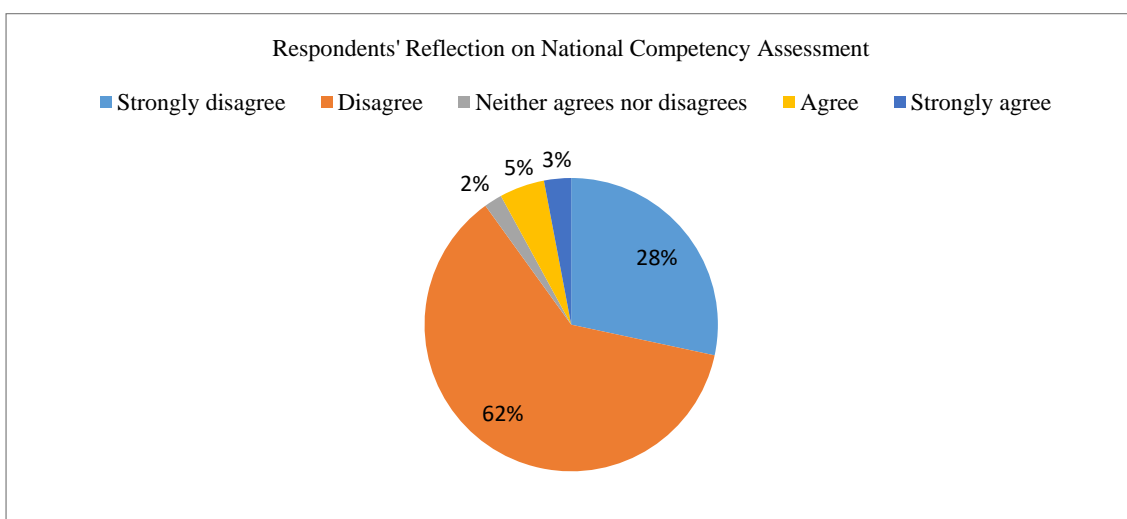


Figure 4-4: Respondents' Reflection on National Competency Assessment

From the Figures 4-3, majority of respondents (98 or 49%) have disagreed and 66(34%) have strongly disagreed that poor quality of institutional assessment of trainees is the key quality challenge to the quality outcome based TVET delivery. The term “key” is important in a sense that although the quality problem and of course extreme quality problem of institutional assessment is a serious problem, respondents have said that this is not a key challenge highly impacting the end results of the outcome based TVET which is literally mean the quality of graduates. Institutional competency assessment is basically college level assessment of students to prepare for national competency assessment and assure completion.

Regarding the national competency assessment, one could understand from the Figure 4-4 that majority of respondents (124 or 62%) have disagreed and 57 (28%) have strongly disagreed on the statement “poor quality of national competency assessment (CoC) is the key quality challenge to the quality outcome based TVET delivery”. This is again the issue of prioritization and it does not mean that the quality problems on national competency assessment do not affect the quality. However, the quality of national competency assessment has less impact as compared to others challenges on ensuring the high quality outcome based technical and vocational education and training. Occupational competency assessment is like a check point, however, it is not directly playing in improving the quality of training rather the feedbacks from occupational competency assessment are inputs to improve the quality of training.

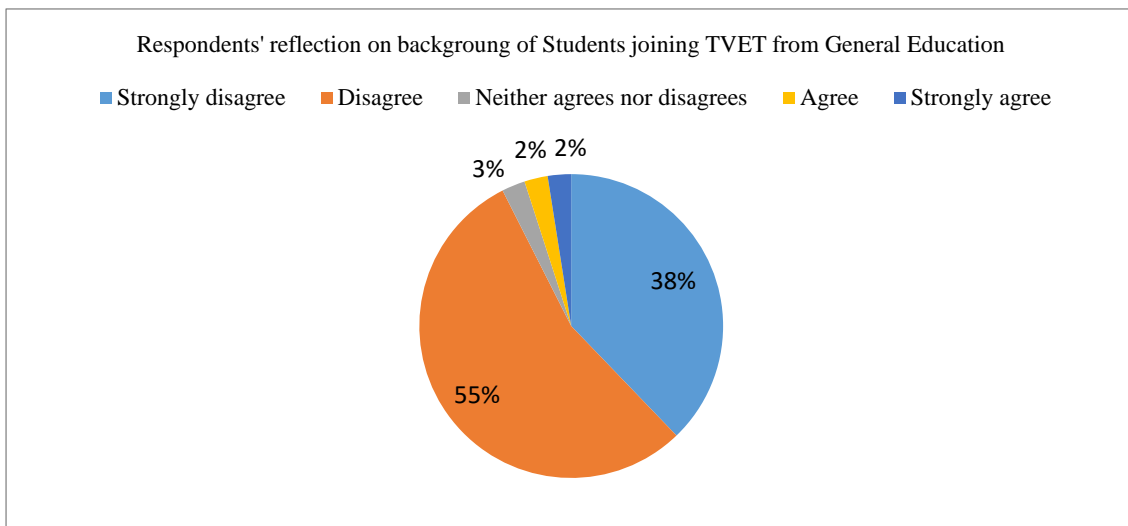


Figure 4-5: Respondents' reflection on background of Students joining TVET from General Education

From the Figure 4-5, one could see that majority of respondents (110 or 55%) have disagreed and 76 (38%) have strongly disagreed that poor background of trainees (poor quality of general education/ before TVET) is the key quality challenge to the quality outcome based TVET delivery. The quality of general education is very important in a way that the students who leave high school with better general knowledge could perform better when they join technical and vocational education and therefore, the background of the students have ultimate effect. However, the respondents have indicated that even the poor background of the students is not a key problem for existence of low quality outcome based TVET. There are other factors which account more priority. One could also see from Figure 4-6 that majority of respondents (103 or 51%) disagreed on the statement “student admission without considering individual choices/talents is the key quality challenge to the quality outcome based TVET delivery” and 87 (43%) have strongly disagree.

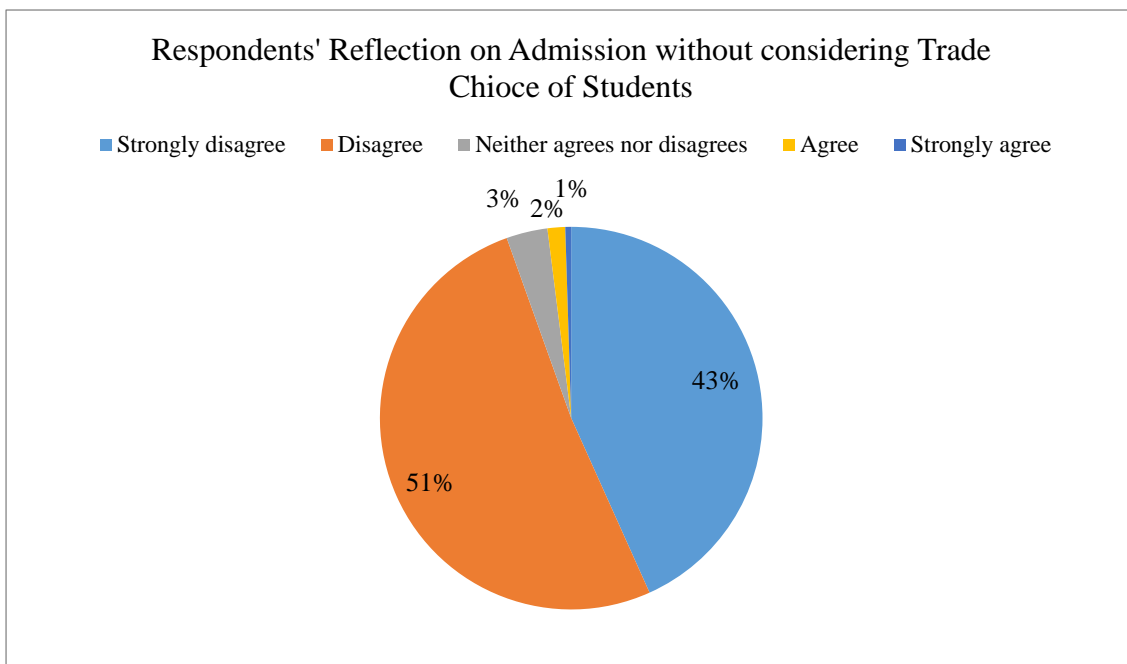


Figure 4-6: Respondents' Reflection on Admission without considering Trade Choice of Students

4.4. Prioritization of the Quality Challenges of Outcome based TVET Delivery

Prioritizing quality challenges of outcome based technical and vocational education and training helps the policy makers to focus on those challenges and use the limited resources effectively and efficiently to solve them. As it was captured during the focus group discussion, one of the weaknesses of TVET managers is lack of focusing on the key challenges. When one cannot focus, the interventions strategy would be so scattered and could not effective. This would be usually worst in situation whereby there are no adequate resources to afford ineffective approach. Developing countries could not afford and prioritization is very important.

The statistical data of the ratings of the respondents on the quality challenges from Table 4-13 show that less equipped workshops (lack of training machines, tools and equipment), poor quality of trainers, poor quality of training materials, poor quality of cooperative training and poor quality of TVET managers are the key challenges having significant impacts on the quality of outcome based TVET delivery

Table 4-13: Statistical Data of respondents against the prioritization of Quality Challenges of Outcome Based TVET Delivery to Employment

| Statistics | Valid | Educational Level | | | | Poor quality of labour market information /non-availability | Poor quality of curriculum | Poor quality of teaching, training and learning materials (TTLMs)/ non-availability of TTLMs | Poor quality of trainers/trainers in college | Poor quality of company based trainees | Less equipped workshop (machines/ tools, equipment, consumables) | Poor quality of cooperative training | Poor training plan | Poor quality of institutional assessment of trainees | Poor quality of national competency assessment (CoC) | Poor background of trainees (poor quality of general education/ before TVET) | Student admission without considering individual choices/talents | Poor quality of TVET managers at different level (national/regional/college) |
|----------------|-------|-------------------|------|------|-----------------------|---|----------------------------|--|--|--|--|--------------------------------------|--------------------|--|--|--|--|--|
| | | Current Role | Age | Sex | Occupational standard | | | | | | | | | | | | | |
| N | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | 201 | |
| Missing | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Mean | 4.00 | 1.62 | 1.44 | 1.67 | 1.87 | 1.81 | 4.74 | 5.00 | 1.66 | 5.00 | 4.73 | 1.69 | 1.94 | 1.93 | 1.77 | 1.65 | 4.95 | |
| Median | 5.00 | 1.00 | 1.00 | 2.00 | 2.00 | 2.00 | 5.00 | 5.00 | 2.00 | 5.00 | 5.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 5.00 | |
| Mode | 5 | 1 | 1 | 2 | 2 | 2 | 5 | 5 | 2 | 5 | 5 | 2 | 2 | 2 | 2 | 2 | 5 | |
| Std. Deviation | 1.405 | .808 | .497 | .720 | .845 | .753 | .439 | .071 | .563 | .000 | .447 | .604 | .889 | .877 | .823 | .671 | .228 | |
| Minimum | 1 | 1 | 1 | 1 | 1 | 1 | 4 | 4 | 1 | 5 | 4 | 1 | 1 | 1 | 1 | 1 | 4 | |
| Maximum | 5 | 4 | 2 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 5 | 4 | 5 | 5 | 5 | 5 | 5 | |

| | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|------|-----|-----|-----|-----|-----|-----|-----|
| Sum | 803 | 338 | 289 | 326 | 396 | 376 | 363 | 953 | 1004 | 333 | 1005 | 950 | 340 | 389 | 387 | 356 | 331 | 994 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|------|-----|-----|-----|-----|-----|-----|-----|

The Pareto analysis was applied to identify high impact causes for the low quality of outcome based TVET. The reason why Pareto analysis was applied is just because it is less complicated analysis method to assess and prioritize the quality problems by comparing the benefit that solving each one would provide. Unlike the Delphi method, which is more procedural and exhausting, Pareto analysis is less complicated and easy to understand for readers and users of this study. Taking that the total quality problem or the low quality of outcome based technical and vocational education of training is as a subsequence of the quality challenges of the inputs which have been discussed, the Pareto analysis on Figure 4-7 shows that most of the causes for the low quality of outcome based TVET delivery to employment are the five key challenges such as namely; less equipped workshops (lack of training machines, tools and equipment), poor quality of trainers, poor quality of training materials, poor quality of cooperative training and poor quality of TVET managers. These five key quality challenges basically account 20% approximately and these are the quality challenge which highly contributes for the low quality of outcome based technical and vocational education and training or the low quality of TVET graduates.

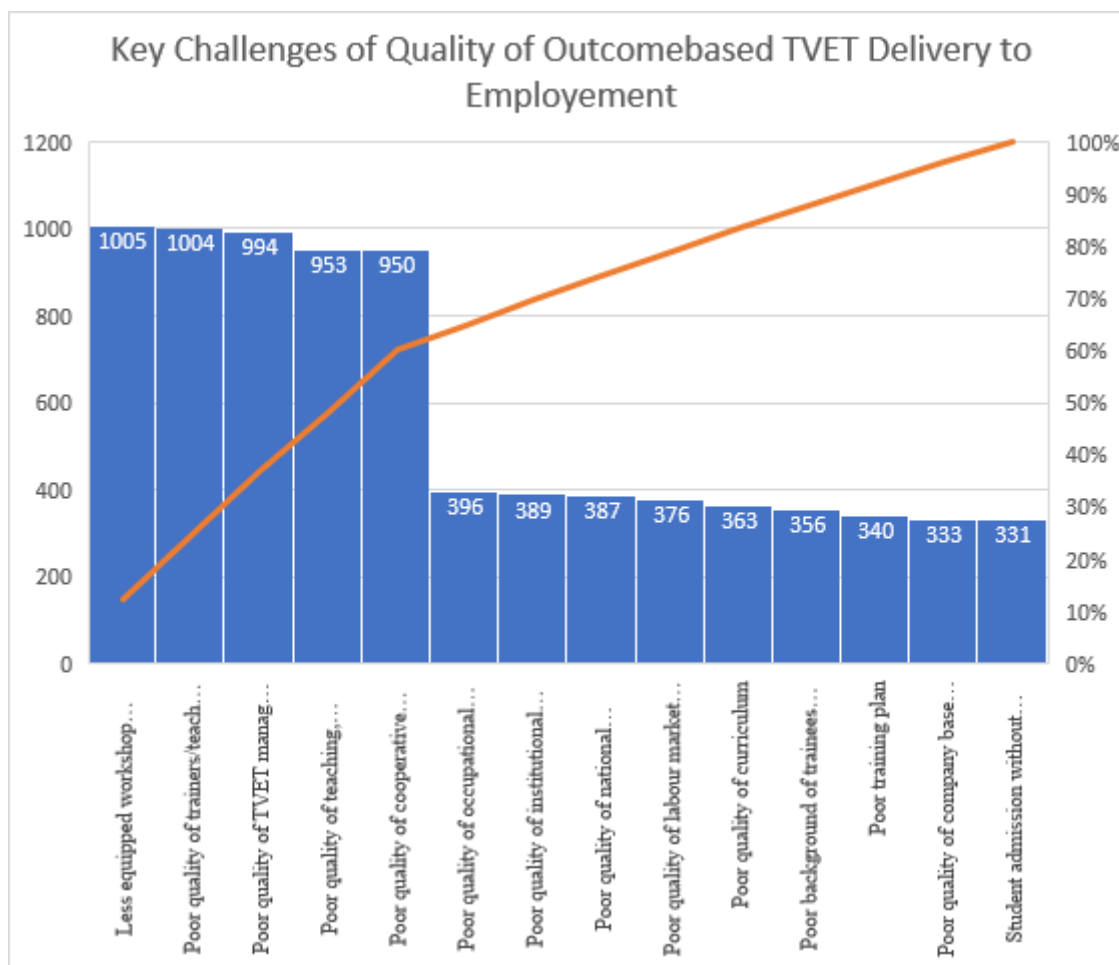


Figure 4-7: key Challenges of Quality of Outcome based TVET Delivery to Employment

4.5. The findings on Root cause analysis for key challenges and solutions for the root causes

4.5.1. Root Cause and Mitigation (RCM) Analysis

The root cause analysis has been conducted for the five quality prioritized challenges based on the data gathered through focus group discussions. The fishbone diagrams on the Figure 4-8, 4-9, 4-10, 4-11 and 4-12 have depicted the root causes of the particular key quality challenge for the outcome based TVET delivery.

Training Workshops (tools, equipment, machines and consumables): The top first challenge of outcome based technical and vocational education and training in the current content comes **less equipped workshops**. As TVET by its nature is more of practical training, the workshops shall be well equipped for quality training to take place. As government has been focusing on the accessibility theme for many years, the quality of

training has been forgotten. In outcome based TVET system, what guides is the occupational standard and it is very important to have tools, equipment, machines and consumable materials required for actual provision of training as per the occupational standard. The performance criteria on occupational standards basically guide what kind of training inputs shall be supplied and it is usually exhaustively put on curriculum document as well. When the workshops lack required training inputs, the quality of training would be affected highly and this has been captured as serious challenge. As it could be seen from the Figure 4-8, the root cause for less equipped workshops have been lack of regular workshop auditing especially identifying and recording what machines, tools and equipment are available and what are missing as per occupational standard. The regular auditing is a missing work culture and it is important to regularly identify the missing inputs and supply accordingly. The other root cause for less equipped workshops is poor maintenance culture. Quite a number of machines and equipments are not efficiently and effectively used because of the poor culture of maintenance. The other root cause is that the machines, tools and equipment are outdated and are not in line with occupational standard requirements. As most of the machines are supplied through aid, the colleges are being taken as dumping places of outdated machines from other countries. The Low budget allocation from the government and limited source of finance for colleges comes as another key root cause for less quipped workshops. Another very clashing problem is that the colleges themselves are very weak even to properly and efficiently utilize already allocated small budget. This has also interconnection with very poor capacity of TVET managers and other staffs. Another very important issue to be raised as root cause is weak culture of checking functionality of machines, tools and equipments before placing purchase order by colleges. The colleges do not have constituted the team of experts who checks the functionality of machines and equipment before placing order or actual receiving.

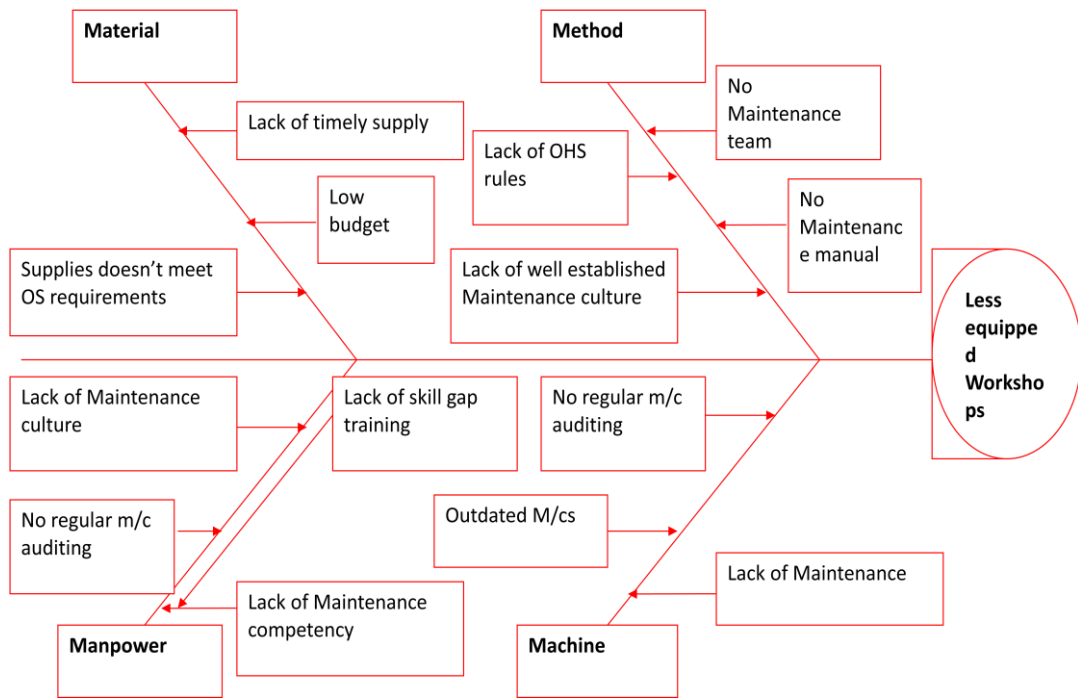


Figure 4-8: Fishbone for Less Equipped Workshop

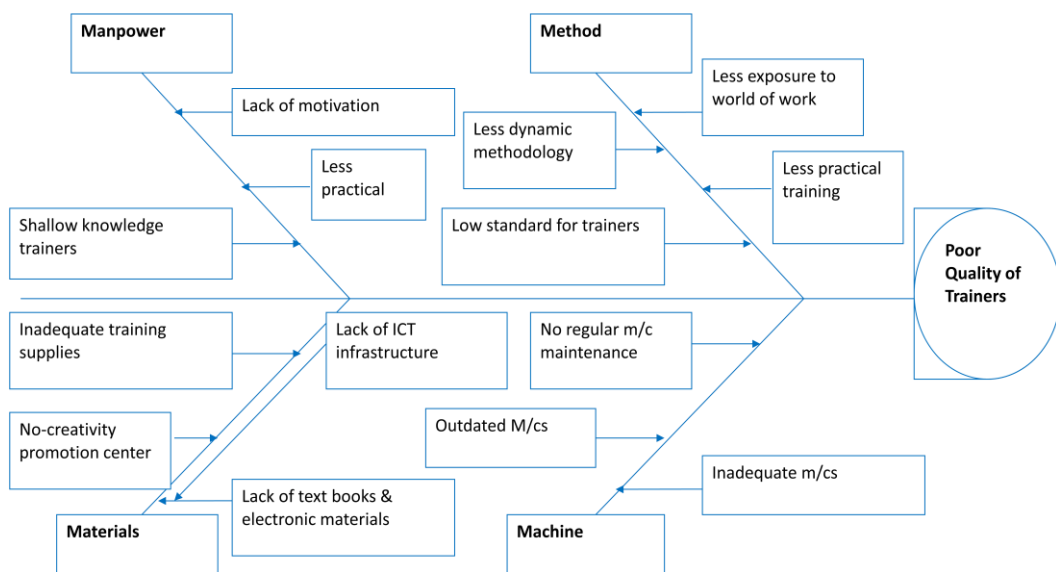


Figure 4-9: Fishbone for Poor Quality of Trainers

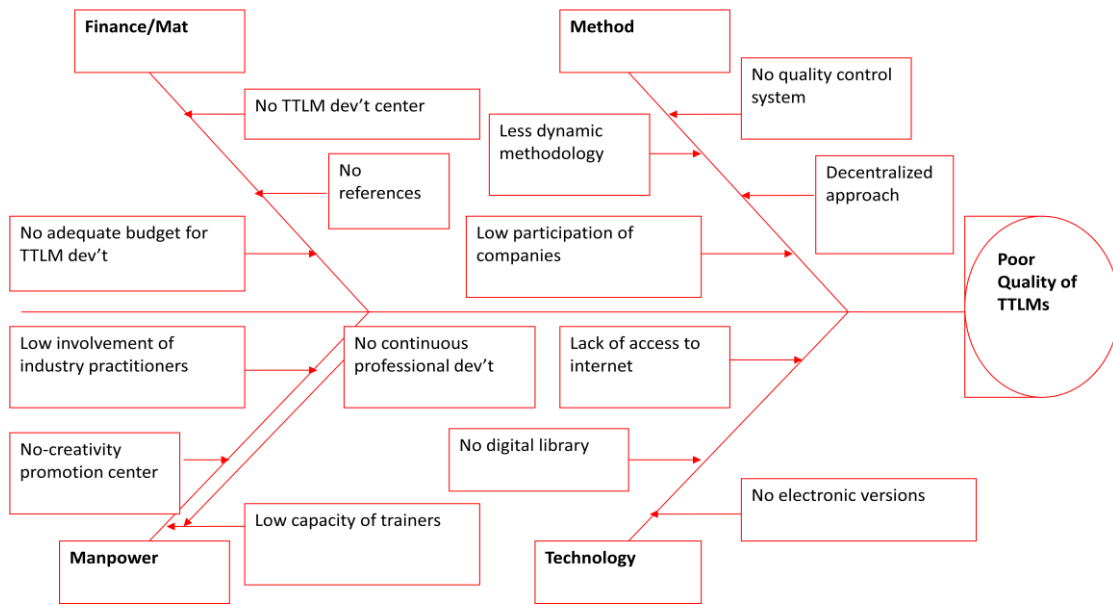


Figure 4-10: Fishbone for Poor Quality of TTLMs

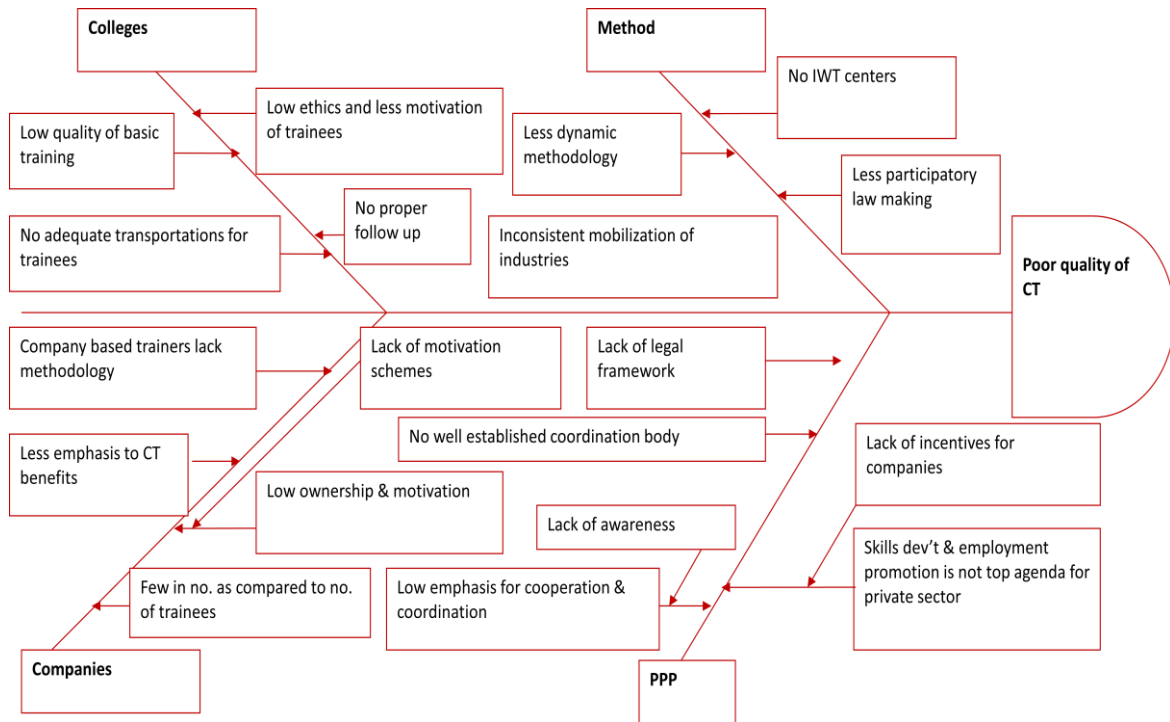


Figure 4-11: Fishbone for Poor Quality of Cooperative Training

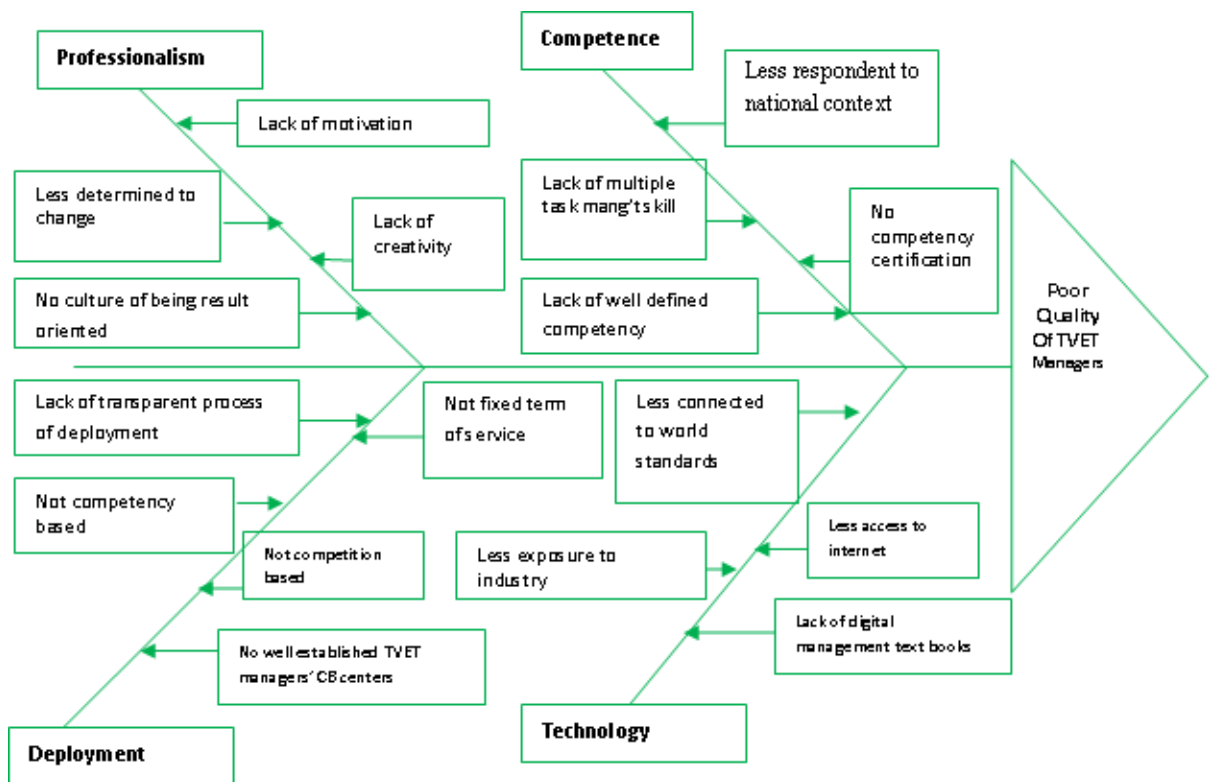


Figure 4-12: Fishbone for Poor Quality of TVET Managers

To ensure high quality outcome based technical and vocational education and training, establishing well equipped workshops comes as top priority. The particular root causes and the associated mitigation strategies are tabulated as it could be seen from the Table 4-14 for detailed information.

4-14: less equipped workshops (lack of training machines, tools and equipment)

| Variable Code/Name | Root Causes | Mitigations |
|--------------------|--|---|
| RCM11 | Low experience for regular auditing of machines, tools and equipment | Regular machine, tools and equipment auditing shall be made culture, task team should be organized for the auditing and reporting the status of machines |
| RCM12 | Poor maintenance culture | Maintenance system supported by directives need be put in place. Workshop machinery maintenance should be properly exercised. Maintenance team should be established at |

| | | |
|-------|--|--|
| | | college, regional and national level and adequate budget should be allocated |
| RCM13 | Machines, tools and equipment are outdated and not in line with occupational standard requirements | Outdated machines need to be disposed and substituted. Machines, tools and equipments shall be in line with occupational standards and industry requirements. |
| RCM14 | Low budget allocation | The national authority shall work on proper awareness about high return rate of TVET investment so that the government allocates adequate budget. Colleges need to generate incomes and use it for further development. Levy systems need to be explored to increase source allocation for TVET. |
| RCM15 | Less effective budget utilization in fulfilling workshop equipment | The allocated budget needs to be efficiently utilized to fulfill workshop materials. College management shall make sure timely procurements. |
| RCM16 | Poor culture of checking functionality of machines, tools and equipments before placing purchase order and receiving from donors | Establish the team who will check machines before placing order and also who checks those which are donated |

**RCM is short form for Root Cause Vs Mitigation*

Regardless of its priority, it is very important to have tools, equipment, machines and consumable materials required for actual provision of training as per the occupational standard (Hailu, 2014). The occupational standard is a guide especially when it comes to actual exercise of equipping workshops.

The performance criteria on occupational standards basically guides what kind of training inputs shall be supplied and it is usually exhaustively put on curriculum document as well. As the solution for lack of regular auditing of machines, tools and equipment, the task team should be organized for the auditing and reporting the status of machines. In order to reverse the poor maintenance culture which is very serious root cause, maintenance system supported by directives need be put in place. The group discussants have also stressed that workshop

machinery maintenance should be properly exercised. Maintenance team should be established at college, regional and national level. The government should also allocate adequate budget and additional sources of finance should be explored. Outdated machines need to be disposed and substituted. Machines, tools and equipments shall be in line with occupational standards and industry/ workplace requirements. The national TVET authority shall work on proper awareness creation about high returning rate of TVET investment so that the government allocates adequate budget. Besides all other options of resource mobilization including levy systems have to be explored. Another solution captured during focus discussion was that colleges need to generate incomes and use it for further development. As another root cause for less equipped workshops is less effective budget utilization in fulfilling workshop equipment. The allocated budget needs to be efficiently utilized to fulfill workshop materials and college management shall always make sure timely procurements. The last but not least, poor culture of checking functionality of machines, tools and equipments before placing purchase order and receiving from donors are the key root causes for the particular quality challenge to be existent. Therefore, establishing the team who will check machines before placing order and also who checks those which are donated are important solution ways.

Quality of Trainers: The data collected during the focus group have revealed that the root causes for the poor (reduced) quality of TVET trainers are lack of well established trainers’ development strategy, trainers lack actual workplace exposure and practical skills, trainers lack motivation and professional pride, trainers have shallow theoretical knowledge in subject matter, trainers lack methodology/ pedagogy or how to train different categories of trainees and poorly equipped workshops and low quality of ToTs.

Table 4-15: poor quality of trainers

| Code given for SPSS Analysis | Root Causes | Mitigations |
|------------------------------|---|---|
| RCM21 | Lack of well established trainers’ development strategy | Develop comprehensive trainers’ development strategic document taking into account international competitiveness. The development strategic Plan is important in terms of clearly defining and forecasting the required volume, |

| | | |
|-------|--|--|
| | | timing, qualification levels, quality and relevance of trainers required for enhancing quality of training. |
| RCM22 | Trainers lack actual workplace exposure and practical skills | Identify particular skill gap of trainers and provide practical training, expose trainers in the actual workplace for adequate time (trainers' externship) |
| RCM23 | Trainers lack motivation and professional pride | Provide motivational training, provide performance based benefit packages, avoid political interventions in teacher professions, raise up trainer profession |
| RCM24 | Trainers have shallow theoretical knowledge in subject matter | Continuously improve the curriculum of trainers and best practices shall be considered |
| RCM25 | Trainers lack methodology/ pedagogy or how to train different categories of trainees | Properly include the pedagogy course in trainers'/teachers' curriculum and apply continuous professional development strategy |
| RCM26 | Poorly equipped workshops and low quality of ToTs | Increase the quality of trainers' training facilities and provide high quality ToTs |

Based on the study, the root causes for the poor quality of TVET trainers and respective mitigation strategies are summarized as follows. Lack of well established trainers' development strategy is one of the root causes and developing comprehensive trainers development strategic document taking into account international competitiveness was suggested as an important mitigation intervention. With regard to lack of actual workplace exposure and practical skills among trainers, identifying particular skills gap and providing catered practical trainings in actual workplace with externship modality could be a short term solution. It has been also essentially considered to improve quality of Trainers' curriculum and making sure the trainers' development process is capable enough to produce high quality professional trainers with proper pedagogical competency, theoretical and practical skills. Increasing quality of trainers' training facilities including training workshops has been also

indicated as an important solution. Some of interventions such as providing motivational training, performance based benefit packages, avoid political interventions in teacher professions and rising up trainer/teacher profession could be solution for respective root causes.

Quality of TTLMS: The root causes for poor quality of TTLMs have basically been identified as highly decentralized approach of TTLM development, less emphasis given to professional level of TTLM developers, low budget allocation for TTLM development, low involvement of industry experts and no quality assurance system put in place to control quality of TTLMs

Table 4-16: Poor quality of Teaching, Training and Learning Materials (TTLM)

| Code given for SPSS Analysis | Root Causes | Mitigations |
|------------------------------|--|--|
| RCM31 | Highly decentralized approach of TTLM development | Identify the distinctive areas of competency (DAC) for colleges and assign TTLM development task in those occupational areas, the developed materials need to be collected and quality shall be controlled nationally/regionally |
| RCM32 | Less emphasis given to professional level of TTLM developers | Develop minimum qualification requirement for TTLM developers and engage them accordingly. |
| RCM33 | Low budget allocation for TTLM development | Allocate adequate budget for TTLM development whereby the developer could be encouraged. |
| RCM34 | Low involvement of industry experts | Make sure TTLM development task team includes industry experts, the technical experts panel and advisory panel shall be strongly engaged in sustainable approach |
| RCM35 | No quality assurance system put in place to control quality of TTLMs | Put in place TTLM quality control and continuous improvement system. The internal quality improvement process control should be also exercised as long term and continuous improvement approach |

Highly decentralized approach of TTLM development was identified as one of the root causes and therefore, identifying the distinctive areas of competency (DAC) for colleges and assign TTLM development task in those occupational areas, control quality nationally/regionally was put as mitigation. Less emphasis given to professional level of TTLM developers was another root cause for poor quality of TTLMS and therefore, developing minimum qualification requirement for TTLM developers was set as mitigation. Allocating adequate budget for TTLM development process has been put as mitigation particularly for the root cause associated to lack of budget. Involvement of industry experts and making sure TTLM development task team includes industry experts were suggested as part of mitigation strategies. Moreover, putting in place the quality control of TTLMs and ensure continuous improvement has been indicated as an important solutions.

Quality of Cooperative Training: According to the study, the root causes for poor quality of CT are identified as low interest of companies (Low awareness about importance of CT, Low quality of basic training at college, No incentive packages), lack of flexible models of CT implementation, almost no industry wide training centers, industry based trainers lack pedagogy/ how to train, and skills development and employment promotion is not agenda for organized private sectors and companies

Table 4-17: Poor Quality of Cooperative Training

| Code given for SPSS Analysis | Root Causes | Mitigations |
|------------------------------|--|--|
| RCM41 | <p>Low interest of companies</p> <ul style="list-style-type: none"> • Low awareness about importance of CT • Low quality of basic training at college • No incentive packages | <p>Continuous awareness creation should be given to companies about the importance of CT and this has to be institutionalized with ownership of organized private sector. Quality of basic training at college should be improved through implementing internal TVET delivery process improvement. The internal quality makes companies to have confidence on trainees. Incentives like tax reduction, refunds, grants etc should be designed for companies based on international</p> |

| | | |
|-------|---|---|
| | | experience |
| RCM42 | Unable to implement CT models in flexible way as per the context | Different models of cooperative trainings such as apprenticeship model, traineeship model need to be implemented flexibly as the size and nature of companies varies and one could not fit to all types. The existing approach of one size fits for all should not be followed. |
| RCM43 | Almost no industry wide training centers | Initiate organized private sectors and companies to establish industry wide training centers |
| RCM44 | Industry based trainers lack pedagogy/ how to train | Provide methodology training for company based trainers and introduce certification system |
| RCM45 | Skills development and employment promotion is not agenda for organized private sectors and companies | The organized private sector should be informed that skills development and employment promotion should not be only task of government and should actively participate with full ownership. The structure of private sector should also consider such an important socio-economic agenda, |

Low interest of companies for cooperative training (Low awareness about importance of CT, Low quality of basic training at college, No incentive packages) was one of the root cause for poor quality of CT. Therefore, it has been come out that continuous awareness creation should be done to companies about the importance of CT and quality of basic training at college should be improved so that companies develop confidence on trainees' basic skills. The organized private sector should be also informed that skills development and employment promotion should not be only task of government and they should actively participate with full ownership. Moreover, incentives should be designed for companies based on international experience to increase motivation of companies towards CT. Another root cause was lack of flexible models of CT implementation and hence, different models of cooperative training need to be implemented and one size fits for all should not be followed. Almost no industry wide training centers exist and this also affects the quality and initiating organized private sectors and companies to establish industry wide training centers could be

mitigation. Industry wide training center is a training center used when the training center at college and actual workplace are not able to cover the competency areas to be trained. Another root cause for poor quality of cooperative training has been lack pedagogy skills among industry based trainers. Therefore, providing structured methodology training for company based trainers and introduce certification system would be an important measure.

Quality of Managers: The root causes for the poor quality of managers, which could be attributed by the low leadership capability, low commitment and motivation of deans and deputy deans in particular, are TVET managers lack management knowledge, skills and commitment, lack of properly defined qualification requirements/competencies for TVET managers and deployment of TVET managers is not professional and competition based.

Table 4-18: Poor quality of TVET managers

| Code given for SPSS Analysis | Root Causes | Mitigations |
|------------------------------|---|---|
| RCM51 | TVET managers lack management knowledge, skills and commitment | Professional assessment and licensing should be introduced for TVET managers to make sure managers have possessed required competency. This could best be managed by Quality Assurance Agency to be established; however, currently the Federal TVET Institute who is also institute for TVET leadership training could manage the task of licensing. TVET managers should also develop trend of visiting industries. |
| RCM52 | Lack of properly defined qualification requirements/competencies for TVET managers | Competencies should be defined and each and every manager should own those competencies before competing for college management position |
| RCM53 | Deployment of TVET managers is not professional (more of political) and competition based | TVET managers should compete transparently to be college dean or deputy dean. The deployment should be competition based with fixed term of service. |

The root causes for the challenge are TVET managers lack management knowledge, skills and commitment, no properly defined qualification requirements/competencies for TVET managers and deployment of TVET managers is not professional and competition based. As mitigation strategies; professional assessment and licensing should be introduced for TVET managers to make sure managers have possessed required competency. TVET managers should also have regular exposures/visits to industries so that managers have real pictures and demands in the workplaces in terms of skills of workers. This would help managers/deans of colleges to adjust their management styles towards enhancing the quality of trainings. Competencies TVET managers need to be defined and each and every manager should own those competencies before competing for college management position. TVET managers should compete transparently for college dean and deputy dean positions. The deployment should be competition based with fixed term of service rather than political appointed.

4.5.2. Validation of the Solutions for the Root Causes of Quality Challenges

The relevance of suggested solutions was validated at desk level whereby the views of professionals have collected using the five Likert scales and analyzed accordingly. These rating scales have been 5-very relevant, 4- Fairly Relevant, 3- Somehow relevant, 2- Not relevant and 1-irrelevant. The result of validation was tabulated on the Table 4-19.

Table 4-19: Root Cause Vs Mitigation Validation data for Less Equipped Workshops

| | | Statistics | | | | | |
|----------------|---------|------------|-------|-------|-------|-------|-------|
| | | RCM11 | RCM12 | RCM13 | RCM14 | RCM15 | RCM16 |
| N | Valid | 81 | 81 | 81 | 81 | 81 | 81 |
| | Missing | 0 | 0 | 0 | 0 | 0 | 0 |
| Mean | | 4.65 | 4.67 | 4.85 | 4.47 | 4.59 | 4.65 |
| Median | | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| Mode | | 5 | 5 | 5 | 5 | 5 | 5 |
| Std. Deviation | | .528 | .632 | .422 | .808 | .494 | .504 |
| Minimum | | 3 | 3 | 3 | 3 | 4 | 3 |
| Maximum | | 5 | 5 | 5 | 5 | 5 | 5 |
| Sum | | 377 | 378 | 393 | 362 | 372 | 377 |

From the Table 4-15, it could be seen that the mean value of results of solution validation has been between 4.47 and 4.85 which have confirmed that the mitigation strategies are fairly relevant. The results show the validation of relevance of the particular mitigation strategy against the identified root cause of associated quality challenges.

Table 4-20: Root Cause Vs Mitigation Validation data for Poor Quality of Trainers

| | | Statistics | | | | | |
|----------------|---------|------------|-------|-------|-------|-------|-------|
| | | RCM21 | RCM22 | RCM23 | RCM24 | RCM25 | RCM26 |
| N | Valid | 81 | 81 | 81 | 81 | 81 | 81 |
| | Missing | 0 | 0 | 0 | 0 | 0 | 0 |
| Mean | | 4.65 | 4.68 | 4.57 | 4.79 | 4.49 | 4.70 |
| Median | | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| Mode | | 5 | 5 | 5 | 5 | 5 | 5 |
| Std. Deviation | | .479 | .470 | .498 | .410 | .793 | .511 |
| Minimum | | 4 | 4 | 4 | 4 | 3 | 3 |
| Maximum | | 5 | 5 | 5 | 5 | 5 | 5 |
| Sum | | 377 | 379 | 370 | 388 | 364 | 381 |

From the Table 4-20, we could see that the mean value of results of solution validation has been between 4.49 and 4.79 which have confirmed that the mitigation strategies are fairly relevant. The results show the validation of relevance of the particular mitigation strategy against the identified root cause of associated quality challenges.

Table 4-21: Root Cause Vs Mitigation Validation for Poor quality of Teaching, Training and Learning Materials (TTLM)

| | | Statistics | | | | |
|----------------|---------|------------|-------|-------|-------|-------|
| | | RCM31 | RCM32 | RCM33 | RCM34 | RCM35 |
| N | Valid | 81 | 81 | 81 | 81 | 81 |
| | Missing | 0 | 0 | 0 | 0 | 0 |
| Mean | | 4.46 | 4.58 | 4.62 | 4.46 | 4.52 |
| Median | | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| Mode | | 5 | 5 | 5 | 5 | 5 |
| Std. Deviation | | .791 | .521 | .663 | .690 | .527 |
| Minimum | | 3 | 3 | 3 | 3 | 3 |
| Maximum | | 5 | 5 | 5 | 5 | 5 |
| Sum | | 361 | 371 | 374 | 361 | 366 |

From the Table 4-21, we could see that the mean value of results of solution validation against the root causes in TTLMs has been between 4.46 and 4.62 which have confirmed that the mitigation strategies are fairly relevant. The results show the validation of relevance of the particular mitigation strategy against the identified root cause of associated quality challenges.

Table 4-22: Root Cause Vs Mitigation Validation for Poor quality of Cooperative Training

| | | Statistics | | | | |
|----------------|---------|------------|-------|-------|-------|-------|
| | | RCM41 | RCM42 | RCM43 | RCM44 | RCM45 |
| N | Valid | 81 | 81 | 81 | 81 | 81 |
| | Missing | 0 | 0 | 0 | 0 | 0 |
| Mean | | 4.69 | 4.63 | 4.62 | 4.62 | 4.30 |
| Median | | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| Mode | | 5 | 5 | 5 | 5 | 5 |
| Std. Deviation | | .491 | .511 | .489 | .514 | .887 |
| Minimum | | 3 | 3 | 4 | 3 | 3 |
| Maximum | | 5 | 5 | 5 | 5 | 5 |
| Sum | | 380 | 375 | 374 | 374 | 348 |

From the Table 4-22, we could see that the mean value of results of solution validation against the challenges in CT has been between 4.30 and 4.69 which have confirmed that the mitigation strategies are fairly relevant. The results show the validation of relevance of the particular mitigation strategy against the identified root cause of associated quality challenges.

Table 4-23: Root Cause Vs Mitigation Validation for Poor quality of TVET managers

| | | Statistics | | |
|----------------|---------|------------|-------|-------|
| | | RCM51 | RCM52 | RCM53 |
| N | Valid | 81 | 81 | 81 |
| | Missing | 0 | 0 | 0 |
| Mean | | 4.77 | 4.77 | 4.63 |
| Median | | 5.00 | 5.00 | 5.00 |
| Mode | | 5 | 5 | 5 |
| Std. Deviation | | .426 | .426 | .486 |
| Minimum | | 4 | 4 | 4 |
| Maximum | | 5 | 5 | 5 |
| Sum | | 386 | 386 | 375 |

As it could be seen from the table 4.23, the mean value of the key informants' feedback against each Root Cause Vs Mitigation (RCM) regarding the solutions to the root causes of reduced quality of managers is between 4.63 and 4.77 which implies that the mitigations strategies set for the root causes of the top five quality challenges of the outcome based TVET delivery to employment are fairly relevant and very much relevant ones. This is important exercise in a sense that the solutions designed are validated for more confidence before actual execution.

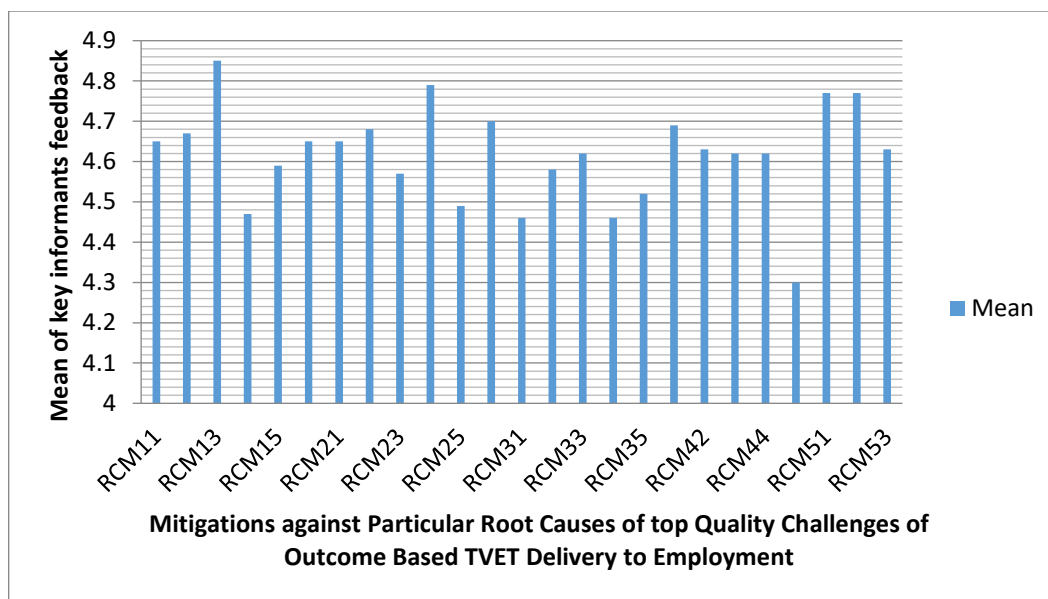


Figure 4-13: Root Cause Vs Mitigation Validation Analysis for top Quality Challenges of Outcome Based TVET Delivery to Employment

Generally the finding of the study has showed (as it could be also seen from the Figure 4-13) that the mean value of the key informants’ validation feedback on the already designed mitigations was all between 4.3 and 4.8. This reveals that the solutions against the root causes of the key challenges of outcome based TVET delivery to employment are fairly relevant.

4.6. The Finding Regarding Sustainable Model for Quality Improvement of Outcome Based TVET Delivery to Employment

Focus group has been conducted to gather qualitative data towards designing sustainable quality improvement model for outcome based TVET delivery to employment. The focus group discussion was conducted with key informants in different category of TVET stakeholders such as policy makers, TVET managers, organized private sector representatives, TVET experts, teachers and industry practitioners. The data were consolidated and analyzed leading to the model development for sustainable quality improvement of outcome based TVET provision.

According to the data collected during focus group discussion, the key pillars of quality of outcome based are the strong engagement of private sector in TVET and internal process quality assurance of TVET delivery. Private sectors are basically companies of different sizes, professional associations, organized private sectors like chambers, sectoral associations etc. Whether companies are engaged in manufacturing or service provision or whether they are local market suppliers or exporters, their productivity and competitiveness is highly

dependent on having the competent workforce and hence the quality and relevance of TVET delivery contributes a lot. The quality of TVET delivery depends also on strategic engagement of private sector in the process of occupational standard development, curriculum development, occupational competency assessment tool development, occupational competency assessment and certification (ILO, 2015c). One of the respondents from industry has said;

“The quality of TVET delivery is very important to produce employable skilled workforce. Industries want those graduates who could make the company productive, competitive and profitable and hence the quality of training should be ensured at any cost. If the graduate is not to the expected competence level, it is less likely that he or she could be employed and also it is less encouraging for companies to pay him/her competitive salary.”

Unless the quality of the TVET delivery is sustainably ensured, it is difficult to ensure the employability of the graduates and also make sure they get decent job.

According to the study conducted by the Ethiopian Chamber of Commerce and Sectoral Association, the engagement of private sector on skills development and employment promotion of Ethiopian economy is significantly low (ECCSA, 2020). The same study has revealed that the economic competitiveness of the countries depend on the quality and relevance of skills development and the quality of skills development or generally quality of education and training could be ensured through strong engagement of private sector in TVET. Strong engagement of private sector in occupational standards development, curriculum and TTLM development, cooperative training, trainers’ capacity building, occupational competency assessment and certifications and other activities could ensure sustainable and continuous improvement of technical and vocational education and training system of a country (ILO, 2016) & (ECCSA, 2020). During focus group discussions, quite diverse ideas have come out from different experts on how the private sector specially companies and organized private sectors such as chambers, sectoral associations, professional associations, skilled workers associations could be engaged in sustainable quality improvement of TVET delivery and employment promotion.

One of the key informants has said;

“As one of the bottle necks for the sustainable quality TVET delivery is the poor coordination among the stakeholders and the coordination platform could be created by fusing the public

sector and private sector representatives in structure which is so called TVET Council or skills development council.’’

Another key informant from public sector has said;

‘‘There is currently existing TVET council which was established in 2016, however, the council has done nothing because its establishment was not in a way it should be. Most of members are politicians who are mostly ministers and they hardly feel the private sector actual context. Most of the members of the TVET council would have been those people who are very close to private sector. They need to be from organized private sectors or companies’’

The data collected from the key informants has revealed that the sectoral skill councils are very important to ensure the quality of outcome based TVET delivery. The countries like South Africa, Philippines, UK and so on have sector based skills councils who play strong role to improve the quality and effectiveness of skills development(ILO, 2015a) & (Nassar, 2018). Based on the focus group discussion output and document review, strategic private sector engagement model is demanding to be designed. The model basically should indicate that sector skill councils could be established at national and regional level in particular economic sectors such as agriculture, health, manufacturing, infrastructure, mining, hospitality, sport, social affairs etc. Sector based skills council establishment might have various procedures and responsibility approaches when it comes to roles of private and public representatives.

Based on the desk review which was done prior to primary data collection, the researcher has been able to put in figure the existing process of outcome based TVET delivery. The existing process flow of the TVET delivery from the very initial task of assessing the world of work up to training delivery and then assessment and certification has been depicted on **figure 4.14**.

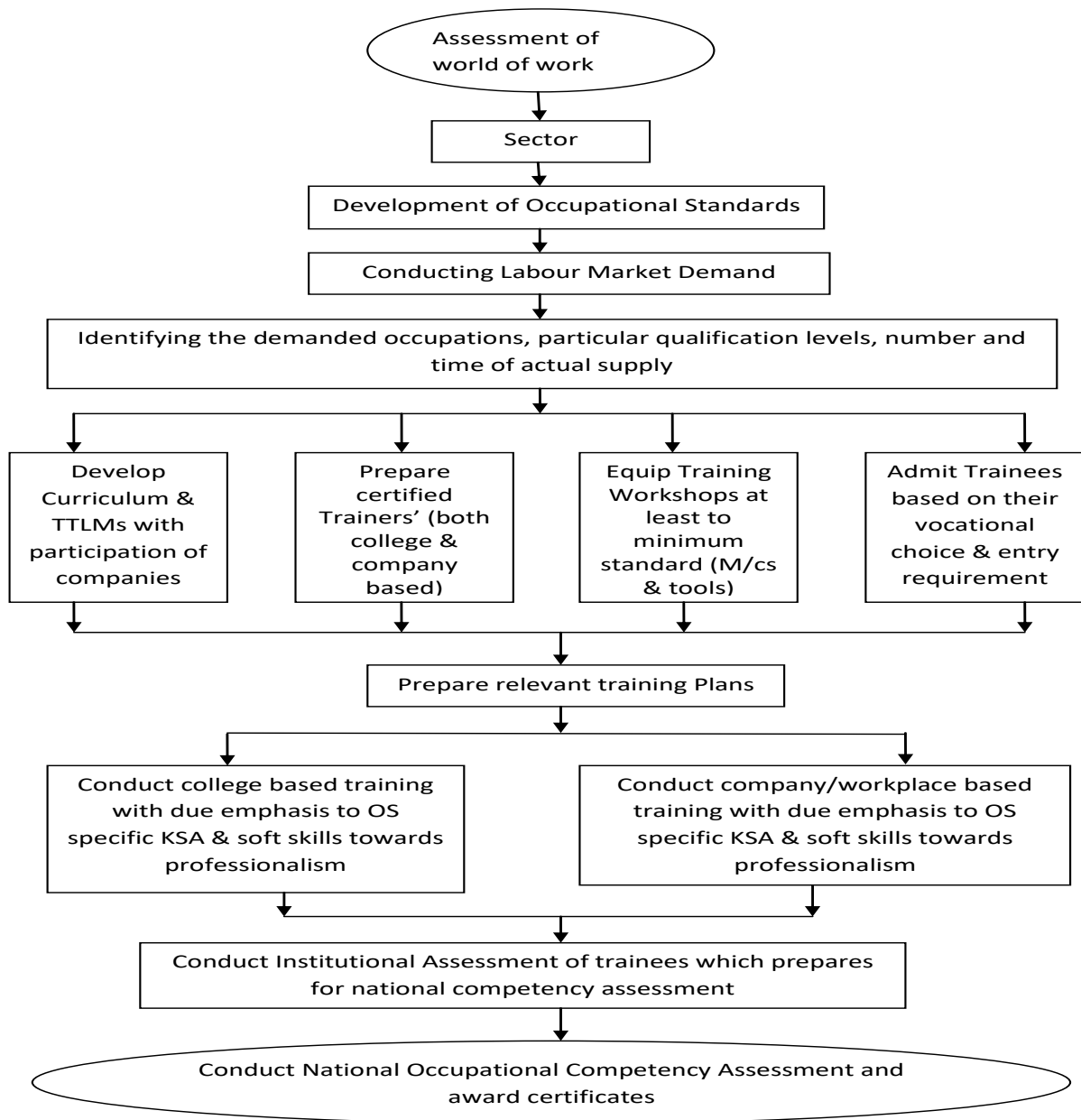


Figure 4-14: Existing Process Flow for Outcome Based TVET Delivery

Source: own formulated based on Desk review results from different documents ((MoE, 2008b),(FDRE, 2016)& others)

As it could be seen from the process flow chart on **figure 4-14**, the key processes which contribute to the quality of outcome based TVET delivery have no process quality check points. The reluctance in checking the quality of at least key processes significantly affect quality of the ultimate output; the graduate quality. For the question “what quality infrastructures (including TQM) exist in TVET system?” which was presented during the focus group discussion, the key informant has said;

“There have been attempts towards establishing the national quality assurance system. The quality assurance mechanisms in TVET system are program registration and accreditation manuals, national standard for TVET institutions, occupational competency assessment and certification and soon. There are no TQM implemented in TVET sector and there is generally quality framework. However, the instruments and processes are not exhaustive in the first place and the implementation has also significant problems in terms of following up standard procedures.”

The study conducted regarding practices and challenges of occupational competency assessment and certification (Kassa, 2018) has also complemented the findings of the focus group discussion. Furthermore, the results of document review have shown that even though there have been attempts towards establishing the quality assurance system in the outcome based TVET delivery, the actual implementation have had challenges.

Based on the findings of the study, one may come up with possible analysis of the challenges in a way that one of the missing points is lack of having the process quality checks in each critical area. The quality of outcome based TVET delivery could not be ensured without having internal process improvement which could be usually having quality assurance infrastructure like semi-independent body and the process quality improvement mechanisms. Statistical quality control tools and total quality management philosophies need to be applied to improve the quality of the education and training system (Yeap, 2008). Internal process quality check is an important element where by the research tried to indicate on model development.. Besides, establishment of quality assurance body with full responsibility of designing and implementing quality improvement initiatives is fundamental take-up. One of the complementary finding through desk review was that world bank project called East African Skills Transformation for Regional Integration Project (EASTRIP) (WB, 2018) has aimed at supporting government particularly TVET sector to establish the national quality assurance agency. The role of the national quality assurance agency is envisaged to improve the quality of outcome based TVET delivery through implementing internal quality assurance measures like certification of managers, trainers, controlling the process quality of curriculum development, quality of workshops, upgrading standard of TVET institutions in general through applying quality checks, monitoring and evaluation and so on.

During the focus group discussion, it was discussed about whether TVET system has quality award or not. One of the key informants has said;

“There is no structured quality award system in TVET sector in Ethiopia in general and there is no proper quality management system in place. We want to take different experiences to establish well structured quality award system for TVET and we strongly believe that this will contribute towards enhancing quality of TVET delivery.”

The document review result has also revealed that there has not been quality award system and total quality management system in the TVET sector although there is occupational competency assessment and certification system to check whether the graduate/individual owns the required competency or not ((MOE, 2000), (MoE, 2005), (MOE, 2010), (MoE, 2015)(MoE, 2018)). According to the guidelines for model TVET institutions in Bangladesh(ILO, 2019) some criteria such as a) Governance and Management, b) Teaching and Learning, c) Faculty and Staff, d) Research and Development, e) Engagement and linkages, f) Resources (Financing) and g) Support for Students were set as quality performance indicators and helped as criteria to evaluate the performances of TVET institutions and recognize accordingly. This has helped to improve the quality of TVET institutions in Bangladesh. Some other countries around the world have also adopted their own quality performance assessment models based on their own context and theories of quality excellence models where by the Malcolm Baldrige education criteria for performance excellence model could be also mentioned (Lim et al., 2009). Quality Award system is one of total quality management exercise which is also common in manufacturing and service provision industries. Ethiopian Quality Award system is one of the initiatives of total quality management to improve the quality of products and services for ultimate competitiveness. Under the **figure 4-15**, there are the quality award assessment criteria which were to assess the performance of companies against each element of criteria.

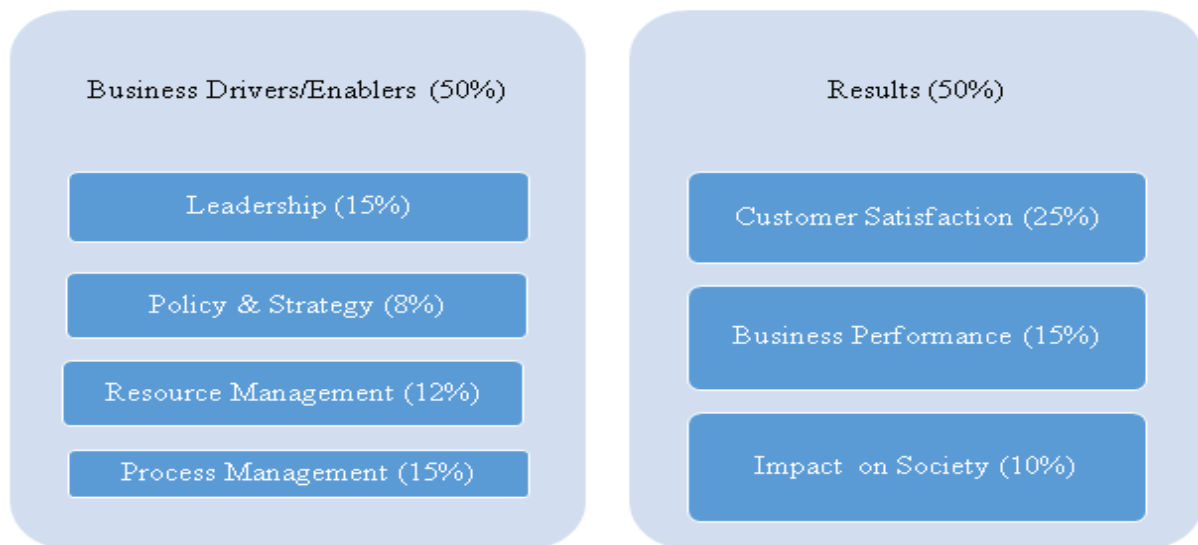


Figure 4-15: Ethiopian Quality Award Assessment Model
 Source: *ethiopianqualityaward.org*

The results of focus discussion has tended in to the concept that the Ethiopian Quality Award Assessment model could be adopted for the TVET sector quality performance assessment and Ethiopian TVET Quality Award Assessment Model could be part of the complementary model. One of the main purposes of developing national quality award is to improve the performance of the organization and hence move towards excellence (Doulatabadi & Yusof, 2018) and (Boulter et al., 2013).The existence of Ethiopian TVET Quality Award could play significant role to boost the quality of TVET delivery and also would have generally considerable contributions towards ensuring sustainability of outcome based TVET delivery to employment.

Another respondent from private sector has suggested the following for the sustainable quality improvement of TVET delivery;

“TVET delivery could not produce complete person in terms of the required knowledge, skills and attitude by a training given only in the colleges. Companies need to participate in the training process through cooperative training approach and they need to participate in developing occupational standards, curriculum, TTLM and others. Therefore, this calls the government and the private sector to work collaboratively and there should be suitable platform for that.”

The study has revealed extensively that the collaboration and coordination among the private and public partners in different areas of skilled work force development process is an important phenomenon. Without strategic partnership of the private and public partners, high quality and sustainable workforce development could not be realized. An internal quality improvement towards high quality TVET delivery should be combined with the strategic engagement of private sector so that the skilled workforce to be produced could fit the demanded workforce in the workplace. The synergy of public and private actors complimented by the total quality management system which is in this case; TVET quality award would be proper model to ensure the sustainable quality improvement of outcome based TVET delivery. Therefore, the three complimentary models were 1) Strategic Private Sector Engagement (PSE) model, 2) TVET Delivery Internal process quality Improvement Model and 3) Ethiopian TVET Quality Award Assessment Model.

CHAPTER FIVE

5. MODEL DEVELOPMENT

5.1. Introduction

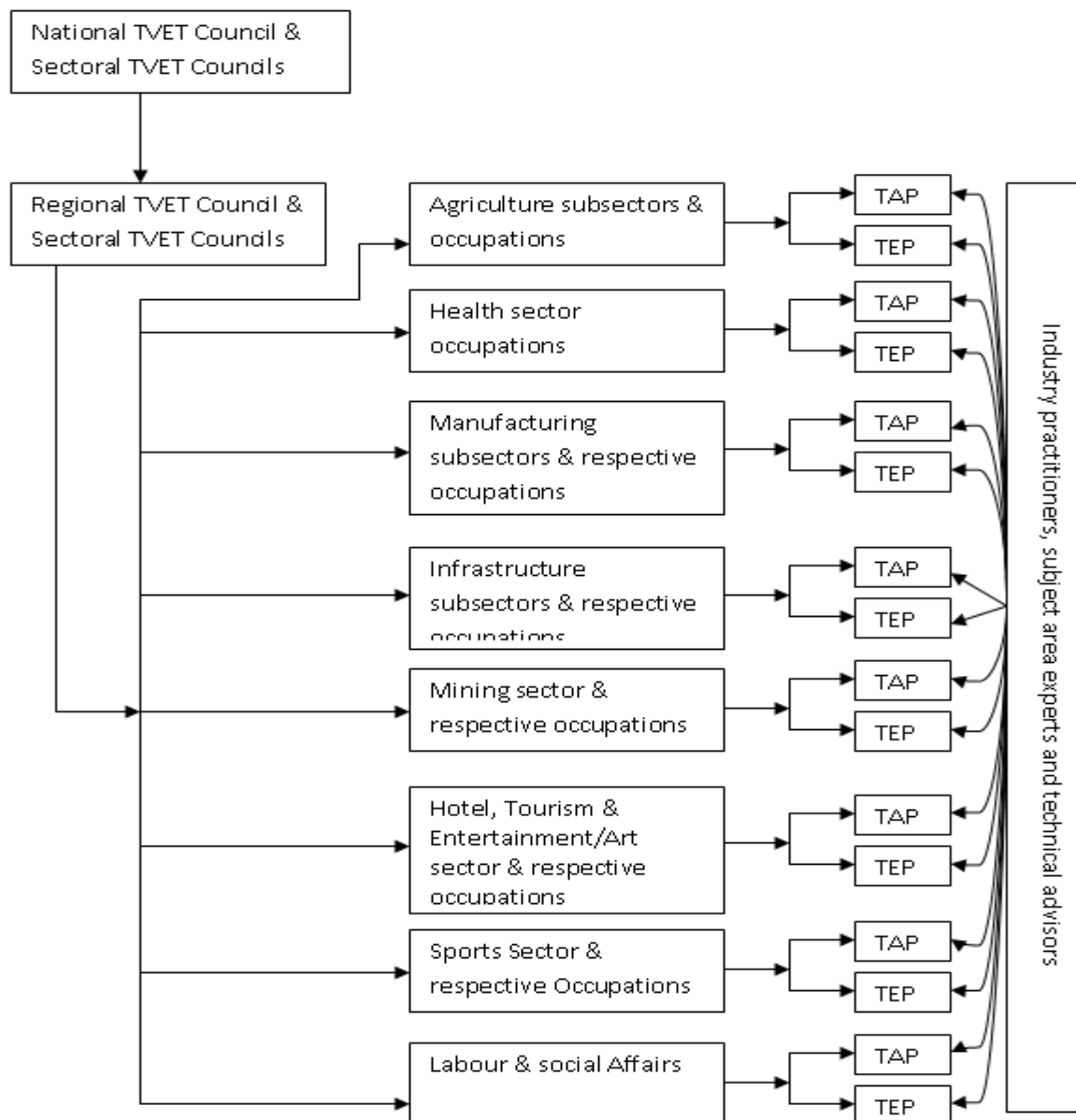
Sustainable quality improvement model for outcome based TVET delivery has been one of the missing element in Ethiopian TVET system. There has not been well defined model whereby key players of quality and relevance of skills development could be brought together in a meaningful and strategic pattern of engagement. In fact it was not only in Ethiopian TVET system such a model has not been existent but also across the world. The model development has carried out based on the result of qualitative and quantitative was made on earlier chapter especially the juicy analysis part of quality challenges. The solutions which were presented to the respective quality challenges in chapter four could be said short term, mid-term and long-term solutions; however, there should be even more future oriented and sustainable solution for the quality improvement of Technical and Vocational Education and Training (TVET) system. Skilled workforce development, as it is the backbone of countries' economic growth and development, has different stakeholders who usually got involved in the process of ensuring its quality and relevance. Technical and Vocational Education and Training (TVET) providers such as colleges, government regulatory bodies, private sectors such companies and organized private bodies like chambers and sectoral associations and the public at large have stakes on the skilled workforce development process unless the uninformed socio-economic and political landscape of particular country makes it sidelined. This is the case in most of developing countries including Ethiopia to some extent. The strategic combined effort of government and private sector towards high quality and relevant skills development has an inevitable role to produce high quality workforce and hence high quality citizens and this pays back for creation of healthy socio-economic and political environment in a certain country and hence result on ultimate satisfaction of citizens and government in general. Therefore, the essential point here is what kind of model/s could be designed in a way that key stakeholders could best contribute towards sustainable quality improvement of an outcome based TVET delivery system. The study has revealed that a single model could not be a solution; however, the combined effect of different models would rather have better contribution. As it could be seen from the Figures 5.1, 5.2 and 5.3, the three standalone models were first developed and these models basically function separately but the missing of a single would not make the sustainable quality improvement effort complete. Therefore, the three standalone models must work in complementary way and this is the point where the new concept of complimentary model came into existence. The complementary model, shown on Figure 4.14, has brought together all three standalone models which are mention below.

1. Strategic Private Sector Engagement Model in TVET
2. Internal Process Quality Improvement model for Outcome based TVET delivery

3. Ethiopian TVET Quality Award Assessment Model

5.2. Strategic Private Sector Engagement Model in TVET

According to the ILO (2015), the role of private sector on the process of quality and relevant skills development process is unavoidable. The quality implies the performance level of the workforce and the relevance is basically how the trade/occupation type, which the graduate pass through, fits the need of employer or world of work in general. The term “strategic” in the naming of model has implication that the model itself was premeditated and calculated at post analysis stage. The contemplation behind has been solving the challenges of lack of pattern towards meaningful engagement of private sectors such as individual companies, organized private bodies such as chambers, consortium of small and medium businesses, sectoral associations, professional and skilled crafts associations etc in the process of ultimate high quality workforce development. The study conducted by Ethiopian Chamber of Commerce and Sectoral association- ECCSA (2020) has revealed that there has not been well defined pattern of private sector engagement in technical and vocational education and training development and generally in the quality workforce development endeavor. The model has basically stood on the ILO principle of sectoral approach towards skills development, however, has also brought the concept of engaging the ad-hock and permanent technical expert panels (TEP) and technical advisory panels (TAP) in each sectors of TVET. The TAP and TEP are the smallest units who would deal with technical activities in the skills development process. The key industry representatives or representatives of respective government authority representatives & institutions and professional associations concerned about TVET development in a particular sector could constitute the sector TVET council in the model. The consortium of the Sectoral TVET Councils constitutes the Regional and Federal level TVET councils as indicated on **figure 5.1**.



Technical Advisory Panels (TAP) and Technical Expert Panels which are supposed to be established from sectors and occupations should systematically and sustainably be involved and given ownership for the continuous quality improvement of outcome based TVET delivery to employment in a way that they will work on development of occupational standards, curriculum, TTLMs, assessment tools, workshop quality assurance, program accreditations and auditing, CT implementation and other key activities in the area of skills development & employment promotion in general.

Figure 5-1: Strategic Private Sector engagement model in TVET

Source: Own

5.3. Internal Process Quality Improvement model for Outcome based TVET delivery

The current process of outcome based technical and vocational education and training delivery which basically moves all the way from occupational standard development,

curriculum and TTLM development, training provision and assessment and certification implementation has no any process quality checks being exercised. Lack of quality check at each process step has been one of contributory factor for the low quality of occupational standards, curriculums, TTLMs, trainers' performance, actual delivery of training, assessments and certification activities.

Based on the findings of the study, it could be come up with possible analysis of the challenges in a way that one of the missing points has been lack of having the process quality checks in each critical area. The quality of outcome based technical and vocational education and training provision could not be ensured without having internal process improvement which may usually include having quality assurance infrastructure like semi-independent body and the process quality improvement mechanisms.

The study has basically disclosed that unavailability of clear and consistent internal quality improvement framework across each and every process steps of technical and vocational education and training has been basic problem. As the primary data and the associated qualitative analysis has indicated to there has been a need to construct a model towards creating a framework of improving the internal quality process of outcome based TVET delivery.

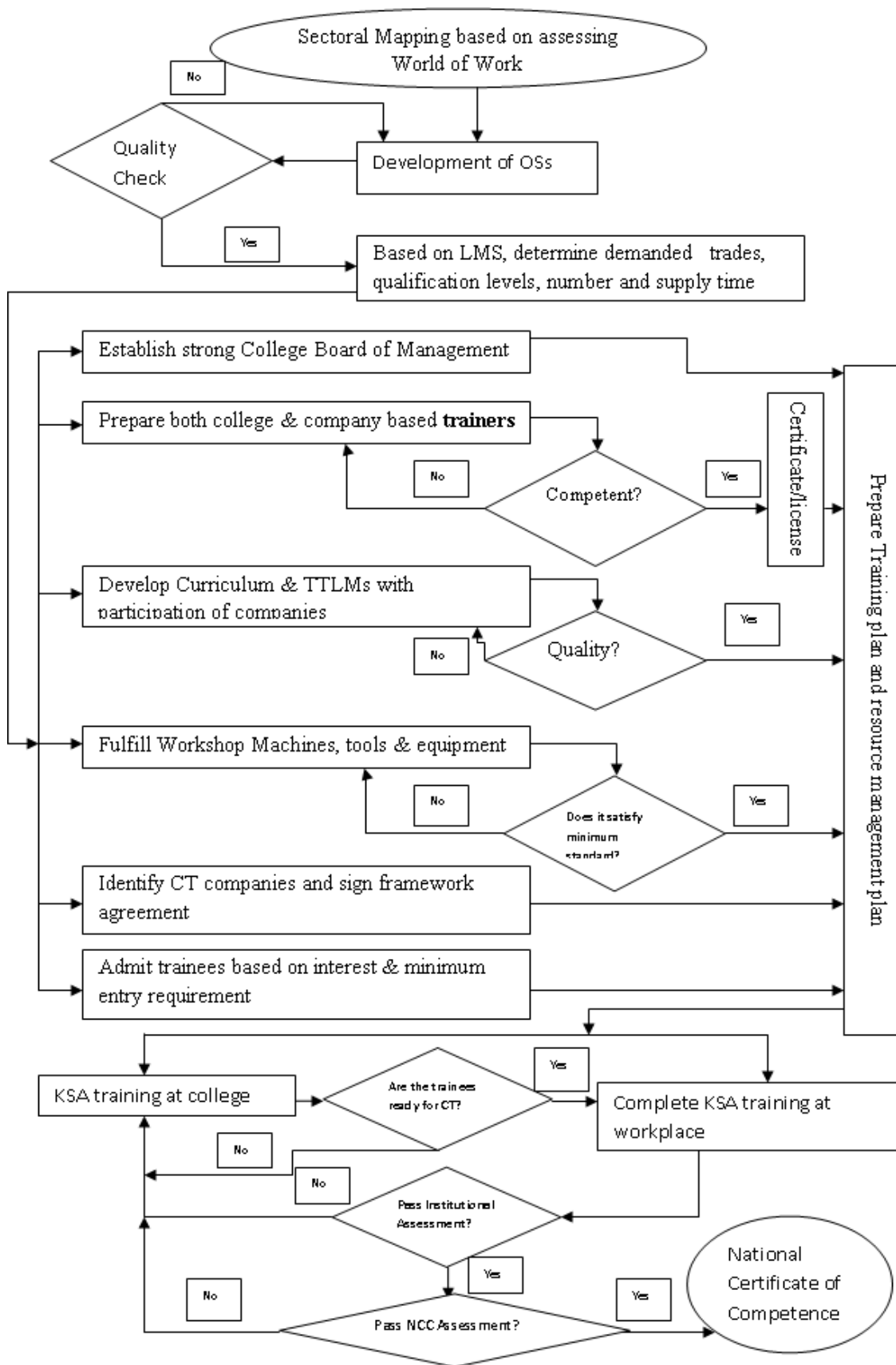


Figure 5-2: Outcome Based TVET Delivery Internal Process Quality Improvement Model
 Source: own

As it could be seen from **Figure 5.2**, the new model is designed for outcome based technical and vocational education and training provision in such a way that there would be internal process quality check points to ensure the improvement of quality. The model has been rooted to the building up approach and complements the guiding principles of TVET strategy (2008) and the recent education and training road map review (2018).

5.4. Ethiopian TVET Quality Award Assessment Model

The outcome based technical and vocational education and training delivery system always take into account demand and supply dynamics of labour market. The demand side basically represents the employers' and industries' side which could be also mentioned as world of work and the supply side represents the training providers like TVET colleges. Both the demand and supply side parties have key roles towards ensuring quality TVET delivery system. Employers or companies which have been usually called private sectors, are basically responsible for development of occupational standards, workplace training or cooperative training, assessment tool development and assessing and certifying graduates. TVET providers such as colleges are basically responsible for development of curriculum, teachers/trainers development, training/teaching material development, workshop management, basic training preparing students for workplace training. This does not mean the demand and supply sides work separately but rather both should work in a key and lock model approach where by each demand and supply side actors operate in clearly defined quality improvement models which are strategic private sector engagement model and internal process quality improvement models. However, the study has revealed that there should be also additional third model to the aforementioned two models for ensuring sustainability. As it has been discussed in chapter four, the third models comes with the concept of inducing quality award system in supply side of TVET so that it contributes for continuous quality improvement and ultimate creating excellence in TVET system. Quality award is more of motivation towards improving quality as it has intrinsic effect. To this effect, the data analysis has driven for the adoption of Ethiopian Quality Awards Assessment model for the very reason of suitability and compatibility. Besides the demand side or private sector has been basically implementing Ethiopian Quality Award Assessment model.

Therefore, the Ethiopian TVET Quality Award need to be introduced and the Ethiopian TVET Quality Award assessment model has been adopted in this study as a key complementing model towards establishing sustainable quality of outcome based technical

and vocational education and training delivery. The model is therefore illustrated on **Figure 5.3**.

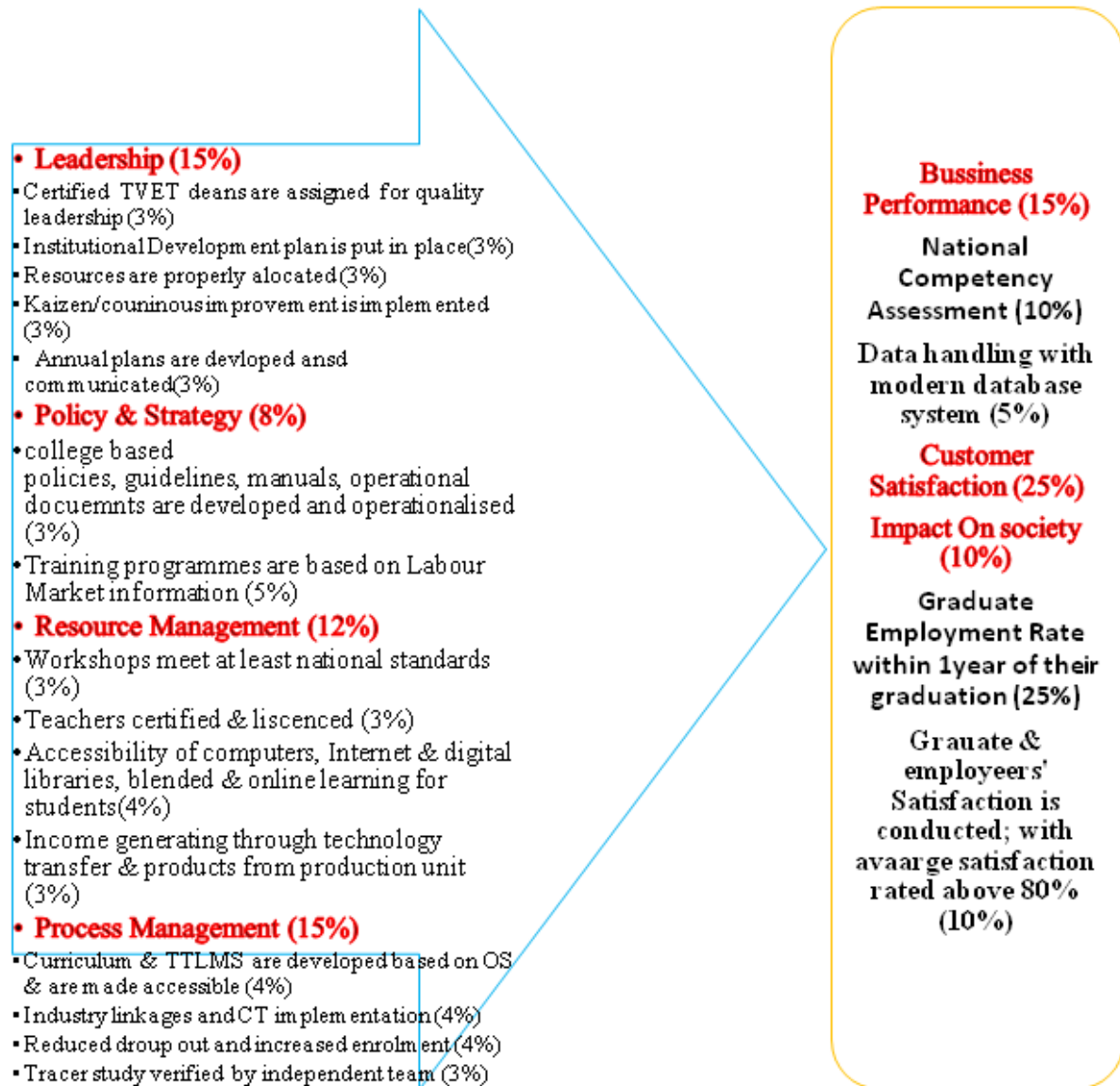


Figure 5-3: Ethiopian TVET Quality Award Assessment Model

(Source: Adopted from Ethiopian Quality Award Assessment Model)

As the summary of the models, the collaboration and coordination among the private and public partners in different areas of skilled work force development process is an important phenomenon. Without strategic partnership of the private and public partners, high quality and sustainable workforce development could not be realized. TVET delivery as supply side should be backed by the strategic engagement of private sector so that the skilled workforce

to be produced could fit the demanded workforce in the workplace. The synergy of public and private actors complimented by the total quality management award system would be proper model to ensure the sustainable quality improvement of outcome based TVET delivery. Therefore, the three complimentary models designed and introduced are; 1) Strategic Private Sector Engagement (SPSE) model 2) TVET Delivery Internal process quality Improvement model, and 3) Ethiopian TVET Quality Award Assessment Model. The model is depicted on **Figure 5-4** and it is named as complementary model. The complimentary model, which has been depicted on **figure 5.4**, was intended to put together those very essential elements for the sustainable quality improvement and the key factors that matters the success of skills development, employment promotion and hence socio-economic security and political stability for a certain country. The private sector obviously contributes a lot for the GDP of the country and it also the largest absorber of workforce. Those companies engaged in agriculture, manufacturing and service need competent work force for the purpose of their own competitiveness in the local and global markets. Without strategic involvement of private sector on skills development, the difficulty to get competent workforce is evident. However, the engagement of private sector alone would not be adequate and therefore, the TVET providers need to improve the internal operation process. This is literally dealing with internal process quality improvement. Therefore, TVET delivery internal process quality is very mandatory whereby the motivation of the internal efforts could be backed with serious assessment followed by recognitions. For Performance assessment and consecutive recognitions, there should be clearly defined and nationally aligned quality award assessment model. That is where the ETQA Award model comes in.

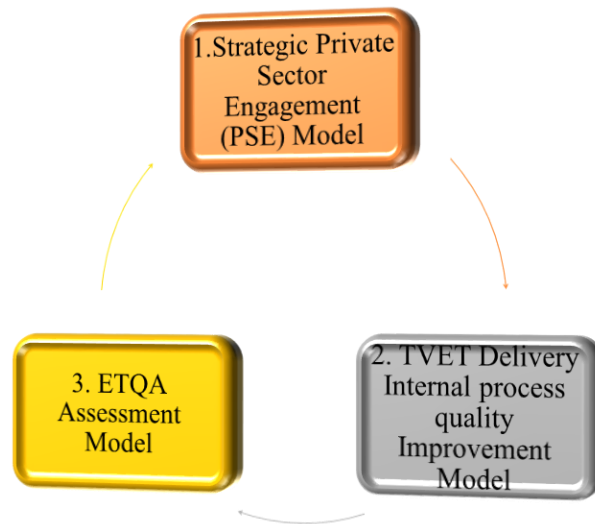


Figure 5-4: Complementary Model for Sustainable and Continuous Quality improvement of Outcome Based TVET Delivery

(Source: Own)

The implementations of ETQA assessment model would also contribute to lead the TVET development towards excellence and hence ensure ultimate objective of supplying competent workforce for the industries that has multiple positive mega impact as a result. All the models have been validated in the workshop set up where by key professionals and stakeholders have attended. The result of the validation has been quite positive towards the relevance of the models. Encouraging feedbacks have been forwarded and responsible government and private bodies were requested and advised to pilot the models in complimentary approach.

CHAPTER SIX

6. CONCLUSION AND RECOMMENDATIONS

6.1. Conclusion

The finding of the study has shown that some of the challenges have significantly affecting the quality of outcome based TVET delivery while others have relatively less impact. Using the five Likert scale nominal measurement, the data was collected from the key informants regarding their judgments on how significantly particular challenges have affected the quality of outcome based TVET delivery. The study finding has revealed that the quality challenges which have been highly affecting the outcome based TVET delivery were five major ones such as less equipped workshops, poor quality of trainers, poor quality of managers, poor quality of TTLMs and poor quality of cooperative training in sequence.

Taking the quality challenges as critical causes for the current low quality of outcome based TVET provision (graduate performance), about the 20% of the quality challenges (among 14 identified ones) are contributing for the low quality of graduates. Focusing on the key challenges and talking them would make difference rather than scattering efforts on all the potential challenges at same time. The root causes of the key five quality challenges have been thoroughly analyzed and respective solutions/mitigations were designed. The mitigation strategies have been validated by the professionals and the desk validation result has indicated that the mitigations designed have been relevant. The mitigation strategies are potentially short term and mid-term solutions. However, it has been important to develop sustainable quality improvement models. The sustainable quality models were designed based on the result of data analysis whereby strategic private sector engagement model is one of the important models. This is ultimately aiming at pulling-in the private sector on skills development and employment promotion strategically. The other models are TVET delivery internal process improvement model and Ethiopian TVET Quality Award Assessment models.

The study has revealed that the sustainable quality of outcome based TVET provision could be ensured through the complimentary effect of private sector engagement, internal TVET quality assurance and the quality award models executions. Therefore, the new model called complimentary model was introduced on top of designing three standalone models.

6.2. Recommendations

Based on the findings and the conclusion, the researcher provides the following recommendations for the policy makers, for industry managers/practitioners and implementers of TVET system so that the current challenges that are affecting the quality of outcome based TVET delivery to employment in Addis Ababa city administration and literally across the country could be sustainably mitigated.

- Primarily, it would be essential that TVET sector authority at national and regional level should focus on the top quality challenges and implement mitigation strategies which were properly suggested in the study. The study has indicated that the five top quality challenges which are affecting the outcome based TVET delivery are a) less equipped workshops, b) poor quality of trainers, c) poor quality of TVET managers, d) poor quality and/or non-availability of TTLMs and e) poor quality of cooperative training among others. We might have many more quality challenges; however, one cannot embark on all challenges at same time as resources (human, money, material, time etc) are always limited. Putting the scarce resource towards solving all challenges at same time would cause scattered effort and perhaps one would end up without achieving expected results. This has been literally noticed from the study process that lack of focus on top quality challenges and solving them one by one is not a trend. The researcher strongly recommends that the TVET authority should put the scarcely available resources towards solving top quality challenges in an efficiently manner in order to improve the quality of outcome based TVET delivery in the given context. Trying to solve all quality challenges at same time will lead to the scattered effort and no result.
- The mitigation strategies which were set in the fishbone analysis should be implemented as short term and mid-term solutions. For example, improving the efficiency of machine maintenance, increasing awareness to the government so that it considers increasing budget for TVET, improving the effectiveness and efficiency of procurement could be short term solutions for less equipped workshops as quality challenges. Whereas, enabling colleges to generate income and involvement of private sector to contribute for TVET financing through wage levy could be midterm and long term solutions respectively.
- Implementation of quality management has high effect towards improving quality of Outcome based TVET delivery and the researcher recommends the adoption of Ethiopian

Quality Award Assessment Model and development and implementation of Ethiopian TVET Quality Award Assessment Model. The research study provides an excellent input at this point.

- The internal TVET delivery process quality improvement model demands establishment of an independent quality assurance authority and it is highly recommended in this study that the government should give emphasis to establish such an organization called national TVET Quality Assurance Authority at national level. The authority would be responsible to ensure the quality control activities indicated on the TVET Delivery internal process improvement model using legal instruments to be developed accordingly.
- The complementary model implementation as sustainable and long-term solution for improving the quality of outcome based TVET delivery need to be properly taken into policy and strategy development. The study has revealed that the three models such as TVET Delivery internal process improvement model; Strategic private sector engagement model and Ethiopian TVET Quality Award Assessment Model have to be implemented complementarily. A single model alone could not ensure sustainable quality improvement of TVET delivery, however, the synergy of the three models could ensure sustainable quality improvement of outcome based TVET delivery to employment.

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APPENDIX I: Survey Questionnaires

Addis Ababa University Institute of Technology
School of Postgraduate
Department of Industrial & Mechanical Engineering

Data collection survey Questionnaires

Dear Respondent,

This data collection survey will only take 2 minutes and its aim is to gather professional views of TVET managers, practitioners, training providers, students and employers about the effect of particular quality challenges contributing to low quality of outcome based TVET delivery to employment. The data collected will help to prioritize quality challenges from high effect to low effect based on frequency of professional ratings. Prioritization is very important to focus on those quality challenges with high effect because it is difficult to solve all challenges at one time because of limited resources. Especially developing countries, like Ethiopia, need to prioritize challenges and interventions strategies via research based evidences for the very reason of resource optimization. Based on the literatures of former studies, 14 plus TVET quality challenges are identified. There are 18 questions in this survey. Questions from Q1 up to Q4 seek for basic information about respondent and questions from Q5 up to Q18 are simply quality challenges whereby i kindly request you to provide your professional judgment about its effect on the quality of outcome based TVET delivery to employment. Your honest information contributes a lot for reliability of the research result. Thank you for your kind cooperation and dedication.

1. What is your current role/status/position?

- Director/head/dean/deputy director/head/dean in Agency/Institute/Bureau/college
- Manager/head/practitioner in private sector/industry
- Trainer

- TVET Student
- Other (please specify)

2. What is your educational Level?

- TVET Level/Diploma
- Bachelors Degree
- Masters Degree
- PHD

3. Gender

- Male
- Female

4. Age

- <30
- 30-39
- 40 - 49
- >50

5. Poor (reduced) quality of occupational standard is a key challenge contributing to low quality of outcome based TVET delivery to employment.

- Strongly agree
- Agree
- Neither agrees nor disagrees

- Disagree
- Strongly disagree

6. Poor (reduced) quality of labour market information/non-availability is one of the key challenges which is contributing for low quality TVET delivery.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

7. Poor (reduced) quality of curriculum is key challenge contributing to low quality of outcome based TVET delivery to employment.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

8. Poor (reduced) quality of teaching, training and learning materials (TTLMs)/non-availability of TTLMs is key challenge contributing for low quality of outcome based TVET Delivery to employment.

- Strongly agree
- Agree

Neither agree nor disagree

Disagree

Strongly disagree

9. Poor (reduced) quality of trainers/teachers in college is a key challenge contributing to low quality of outcome based TVET delivery to employment.

Strongly agree

Agree

Neither agree nor disagree

Disagree

Strongly disagree

10. Poor (reduced) quality of company based trainers is the key challenge contributing to the low quality of outcome based TVET delivery to employment.

Strongly agree

Agree

Neither agree nor disagree

Disagree

Strongly disagree

11. Less equipped workshop (machines/tools, equipment, consumables) is the key challenge contributing to the low quality of outcome based TVET delivery to employment.

Strongly agree

Agree

Neither agree nor disagree

Disagree

Strongly disagree

12. Poor (reduced) quality of cooperative training is the key challenge contributing to the low quality of outcome based TVET delivery to employment.

Strongly agree

Agree

Neither agree nor disagree

Disagree

Strongly disagree

13. Poor (reduced) training plan is the key challenge contributing to the low quality of outcome based TVET delivery to employment.

Strongly agree

Agree

Neither agree nor disagree

Disagree

Strongly disagree

14. Poor (reduced) quality of institutional assessment of trainees is a key challenge contributing to the low quality of outcome based TVET delivery to employment.

Strongly agree

Agree

- Neither agree nor disagree
- Disagree
- Strongly disagree

15. Poor (reduced) quality of national competency assessment (CoC) is a key challenge contributing to the low quality of outcome based TVET delivery to employment.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

16. Poor (reduced) background of trainees (poor quality of general education/ before TVET) is a key challenge contributing to the low quality of outcome based TVET delivery to employment.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

17. Student admission without considering individual choices/talents is a key challenge contributing for the low quality of outcome based TVET delivery to employment.

- Strongly agree

- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

18. Poor (reduced) quality of TVET managers at different level (national/regional/college) is a key challenge contributing to the low quality of outcome based TVET delivery to employment.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

APPENDIX II: Semi-structured Interview and Focus Group Discussion Questions

Addis Ababa University Institute of Technology

School of Postgraduate

Department of Industrial & Mechanical Engineering

Semi-structured interview and Focus Group Discussion Questions

Based on first level data collection, which was survey questionnaire, the five key challenges which are most affecting the quality of outcome based TVET Delivery to employment were identified and prioritized. The semi-structured and focus group discussion is aiming at identifying the root causes of the quality challenges and design valid mitigation strategies.

| No. | Questions | Root causes | Solutions |
|-----|--|-------------|-----------|
| 1. | What could be root causes and respective solutions for poor quality of teaching, training and learning materials (TTLMs)/non-availability? | | |
| 2. | What could be root causes and respective solutions for poor quality of trainers/teachers in college? | | |
| 3. | What could be root causes and respective solutions for Less equipped workshops (machines/tools, equipment, consumables)? | | |
| 4. | What could be root causes and respective solutions for poor quality of cooperative training? | | |
| 5. | What could be root causes and respective solutions for poor quality of TVET managers at different level (national/regional/college)? | | |

APPENDIX III: Survey Questionnaires for Validation of Mitigations

Addis Ababa University Institute of Technology
 School of Postgraduate
 Department of Industrial & Mechanical Engineering

Questionnaires for Validation of Mitigations

Dear respondent,

Based on first level data collection, which is survey, the five key challenges which are most affecting the quality of outcome based TVET Delivery to employment were identified and prioritized. The semi-structured and focus group discussion was applied to conduct fish bone analysis and hence identify root causes of the five key challenges and design respective mitigations. Given the fact that the researcher has put the mitigation strategies carefully, the relevance of solutions is supposed to be validated or evaluated at desk level before actual implementation. Therefore, five Likert scale questionnaires were developed to collect the feedbacks on the relevance of mitigation strategies against the root causes of quality challenges over outcome based TVET delivery to employment. Your honest information contributes a lot for reliability of the research result. Thank you for your kind cooperation and dedication.

| No. | Root Causes | Mitigations | Scale description; 5-very relevant 4- Fairly Relevant 3- Somehow relevant 2- Not relevant 1-irrelevant | | | | |
|-------------|--|--|--|---|---|---|---|
| | | | 5 | 4 | 3 | 2 | 1 |
| 1. | less equipped workshops (lack of training machines, tools and equipment) | | | | | | |
| 1.1. | Low practice for regular auditing of machines, tools and equipment | Regular machine, tools and equipment auditing shall be made culture, task team should be organized for the auditing and reporting the status of machines | | | | | |
| 1.2. | Poor maintenance culture | Maintenance system supported by directives need be put in place. Workshop machinery maintenance should be properly exercised. Maintenance | | | | | |

| | | | | | | | |
|-------------|--|--|--|--|--|--|--|
| | | team should be established at college, regional and national level and adequate budget should be allocated | | | | | |
| 1.3. | Machines, tools and equipment are outdated and not in line with occupational standard requirements | Outdated machines need to be disposed and substituted. Machines, tools and equipments shall be in line with occupational standards and industry requirements. | | | | | |
| 1.4. | Low budget allocation | The national authority shall work on proper awareness about high returning rate of TVET investment so that the government allocates adequate budget. Colleges need to generate incomes and use it for further development. | | | | | |
| 1.5. | Less effective budget utilization in fulfilling workshop equipment | The allocated budget needs to be efficiently utilized to fulfill workshop materials. College management shall make sure timely procurements. | | | | | |
| 1.6. | Poor culture of checking functionality of machines, tools and equipments before placing purchase order and receiving from donors | Establish the team who will check machines before placing order and also who checks those which are donated | | | | | |
| 2. | poor quality of trainers | | | | | | |
| 2.1. | Lack of well established trainers' development strategy | Develop comprehensive trainers development strategic document taking into account international competitiveness | | | | | |
| 2.2. | Trainers lack actual workplace exposure and | Identify particular skill gap of trainers and provide practical training, expose | | | | | |

| | | | | | | | |
|-------------|--|---|--|--|--|--|--|
| | practical skills | trainers in the actual workplace for adequate time (trainers' externship) | | | | | |
| 2.3. | Trainers lack motivation and professional pride | Provide motivational training, provide performance based benefit packages, avoid political interventions in teacher professions, raise up trainer profession | | | | | |
| 2.4. | Trainers have shallow theoretical knowledge in subject matter | Continuously improve the curriculum of trainers | | | | | |
| 2.5. | Trainers lack methodology/ pedagogy or how to train different categories of trainees | Properly include the pedagogy course in trainers'/teachers' curriculum and apply continuous professional development strategy | | | | | |
| 2.6. | Poorly equipped workshops and low quality of ToTs | Increase the quality of trainers' training facilities and provide high quality ToTs | | | | | |
| 3. | Poor quality of Teaching, Training and Learning Materials (TTLM) | | | | | | |
| 3.1. | Highly decentralized approach of TTLM development | Identify the distinctive areas of competency (DAC) for colleges and assign TTLM development task in those occupational areas, control quality nationally/regionally | | | | | |
| 3.2. | Less emphasis given to professional level of TTLM developers | Develop minimum qualification requirement for TTLM developers | | | | | |
| 3.3. | Low budget allocation for TTLM development | Allocate adequate budget for TTLM development | | | | | |

| | | | | | | | |
|-------------|---|--|--|--|--|--|--|
| 3.4. | Low involvement of industry experts | Make sure TTLM development task team includes industry experts | | | | | |
| 3.5. | No quality assurance system in place to control quality of TTLMs | Put in place TTLM quality control and continuous improvement system | | | | | |
| 4. | Poor Quality of Cooperative Training | | | | | | |
| 4.1. | Low interest of companies <ul style="list-style-type: none"> • Low awareness about importance of CT • Low quality of basic training at college • No incentive packages | Continuous awareness creation should be given to companies about the importance of CT, quality of basic training at college should be improved and companies need to have confidence on trainee, incentives should be designed for companies based on international experience | | | | | |
| 4.2. | Lack of flexible models of CT implementation | Different models of cooperative training need to be implemented and one size fits for all should not be followed | | | | | |
| 4.3. | Almost no industry wide training centers | Initiate organized private sectors and companies to establish industry wide training centers | | | | | |
| 4.4. | Industry based trainers lack pedagogy/ how to train | Provide methodology training for company based trainers and introduce certification system | | | | | |
| 4.5. | Skills development and employment promotion is not agenda for organized private sectors and companies | The organized private sector should be informed that skills development and employment promotion should not be only task of government and should actively participate with full ownership. The structure of | | | | | |

| | | | | | | | |
|-------------|--|--|--|--|--|--|--|
| | | private sector should also consider such an important socio-economic agenda, | | | | | |
| 5. | Poor quality of TVET managers | | | | | | |
| 5.1. | TVET managers lack management knowledge, skills and commitment | Professional assessment and licensing should be introduced for TVET managers to make sure managers have possessed required competency | | | | | |
| 5.2. | Lack of properly defined qualification requirements/competencies for TVET managers | Competencies should be defined and each and every manager should own those competencies before competing for college management position | | | | | |
| 5.3. | Deployment of TVET managers is not professional and competition based | TVET managers should compete transparently to be college dean or deputy dean. The deployment should be competition based | | | | | |

APPENDIX IV: Focus Group Discussion Questions related to model design

Addis Ababa University Institute of Technology

School of Postgraduate

Department of Industrial & Mechanical Engineering

Interview Questions for TVET heads, managers, private sector managers/experts, TVET experts and Trainers

Based on first level data collection, which is survey, the five key challenges which are most affecting the quality of outcome based TVET Delivery to employment were identified and prioritized. The semi-structured and focus group discussion was aiming at identifying the root causes of the quality challenges and design relevant mitigation strategies. The second level data collection has again enabled the researcher to validate the mitigation strategies before actual implementation. The mitigation strategies are actually more of short term and midterm corrective measures for the quality challenges of outcome based TVET delivery to employment taking into account the current situation. However, one has to also think of sustainable measures. Therefore, the focus group questions are designed to collect qualitative data towards answering the question of sustainable and continuous quality improvement model for Outcome based TVET delivery to employment.

1. What are the key pillars to ensure quality of outcome based TVET delivery to employment?
2. To what extent does private sector involve on management and coordination of TVET to ensure sustainable and continuous quality improvement of TVET delivery?
3. What quality infrastructures (including TQM) exist in TVET system? Is there any independent organization in charge of institutional relevance and quality assurance?
4. Are there quality awards in TVET system? If no, how do you suggest it to be designed?