



FDRE TECHNICAL AND VOCATIONAL TRAINING INSTITUTE

FACULTY OF TVT LEADERSHIP AND MANAGEMENT

DEPARTMENT OF TVT LEADERSHIP AND MANAGEMENT

PRACTICES AND CHALLENGES OF PROJECT BASED TRAINING IN THE
CASE OF CENTRAL SIDAMA ZONE TVET COLLEGES, SIDAMA REGIONAL
STATE

BY:

DEMOZ TEFERA ZERIHUN

JUNE, 2024

ADDIS ABABA

ETHIOPIA

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A THESIS SUBMITTED TO THE DEPARTMENT OF TVT LEADERSHIP AND
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THE DEGREE OF MASTERS OF ARTS IN TVT LEADERSHIP AND
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DECLARATION

I, Demoz Tefera Zerihun, student of FDRE TVT INSTITUTE hereby declare that the thesis in the title, “PRACTICES AND CHALLENGES OF PROJECT BASED TRAINING IN THE CASE OF CENTRAL SIDAMA ZONE TVET COLLEGES, SIDAMA REGIONAL STATE”, is my original work prepared under the guidance of Bekretsion H/Silassie (PhD). All sources that have been referred to and quoted have been duly indicated and acknowledged with complete references. I further confirm that the thesis has not been submitted either in part or in full to any other higher learning institutions for the purpose of earning any degree.

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This thesis has been submitted for examination with my approval as the institute advisor.

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EXAMINATION BOARD APPROVAL

This is to certify that the Thesis prepared by Demoz Tefera Zerihun entitled “PRACTICES AND CHALLENGES OF PROJECT BASED TRAINING IN THE CASE OF CENTRAL SIDAMA ZONE TVET COLLEGES, SIDAMA REGIONAL STATE” Submitted in partial fulfillment for the Degree of Masters of Arts in TVT Leadership and Management complies with the regulations of the Institute and meets the accepted standards with respect to the originality and quality.

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LIST OF ABBRIVATION AND ACRONYMS

ANOVA	Analysis of Variance
AVU	African Virtual University
BIE	Buck Institute for Education
FDRE	Federal Democratic Republic of Ethiopia
ILO	International Labor Organization
M	Mean
NASEM	National Academies of Sciences, Engineering, and Medicine,
OECD	The Organization for Economic Co-operation and Development
PBT	Project Based Training
PBL	Project Based Learning
SPSS	Statistical Package for Social Sciences
TVET	Technical and Vocational Education and Training
UNESCO	The United Nations Educational, Scientific and Cultural Organization
VTE	Vocational Training and Education

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ABSTRACT

The purpose of this study was to investigate project-based training in TVET colleges in the case of Central Sidama Zone. For this purpose, an attempt was made to see the understanding of project-based training, the current implementation of PBT, the qualifications and skills of the trainers for PBT, and the issues that are difficult for the implementation. The direction of implementation and institutionalization of proper project-based training were suggested. Quantitative research approach, predominantly descriptive survey design was employed to conduct the study. The data was collected from two colleges selected from central sidama Zone namely: Arbegona TVET colleges and, Yirgalem Polytechnic College,. The subjects of the study were 6 deans, 9 department heads, 127 trainers, 6 curriculum coordinators, and a total of 147 respondents. Trainers and department heads were selected through simple random sampling technique while deans and curriculum coordinators were selected through purposive sampling techniques. The data gathered were organized using descriptive statistical analysis. The finding of the study revealed that the project-based training is currently not being given properly due to lack of awareness, gaps in trainer competence, inadequate capacity-building for PBT, inconsistent implementation of project-based TVET approaches, and graduates' inadequate preparation for the industrial market based on national project standards. Based on these findings, recommendations are proposed to enhance PBT effectiveness. These include raising awareness of PBT among trainers and institutional leaders, providing comprehensive training for trainers and leaders, improving collaborative planning among stakeholders, and ensuring sufficient provision and utilization of training resources and facilities. Additionally, strict monitoring and support mechanisms should be implemented for PBT in TVET colleges. In conclusion, addressing these recommendations is crucial to improve PBT provision in TVET colleges; thereby better preparing graduates to meet industry demands

Key words: Project, Project-based training, TVET.

CHAPTER ONE

INTRODUCTION

This chapter comprised of background of the study, Statement of problem, Research questions, Objectives of the study, Significance of the study, Delimitation of the study/expected, Limitation of the study/expected, Definition of key terms and organization of the study.

1.1. Background of the Study

Technical Vocational Education and Training (TVET) are gaining more attention compared to the mainstream education. TVET education is said to be able to solve many issues such as poverty, unemployment and skills in the workplace S. Chamadia and M. Shahid (2018). TVET is a form of education that provides students with the skills and knowledge that enable them to compete in the job market while also making them skilled workers in a field of specialization making TVET education increasingly popular (Jane, 2017). The current vocational education system called TVET system defined as combination of theory, practice, elements of education such as specific calculation of knowledge about certain materials, working methods and so on combined with practical training through instruction in the workshop of a training institution or practical work in an enterprise. While T (technical), in TVET appeals to be different and higher level (above higher education), V(vocational) is linked with specific practical occupations which include training and upgrading in all occupation fields of agriculture, industry, crafts and the service sector (ECBP, 2006). TVET is concerned with the acquisition of knowledge and skills for the world of work. In the past various terms have been used to describe elements of the field that are now conceived as comprising TVET. Within the TVET system the most predominate component is Project-based training is an instructional approach that immerses participants in hands-on, real-world projects to develop practical skills and apply theoretical knowledge. It emphasizes experiential learning, collaborative problem-solving, and the acquisition of competencies relevant to specific tasks or industries.

TVET plays a crucial role in equipping individuals with practical skills and competencies needed for the workforce. As emphasized by UNESCO, TVET is essential for fostering economic development, reducing unemployment, and meeting the demands of a rapidly changing job market (UNESCO, 2012). In response to the evolving nature of work, there has been a shift towards more hands-on and experiential learning approaches. PBT has gained prominence as a pedagogical strategy that immerses students in real-world projects, aligning education with industry needs (Barrows, 1986). PBT offers numerous benefits, including the development of critical thinking, problem-solving skills, and hands-on experience. Research indicates that PBT enhances student engagement and motivation, leading to a deeper understanding of concepts (Hmelo-Silver, 2004; Thomas, 2000).

One of the primary goals of TVET is to produce graduates who are readily employable. PBT facilitates the alignment of educational programs with industry demands, ensuring that students acquire skills that are directly applicable in the workplace (Brown et al., 2019). Despite the potential benefits, TVET education faces challenges, including resource constraints, varying industry requirements, and the need for continuous adaptation to technological advancements (Kerka, 1997). Understanding how PBT addresses or exacerbates these challenges is critical. International trends in TVET underscore the need for innovative approaches, with PBT gaining recognition as a best practice. Comparative studies on the implementation of PBT in TVET institutions globally provide valuable insights into effective strategies (Eichmann et al., 2016; Mulugeta & Ageze, 2019). The successful implementation of PBT depends on the preparedness of educators. Research highlights the importance of professional development for TVET instructors to effectively integrate PBT into their teaching methods (Ertmer, 2005; Walker et al., 2015). TVET colleges offer a diverse range of programs, from engineering and technology to healthcare and business. Each program may present unique challenges and opportunities for implementing PBT, necessitating a nuanced and program-specific approach to its integration. Considering the regional context, such as Sidama Regional State in Ethiopia, adds an additional layer of complexity to the study. Local cultural factors, economic conditions, and regional policies may influence the adoption and effectiveness of PBT in TVET colleges in this specific

area (Gegenfurtner et al., 2019). The study emphasizes the importance of TVET, the development of PBT as a transformative education and the unique challenges and opportunities in TVET colleges. The research aims to contribute to the ongoing discourse on effective practices in TVET and PBT, providing insights that can inform educational policies and practices.

Therefore, the study aims to fill the gap through research by exploring the special practices and challenges of project-based training in technical and vocational education and training colleges in the central Sidama zone and contribute to the literature. By examining current educational approaches in the institutions, the researcher aims to identify areas of strength and areas for improvement in the implementation of project-based training. This will help inform education policy makers, college administrators, and teachers about the effectiveness of project-based learning strategies in technical and vocational education and training colleges.

1.2 Statement of the problem

According to Choarena and Esquire (2002), public technical and vocational education and training institutions continue to attract considerable criticism. In the first place, they could not train a skilled workforce to meet the requirements of the enterprises, and they did not know the importance of continuous training. Second, they were very expensive. In many countries, including Ethiopia, government TVET institutions have not been able to adapt to the new structure of the labor market and the new skill requirements of companies in both formal and informal sectors. Implementation of project-based training at the national level as well as in technical and vocational institutions in Sidama Regional Government presents many challenges and complexities. According to a report issued by the Ethiopian Ministry of Education, one of the primary issues is the adequacy and appropriateness of infrastructure and resources to support project-based education. Many institutions do not have adequate financial support for the materials, equipment, and facilities necessary for students to participate effectively in practical projects. This inadequacy hinders the quality and scope of projects students can undertake, limiting their exposure to real-world applications and practical skill development (Ministry of Education, Ethiopia, 2021).

Moreover, the integration of PBT into the curriculum has been resisted because traditional teaching methods fall under the educational practices of Ethiopia. A study by Asmar and Teshome (2020) identified institutional inefficiency and teachers' reluctance to adopt new teaching methods as major barriers. Faculty members often lack the training and support to effectively facilitate PBT, resulting in inconsistent implementation across institutions. In addition, assessment practices prevalent in Ethiopian TVET systems prioritize theoretical knowledge over practical skills, creating a challenge to align assessment with PBT objectives (Asmara and Teshome, 2020). At the sidama regional level, faced additional challenges related to the local situation. A policy analysis by Sidama Regional Government (2023) found that issues such as regional economic disparities and uneven provision of educational resources exacerbated the difficulties in implementing equitable PBT initiatives.

The researcher has been working in TVET colleges in Central Sidama Zone for the past eight years, and the researcher's initial data shows that there are various challenges in implementing project-based training in technical and vocational education and training institutions in the region. In addition, no research has been done to solve the issues affecting project-based training activities in the area where the study was conducted. In the research area, some of the factors that have influenced the implementation of project-based training activities are: Inconsistency of teaching methods, lack of support and supervision, and limited materials and resources. Infrastructural problems, technological problems and general lack of competence and competitiveness of trainees in project implementation in the industry are general and not supported by sufficient data. Therefore, more research is needed on the factors affecting the implementation of project-based training in order to fill the knowledge gap in colleges in these study areas. Thus, the researcher identified the challenges in the institutions and evaluated the opportunities that have not been used yet. The purpose of this study is to investigate the implementation project-based training and challenges to achieve the goal of the study and develop a treatment guide for the problem. Individuals or interested groups may require further research on the effective implementation of project-based training in vocational education and training

1.3 Basic Research Questions

1. What are the current practices of project-based Training at Central Sidama Zone TVET Colleges in Sidama Regional State?
2. What is the level of TVET trainers' competence and skills to deliver project-based Training in Central Sidama Zone TVET Colleges?
3. What are the major challenges exhibited in implementing project-based Training in Central Sidama Zone TVET Colleges?
4. To what extent the institutional facilities are appropriate for proper implementation of project-based Training in Central Sidama Zone TVET Colleges?

1.4 Objectives of the Research

1.4.1 General Objective

The main objective of the study was to investigate the practices and challenges associated with project-based Training in Central Sidama Zone TVET Colleges.

1.4.2 Specific Objectives

The specific objectives of the study are:

- To examine the current practices of project-based training at Central Sidama Zone TVET Colleges in Sidama Regional State.
- To explore trainers competence and skill to deliver project-based training in Central Sidama Zone TVET Colleges.
- To analyze the challenges faced by trainers in implementation project-based Training at Central Sidama Zone TVET Colleges.
- To analyze the institutional support and resources available for the facilitation of project-based Training at Central Sidama Zone TVET Colleges.

1.5 Significance of the study

Every study has its own importance or contribution to the concerned bodies. In the same way, this study was make the necessary contributions to the leaders, trainers and stakeholders of TVET colleges. By evaluating methods, it aims to increase the quality and relevance of vocational education in the region. The findings of this study was contributed to regional socio-economic development by promoting policy adjustments, curriculum

reforms and capacity building initiatives to improve the labor market readiness of graduates. In addition, this study was serve as a reference for policy makers to test the implementation of project-based training in TVET. Furthermore, it will contribute to future researchers by identifying research gaps and providing insight to conduct more detailed research on the same issue.

1.6 Delimitation of the study

This study was conducted in Central Sidama Zone TVET colleges namely: Arbegona TVET College and Yirgalem polytechnic Colleges in Sidama regional state. The study was focused on practices and challenges of project based training in Central Sidama Zone TVET Colleges. The study does not include other private TVET Colleges in the region. The research work uses descriptive research design to explain the relation and the effects of independent variables in the time frame of 2023-2024.

1.7 Limitation of the study

There were some limitations that challenged the study. Some respondents were unwilling or unable to fill out the questionnaires correctly. They were busy with their regular and careless.. The researcher used different strategies to solve the limitations and these strategies made the respondents to respond by giving more time, explaining and discussing the significance and importance of the study in an appropriate manner and using quationaries the local language to make it clear to them.

1.8 Organization of the study

The study was organized in five Chapters, Chapter one introduces the study with a background overview, statement of the problem, research questions, objectives, significance, delimitation, limitations, and definitions of key terms. Chapter two reviews the conceptual and theoretical frameworks guiding the research, alongside relevant literature on the practices and challenges of Project-Based Training, aligned with the study's objectives and variables. Chapter three outlines the research approach, design, methodology, target population, sampling methods, data collection tools, data analysis procedures, and ethical considerations. Chapter four presents quantitative data analysis and interpretation. Chapter five summarizes the study's key findings, draws conclusions

and provide actionable recommendations for stakeholders at various levels, including suggestions for future research. Appendices include reference materials and sample questions.

1.9 Operational definition of key terms

Challenges: Navigating complexities in curriculum alignment, resource allocation, and managing student engagement throughout extended project durations Bell and Federman (2020).

Project-based training (PBT) involves learning through practical projects or real-world tasks, allowing participants to develop skills and knowledge in a hands-on manner. PBT is its focus on active learning, where participants take on active roles in project planning, execution, and reflection (Thomas, 2000).

Project-based learning (PBL) is an educational approach that involves students working on a specific project or assignment for an extended period of time to gain a deep understanding of a specific subject or topic. This approach emphasizes hands-on learning, collaboration, and the application of knowledge in real-world contexts (Thomas, 2000).

TVET encompasses education, training, and skills development aimed at preparing individuals for employment, often in specific trades or technical fields (ILO and UNESCO 2012).

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2. INTRODUCTION

This chapter provides a theoretical basis and empirical data for the study by reviewing the literatures related to project based training. Concept of TVET, Principles of TVET, The Importance of Technical Education in Modern Society, Technical and Vocational Education in Africa, Technical and Vocational Education and Training in Ethiopia ,Historical Development of Project-Based Training, Challenges of Project-Based Training Implementation, Implementation of Project-Based Training (IPBT), Challenges of Project-Based Training Implementation, research gaps and conceptual framework.

2.1 Concept of TVET

Technical and Vocational Education and Training (TVET) is a comprehensive educational approach that focuses on providing individuals with the knowledge and skills necessary for specific trades, crafts, and professions. According to UNESCO (2012), TVET encompasses "education, training, and skills development activities intended to meet the changing demands of the labor market." This concept underscores the dynamic nature of TVET, aligning education with the evolving needs of industries and promoting employability. A fundamental concept within TVET is the integration of theoretical knowledge with practical skills. This integration ensures that learners not only acquire a deep understanding of the theoretical foundations of their chosen field but also develop the hands-on skills essential for effective application in real-world settings. The International Labor Organization (ILO) emphasizes this balance, stating that TVET should provide a "combination of knowledge and skill acquisition through a strong partnership between learning and doing" (ILO, 2016).

TVET aims to bridge the gap between education and the labor market by aligning its curriculum with the needs of industries. The concept of relevance is crucial, as TVET programs are designed to equip individuals with skills that are directly applicable to the demands of specific trades and professions. UNESCO (2012) highlights the importance of relevance in TVET, emphasizing that programs should "be responsive to the needs of the

economy, the labor market, and society." Flexibility and adaptability are integral concepts within TVET, reflecting the recognition that industries and technologies evolve over time. The curricula of TVET programs are designed to be flexible, allowing for adjustments to keep pace with changing industry requirements. This adaptability ensures that graduates of TVET programs remain relevant and competitive in the ever-evolving job market (European Training Foundation, 2017).

The concept of inclusivity is another cornerstone of TVET. TVET programs aim to provide equal opportunities for individuals of diverse backgrounds and abilities. The United Nations Educational, Scientific, and Cultural Organization (UNESCO) emphasizes the inclusive nature of TVET, stating that it should "reach out to all groups of learners, irrespective of their gender, age, socio-economic, ethnic, or disability status" (UNESCO, 2012). This inclusive approach contributes to the development of a skilled and diverse workforce. Quality assurance is a paramount concept in TVET, ensuring that educational and training programs meet established standards. Quality TVET programs are characterized by effective teaching methodologies, up-to-date curricula, and relevant assessments. The International Labor Organization (ILO) stresses the importance of quality in TVET, stating that it is essential for "enhancing the employability and adaptability of individuals" (ILO, 2016). Emphasizing quality assurance in TVET reinforces the credibility and effectiveness of these programs in preparing individuals for successful careers.

2.2 Vocational Training and Education

Vocational Training and Education (VTE) is a targeted form of education that equips individuals with practical skills and knowledge specifically related to a particular occupation or trade. This approach aims to prepare individuals for the workforce by providing hands-on training and relevant theoretical understanding. According to the International Labor Organization (ILO), vocational education and training are integral components of a comprehensive strategy to address the skills gap and promote employability (ILO, 2017). The concept of VTE emphasizes the development of skills that are directly applicable to the demands of the labor market. It focuses on providing learners with the competencies needed for specific professions, trades, or industries. The

European Centre for the Development of Vocational Training (Cedefop) underscores the practical nature of VTE, stating that it "aims to equip individuals with the skills required for the labor market" by combining theoretical knowledge with hands-on experience (Cedefop, 2018). One of the key principles of VTE is its responsiveness to the evolving needs of industries. Programs are designed to be flexible and adaptable, ensuring that the skills taught remain relevant in the face of technological advancements and changes in the job market. UNESCO (2012) emphasizes this responsiveness, stating that VTE should "anticipate and respond to new and changing skill requirements" to meet the dynamic demands of the global economy.

The concept of inclusivity is central to VTE, which aims to provide equal opportunities for individuals from diverse backgrounds. The Organization for Economic Co-operation and Development (OECD) emphasizes the importance of inclusivity in VTE, noting that it should be designed to address the needs of all learners, regardless of their socio-economic status or educational background (OECD, 2017). This inclusivity contributes to social equity and broadens access to skill development opportunities. Quality assurance is a crucial aspect of VTE, ensuring that training programs meet established standards and effectively prepare individuals for the workforce. The World Bank stresses the importance of quality in VTE, stating that it is essential for "improving the effectiveness and efficiency of skills development systems" (World Bank, 2019). Emphasizing quality assurance in VTE enhances the credibility and impact of vocational education and training in facilitating successful transitions from education to employment.

2.3 Technical Education

Technical education is a structured system aimed at providing recipients with the necessary knowledge and skills to continue their studies at the tertiary education level or to exercise a profession in order to be integrated into the labor market. Technical education, on the other hand, puts more emphasis on theoretical education (Ibid.). By combining the above two as Technical and Vocation Education (TVE), UNESCO and ILO (2001:17) stated that "all forms and aspects of education that are technical and vocational in nature are provided either in vocational institutions or under the authorities of the private sector or through other forms of organized education, formal or non-formal,

aiming to ensure that members of the community have access to the pathways of lifelong learning.”

2.1 Principles of TVET

The principle of technical and vocational education and training (TVET) encompasses a set of guiding principles that shape the design and delivery of vocational education programs. These principles are crucial for ensuring the relevance, quality, and effectiveness of TVET systems worldwide. One key principle is the emphasis on relevance. According to UNESCO, TVET programs should be designed to meet the needs of the labor market and industry, equipping individuals with skills that directly align with current and future job opportunities (UNESCO-UNEVOC, 2019). This principle ensures that TVET graduates are well-prepared to enter the workforce and contribute to economic development.

Another significant principle of TVET is employability. TVET programs are designed to enhance individuals' employability by equipping them with practical skills and competencies that are highly sought after by employers (International Labor Organization [ILO], 2012). This principle recognizes that technical and vocational skills are essential for individuals to secure meaningful employment and build successful careers. Partnerships represent another crucial principle in TVET. Collaboration between TVET institutions, industry, employers, and other stakeholders is vital for the successful design and delivery of TVET programs. Partnerships help ensure that TVET curricula and training methodologies are aligned with industry needs and provide learners with industry-relevant experiences such as internships and apprenticeships (ILO, 2019).

A principle that emphasizes lifelong learning is also central to TVET. TVET recognizes the importance of continuous learning and upgrading of skills throughout an individual's career to remain employable in a rapidly changing economy (European Centre for the Development of Vocational Training [Cedefop], 2019). This principle encourages individuals to engage in further training and education to stay abreast of new technologies and industry developments. Quality assurance is another key principle in TVET. In order to ensure the effectiveness and credibility of TVET programs, quality standards should be

established and adhered to. These standards encompass various aspects such as the qualifications and competency of trainers, the availability of well-equipped training facilities, and the development of industry-relevant curriculum and assessment methods (ILO, 2020).

Inclusivity is a principle that underpins TVET. To promote equal opportunities, TVET should be accessible to all individuals, regardless of their socio-economic background, gender, or disability. TVET institutions should strive to create an inclusive and supportive learning environment that addresses the diverse needs of learners and ensures their active participation (Cedefop, 2019). Flexibility is also considered a fundamental principle of TVET. Programs should be designed to be flexible, offering options such as full-time or part-time learning, flexible scheduling, and competency-based approaches that allow learners to progress at their own pace. This principle recognizes that individuals have different circumstances and learning styles and should have the flexibility to pursue TVET programs in a manner that best suits their needs (UNESCO-UNEVOC, 2019).

In conclusion, the principles of technical and vocational education and training (TVET) provide a framework for the development and implementation of effective vocational education programs. These principles, which include relevance, employability, partnerships, lifelong learning, quality assurance, inclusivity, and flexibility, aim to ensure that TVET programs equip individuals with the skills and knowledge necessary for gainful employment, promote continuous learning, and contribute to economic growth.

2.2 The Importance of Technical Education in Modern Society

Technical education plays a pivotal role in shaping the workforce and driving innovation in modern society. As the world becomes increasingly technologically advanced, the demand for individuals with specialized skills in science, technology, engineering, and mathematics (STEM) fields continues to grow. Technical education serves as a pathway for individuals to acquire the knowledge and expertise required to meet the challenges of a rapidly evolving global economy. According to the World Economic Forum, the Fourth Industrial Revolution is characterized by the integration of digital technologies, and

technical education is crucial in preparing individuals for the changing nature of work (Schwab, 2017).

Skill Development and Employability: Technical education focuses on providing practical skills and hands-on training, making graduates highly employable in various industries. A study by the National Academies of Sciences, Engineering, and Medicine emphasizes that technical education enhances problem-solving abilities and critical thinking skills, making individuals adaptable to diverse work environments (National Academies of Sciences, Engineering, and Medicine, 2017). Employers consistently seek candidates with a strong technical background, and technical education programs play a vital role in producing a skilled workforce that meets industry demands.

Innovation and Economic Growth: Technical education is a driving force behind innovation and economic growth. Research conducted by the Organization for Economic Co-operation and Development (OECD) highlights the positive correlation between a country's investment in technical education and its overall economic development. By fostering a culture of innovation and providing individuals with the necessary skills to contribute to technological advancements, technical education becomes a key factor in a nation's competitiveness on the global stage.

The increasing complexity of technology-driven industries has led to a significant skills gap in the workforce. Technical education programs are essential in bridging this gap by producing graduates with the specialized skills needed in fields such as information technology, engineering, and healthcare. A report by the U.S. Chamber of Commerce Foundation emphasizes the urgency of addressing the skills gap to ensure the continued growth of industries and to maintain global competitiveness (U.S. Chamber of Commerce Foundation, 2018). Technical education institutions play a critical role in aligning their curricula with industry needs, thus preparing students to fill the existing skills void.

Social Mobility and Inclusivity: Technical education serves as a catalyst for social mobility by providing individuals from diverse backgrounds with the opportunity to acquire valuable skills and enter high-demand professions. A report by the European Centre for the Development of Vocational Training underscores the role of technical

education in promoting social inclusion and reducing disparities in access to quality education and employment opportunities (Cedefop, 2018). By offering a practical and accessible route to employment, technical education contributes to building a more inclusive and equitable society.

2.3 Technical and Vocational Education in Africa

Technical and vocational education and training (TVET) in Africa has undergone significant development and transformation over the years. Africa's focus on TVET can be traced back to the post-independence era, when many African countries sought to address the skills gap and promote economic development (De Villiers & Maasdorp, 2018). This resulted in the expansion of TVET institutions and the diversification of vocational training programs to meet the needs of different sectors. One key milestone in the development of TVET in Africa was the adoption of the African Union's Continental Strategy for TVET in 2018. The strategy emphasized the importance of TVET in addressing youth unemployment, promoting entrepreneurship, and fostering innovation (Africa Union Commission, 2018). It called for increased investment in TVET infrastructure, curriculum development, teacher training, and partnerships with industry stakeholders.

International partnerships and initiatives have also played a significant role in shaping TVET in Africa. For instance, the African Development Bank initiated the Jobs for Youth in Africa Strategy in 2016, which aimed to equip young people with the skills needed for employment and entrepreneurship (African Development Bank Group, 2016). This strategy emphasized the importance of TVET in providing practical and job-relevant training. Efforts have also been made to improve the quality and relevance of TVET in Africa. The adoption of competency-based education and training (CBET) approaches has gained popularity. CBET focuses on equipping learners with the skills and competencies needed in the labor market (Purwaningsih et al., 2019). This shift towards competency-based approaches aims to make TVET more responsive to industry needs and enhance graduates' employability.

The integration of technology in TVET has been another significant development in Africa. The use of digital tools, e-learning platforms, and virtual simulations has expanded access to training opportunities and improved the quality of instruction. For example, the African Virtual University (AVU) provides online resources and courses in various vocational disciplines to students across Africa (AVU). Such technological advancements have addressed the challenges of limited access to quality training facilities and resources. Women's participation in TVET has also gained attention and importance in Africa. Efforts have been made to promote gender equality and encourage girls and women to pursue non-traditional vocational careers. Initiatives such as the African Women in Science and Engineering program have been established to create opportunities for women in technical fields and dismantle gender stereotypes (Dedzo & Mills, 2012). In conclusion, the development of technical and vocational education and training in Africa has been shaped by national policies, international initiatives, and the integration of technology. Efforts have been made to align TVET programs with industry needs, improve the quality of instruction, and promote gender equality. However, challenges such as limited funding, inadequate infrastructure, and negative perceptions of TVET still persist, and further investment and support are needed to fully realize the potential of TVET in Africa.

2.4 Technical and Vocational Education and Training in Ethiopia

Technical and vocational education and training (TVET) in Ethiopia has experienced significant growth and development in recent years. The Ethiopian government has prioritized the expansion and improvement of TVET programs to address youth unemployment and enhance the country's economic development (Teshome, 2018). This has led to the creation of a comprehensive TVET policy framework and the establishment of numerous TVET institutions throughout the country. One important milestone in the development of TVET in Ethiopia was the adoption of the Ethiopian TVET Strategy in 2008. The strategy aimed to restructure TVET programs, enhance the quality of training, and establish strong linkages between TVET institutions and industry (Federal Democratic Republic of Ethiopia, 2008). It laid the foundation for the expansion and transformation of TVET in the country.

The Ethiopian government has also made significant investments in TVET infrastructure and facilities. For instance, the Construction and Business Bank of Ethiopia has established a loan program specifically to support TVET institutions in expanding and upgrading their infrastructure (World Bank Group, 2018). This funding has contributed to the establishment of modern and well-equipped training centers across the country. To ensure the relevance and quality of TVET programs, Ethiopia has adopted competency-based approaches to curriculum development and instruction. Competency-based education and training (CBET) focuses on equipping learners with practical skills and knowledge that meet industry requirements (Mulugeta & Thompson, 2019). This shift towards CBET has resulted in the development of industry-driven curricula and the introduction of practical training methods.

Ethiopia has also actively sought international partnerships and support to strengthen its TVET sector. For example, the World Bank has provided technical and financial assistance to improve TVET delivery, teacher training, and the integration of entrepreneurship education (World Bank Group, 2018). International organizations such as the International Labor Organization (ILO) have also collaborated with Ethiopia to improve TVET policies and practices (ILO, 2019). Efforts have been made to promote gender equality and increase women's participation in TVET in Ethiopia. The Ethiopian government has set targets to ensure a minimum of 30% female enrollment in TVET programs (FDRE, 2012). Initiatives such as the Girls' Education Challenge have been implemented to provide support and incentives for girls to choose TVET careers (Girls' Education Challenge, 2020). These efforts aim to empower women and promote their inclusion in non-traditional vocational fields.

To enhance the quality of TVET teaching, Ethiopia has implemented teacher training and professional development programs. The Technical and Vocational Education Teacher Education and Training Strategy was developed to improve the competence and qualifications of TVET instructors (FDRE, 2011). This strategy includes the provision of continuous professional development opportunities and the development of rigorous teacher certification processes. The integration of information and communication technology (ICT) in TVET has been another important development in Ethiopia. The

Ethiopian government has made efforts to equip TVET institutions with modern ICT infrastructure and provide training for both teachers and students (Shimesema et al., 2020). This integration of ICT enhances access to learning resources, improves instruction, and prepares learners for the demands of the digital economy. To address the issue of youth unemployment, Ethiopia has focused on strengthening entrepreneurship education within TVET programs. Entrepreneurship training is embedded in the TVET curriculum, and entrepreneurship development centers have been established in various TVET institutions (Molla et al., 2021). These centers provide business development support and entrepreneurial guidance to foster youth-owned enterprises.

In conclusion, Ethiopia has made significant strides in the development of TVET, with a focus on infrastructure expansion, curriculum reform, international partnerships, gender equality, teacher training, ICT integration, and entrepreneurship education. However, challenges remain, including the need for sustained investment, alignment with industry needs, and the enhancement of employer engagement. Continued support and collaboration from the government, international agencies, and industry stakeholders will be crucial to further advancing TVET in Ethiopia.

2.5 Historical Development of Project-Based Training

Project-based training has a rich historical development spanning various fields, from education to professional development. The roots of project-based training can be traced back to educational philosopher John Dewey, who emphasized learning through hands-on experiences and problem-solving activities. Dewey's ideas, introduced in the late 19th and early 20th centuries, laid the foundation for project-based learning (PBL) by emphasizing the importance of active engagement and real-world application in the learning process (Dewey, 1910). In the early 20th century, the concept of apprenticeship emerged as a prominent form of project-based training, particularly in trades and crafts. Apprenticeships provided individuals with practical, on-the-job training under the guidance of experienced mentors. This model allowed learners to acquire skills through direct participation in real-world projects, gradually building competence and expertise over time (Grollmann & Rauner, 2006).

The mid-20th century saw the rise of project-based training in engineering and technology fields, driven by the increasing complexity of projects and the need for interdisciplinary collaboration. Organizations like NASA pioneered project-based training approaches to prepare engineers and scientists for space exploration missions. These initiatives emphasized hands-on problem-solving, teamwork, and experiential learning, mirroring the principles of project-based training (Mittman, 1990). The 1970s and 1980s witnessed a surge of interest in project-based training in the realm of business and management education. Influential management scholars such as Peter Drucker advocated for a shift from traditional lecture-based instruction to more experiential and project-based approaches. Business schools began integrating real-world projects into their curriculum, providing students with opportunities to apply theoretical knowledge in practical settings and develop critical skills such as leadership, communication, and problem-solving (Drucker, 1973). In the late 20th and early 21st centuries, advances in technology and globalization further fueled the evolution of project-based training. The emergence of digital platforms, online collaboration tools, and virtual reality simulations expanded the possibilities for immersive and interactive learning experiences. Project-based training became increasingly accessible and scalable, enabling individuals to participate in virtual projects and simulations across geographic boundaries (Thomas & Seely Brown, 2011).

Contemporary approaches to project-based training emphasize not only technical skills but also essential competencies such as creativity, adaptability, and cultural competence. Organizations recognize the value of project-based training in fostering innovation, agility, and continuous learning in today's rapidly evolving work environments. As a result, project-based training has become integral to talent development strategies across industries, from software development and engineering to healthcare and education (Barron & Darling-Hammond, 2008). Moreover, research in cognitive science and educational psychology has provided insights into the effectiveness of project-based training in promoting deep learning and long-term retention. Studies have shown that engaging learners in authentic, project-based activities enhances their motivation, metacognitive awareness, and conceptual understanding compared to passive instructional methods (Hmelo-Silver et al., 2007). Looking ahead, the future of project-based training

is likely to be shaped by ongoing technological advancements, evolving workplace dynamics, and the growing emphasis on lifelong learning. As organizations continue to prioritize skills development and workforce readiness, project-based training will remain a cornerstone of education and professional development, empowering individuals to thrive in an increasingly complex and interconnected world.

2.6 Definitions and Concepts of Project Based Training

Project-based training (PBT) is an instructional approach that centers on the completion of real-world projects to facilitate learning and skill development. In PBT, learners engage in hands-on activities that simulate authentic work experiences, allowing them to apply theoretical knowledge to practical problems and tasks. One key aspect of PBT is its focus on active learning, where participants take on active roles in project planning, execution, and reflection (Thomas, 2000). This approach contrasts with traditional lecture-based instruction, as it prioritizes experiential learning and encourages learners to take ownership of their learning journey. Central to the concept of PBT is the idea of project-based learning (PBL), which has its roots in educational theories such as constructivism and experiential learning. PBL emphasizes the importance of inquiry, collaboration, and problem-solving in the learning process (Blumenfeld et al., 1991). In PBT, projects are carefully designed to align with learning objectives and desired outcomes, providing learners with opportunities to develop both subject-specific knowledge and transferable skills such as critical thinking, communication, and teamwork.

The implementation of PBT often involves a structured framework that guides the planning, execution, and assessment of projects. For example, the Project Management Institute (PMI) outlines a set of project management processes, knowledge areas, and best practices that can be adapted for use in PBT contexts (Project Management Institute, 2017). Similarly, the Design Thinking process, popularized by IDEO and Stanford University's school, offers a human-centered approach to problem-solving that can inform the design and execution of PBT projects (Brown, 2008). In addition to its educational benefits, PBT has gained traction in professional development and workforce training initiatives. Organizations recognize the value of PBT in preparing employees for the complexities of modern workplaces, where interdisciplinary collaboration, innovation,

and adaptability are paramount (Barron & Darling-Hammond, 2008). By engaging employees in meaningful projects that mirror real-world challenges, PBT helps bridge the gap between theoretical knowledge and practical application, fostering a culture of continuous learning and improvement within organizations. As PBT continues to evolve, researchers and practitioners are exploring innovative approaches and technologies to enhance its effectiveness and scalability. For example, the integration of digital platforms, virtual reality simulations, and online collaboration tools can enrich the PBT experience by facilitating remote teamwork, immersive learning experiences, and data-driven feedback mechanisms (Thomas & Seely Brown, 2011). Moreover, the growing emphasis on lifelong learning and skill development underscores the importance of PBT as a versatile and adaptable approach to education and training in the 21st century

2.7 Implementation of Project-Based Training (IPBT)

Implementing project-based training (PBT) effectively requires careful planning, execution, and evaluation to ensure meaningful learning outcomes. One crucial aspect of implementation is the design of projects that align with learning objectives and cater to the needs and interests of participants. Projects should be authentic, challenging, and relevant to real-world contexts to engage learners and foster deep understanding (Thomas, 2000). Additionally, clear guidelines, timelines, and expectations should be established to provide structure and guidance throughout the project duration (Blumenfeld et al., 1991). A key consideration in PBT implementation is the role of facilitators or instructors who guide and support learners throughout the project process. Facilitators serve as mentors, coaches, and resources for participants, offering guidance, feedback, and scaffolding as needed (Barron & Darling-Hammond, 2008). Facilitators play a crucial role in fostering collaboration, problem-solving, and reflective thinking among participants, creating a supportive learning environment conducive to growth and development.

Moreover, the integration of technology can enhance the implementation of PBT by providing tools and resources to support project planning, communication, and collaboration. Digital platforms, online forums, and project management software can facilitate virtual teamwork, document sharing, and feedback exchange, enabling participants to engage in projects regardless of geographic location (Thomas & Seely

Brown, 2011). Additionally, multimedia resources, simulations, and interactive learning modules can enrich the PBT experience by providing immersive and interactive learning opportunities (Brown, 2008). Assessment and evaluation are essential components of PBT implementation, allowing educators and trainers to measure learning outcomes, identify areas for improvement, and provide feedback to participants. Assessment in PBT often takes the form of authentic, performance-based tasks that require learners to demonstrate their knowledge, skills, and competencies in real-world contexts (Grollmann & Rauner, 2006). Rubrics, portfolios, and peer evaluations are commonly used to assess individual and group performance, providing multiple sources of feedback and reflection. Furthermore, fostering a culture of collaboration, inquiry, and reflection is crucial for successful PBT implementation. Participants should be encouraged to work together, share ideas, and learn from each other's experiences throughout the project process (Dewey, 1910). Reflection activities, such as journaling, group discussions, and debriefing sessions, can help learners make connections between theory and practice, identify strengths and areas for growth, and deepen their understanding of key concepts (Hmelo-Silver et al., 2007).

To ensure sustainability and scalability, PBT implementation should be supported by institutional buy-in, adequate resources, and ongoing professional development for facilitators and participants. Organizations should invest in training and support systems to build capacity, foster innovation, and continuously improve PBT practices (Project Management Institute, 2017). Additionally, partnerships with industry stakeholders, community organizations, and educational institutions can provide opportunities for authentic project experiences, mentorship, and real-world application of skills (Mittman, 1990). In conclusion, effective implementation of project-based training requires careful planning, support, and evaluation to create meaningful learning experiences and achieve desired outcomes. By integrating authentic projects, supportive facilitation, technology-enhanced learning environments, and robust assessment practices, organizations can harness the power of PBT to develop skills, foster innovation, and empower learners to succeed in today's dynamic and interconnected world.

2.8 Challenges of Project-Based Training Implementation

Implementing project-based training comes with several challenges that training organizers and facilitators must address to ensure its success. One significant challenge lies in resource allocation and management. According to various scholars and educational researchers, these challenges encompass logistical, pedagogical, and organizational dimensions. One prominent challenge is the alignment of projects with learning objectives and curriculum standards. As noted by Thomas and Sitzmann (2022), "Ensuring that projects are aligned with curriculum goals and standards can be complex, requiring careful planning and coordination among educators and stakeholders." This alignment ensures that projects not only engage learners but also contribute meaningfully to their educational outcomes. According to Bell and Federman (2020), "Managing resources effectively, including time, materials, and personnel, is critical for the successful implementation of project-based training." This challenge involves ensuring that adequate resources are available to support the project's scope and complexity, which can vary widely depending on the project's scale and objectives. Effective resource management helps mitigate potential delays and ensures that projects remain on track.

Another significant challenge, project-based training often requires a shift in instructional practices and pedagogical approaches, which can be challenging for both facilitators and participants accustomed to traditional teaching methods. Facilitators may need training and support to effectively guide participants through project-based learning experiences, while participants may initially struggle with the autonomy and responsibility inherent in self-directed learning. Moreover, challenge with the assessment and evaluation of project-based training outcomes. According to Hung, Jonassen, and Liu (2019), "Designing authentic assessments that accurately measure students' understanding and skills developed through project work can be complex." Unlike traditional assessments, which may focus on memorization or standardized tests, assessing project-based learning requires evaluating students' ability to apply knowledge, solve problems, and communicate findings effectively. Additionally, logistical challenges, such as scheduling conflicts, access to appropriate facilities, and coordination among stakeholders, can hinder the implementation of project-based training initiatives. Balancing the diverse needs and

priorities of participants, facilitators, administrators, and other stakeholders requires effective communication, planning, and collaboration to ensure smooth execution of training activities. Finally, sustaining momentum and enthusiasm throughout the project duration is a persistent challenge. As highlighted by Helle et al. (2018), "Maintaining student motivation and engagement over an extended period can be difficult, especially when projects encounter obstacles or delays." Educators must continuously support and encourage students, provide timely feedback, and facilitate reflection to sustain interest and commitment to the project goals.

In conclusion, implementing project-based training involves navigating various challenges related to curriculum alignment, resource management, teamwork dynamics, assessment practices, and maintaining student engagement. Addressing these challenges requires a proactive and collaborative approach from all stakeholders involved in project-based training initiatives. By recognizing and addressing potential barriers upfront, training organizers and facilitators can enhance the effectiveness and impact of project-based learning experiences

2.9 Empirical Research Overview

Empirical research on project-based training spans various disciplines, including education, vocational training, psychology, and organizational development. This overview highlights key findings and insights from empirical studies that investigate the effectiveness, benefits, challenges, and best practices associated with project-based training. Numerous studies have demonstrated the effectiveness of project-based training in promoting deep learning, critical thinking, and problem-solving skills. For example, Blumenfeld et al. (1991) found that project-based learning enhances motivation and engagement among learners, leading to greater understanding and retention of content. Project-based training has been shown to facilitate the development of both technical and soft skills essential for success in various professions. Research by Krajcik et al. (1998) suggests that project-based science classrooms promote inquiry skills, collaboration, and scientific reasoning among students.

One of the key advantages of project-based training is its emphasis on real-world application and relevance. Participants engage in authentic tasks and projects that mirror challenges they may encounter in their future careers. This authenticity fosters intrinsic motivation and a deeper understanding of concepts (Thomas, 2000). Project-based training often results in better retention and transfer of knowledge compared to traditional lecture-based instruction. Participants are more likely to remember and apply what they have learned when it is embedded within the context of a meaningful project (Hmelo-Silver et al., 2007). Despite its benefits, implementing project-based training can pose several challenges. Limited resources, time constraints, and the need for specialized expertise are common barriers faced by training organizers and facilitators (Walker et al., 2012). Assessing the effectiveness of project-based training and evaluating participants' learning outcomes can be challenging. Traditional assessment methods may not capture the full range of skills developed through project-based learning, necessitating the development of alternative assessment strategies (Lee et al., 2014). The role of facilitators is crucial in project-based training. Facilitators must provide guidance, support, and feedback to participants throughout the learning process. Effective facilitation techniques promote collaboration, reflection, and metacognitive skills development (Walker et al., 2015). Creating an optimal learning environment is essential for the success of project-based training initiatives. Flexible spaces, access to relevant resources and technologies, and opportunities for collaboration and experimentation contribute to a positive learning experience (Thomas, 2000).

Research suggests that project-based training enhances motivation and engagement among participants. By giving learners autonomy and ownership over their projects, project-based training fosters a sense of responsibility and investment in learning outcomes (Strobel & van Barneveld, 2009). Continuous evaluation and refinement are essential for the ongoing success of project-based training programs. Training organizers should gather feedback from participants and stakeholders, identify areas for improvement, and make necessary adjustments to enhance the quality and effectiveness of future training initiatives (Thomas, 2000). This overview provides a glimpse into the rich body of empirical research on project-based training, highlighting its benefits, challenges, and implications for educational practice and workforce development.

Many studies have argued that TVET in the Nigerian HE system lacks focus and quality due to low-quality teaching and learning practices. TVET would fail to generate qualified skilled workers, necessitating industries to invest in in-house training or take the risk of hiring unskilled workers, liable for producing low-quality products.” UNESCO-UNEVOC (2012: 7). The British Council of Nigeria (2010) expressed concerns about the ability of Nigeria’s HE institutions to produce quality and skilled graduates due to low-quality teaching and that the crisis in the job market will worsen as growing numbers of unskilled HE graduates enter the labor market. Many researchers have found that the majority of TVET graduates are not employable and do not possess the competence to be gainful or self-employed. While many scholars have blamed this challenge on the academic system inherited from the colonial master, others have blamed the TVET curriculum, the teachers’ quality, and the methods of TVET delivery in Nigerian HE institutions. To address the low skills acquisition and incompetence of TVET graduates, which have attracted the attention of employers and the government in Nigeria, this study argues that better TVET teaching methods that allow deep learning and specific skills mastery are imperative. It proposes the implementation of a problem-based learning approach in TVET delivery in the Nigerian HE system to improve graduate outcomes.

It looks at real-world challenges. Consistent with Telez Lazo (2005); to implement PBL as a teaching method, different phases need to be considered. First phase: identification of the problem or driving question. The problem can never be imposed by the teacher. The students are free to choose the problem to be investigated, but it must be in accordance with the core curriculum elements and the needs of the school and the company in which it was implemented. Second phase: analysis of human and material resources. It is important to analyze the availability of material resources to complete the project as well as the class in terms of diversity (intelligences, learning styles, and economic, educational, and cultural backgrounds).

While observing the vocational lack of training materials and equipment, the lack of training facilities, trainer’s skills, and attitude that are vital for effective teaching and learning, The inadequacy of these facilities is due to inadequate finances in the institutions. Inadequate finances, in turn, shrink the budgets for procuring up-to-date tools

and equipment, repairing old equipment, and developing training materials. First and foremost, quality education hinges on physical facilities, which are the ultimate predictors of students' academic achievements. Indeed, several studies show that the inadequacy of infrastructure, facilities, and equipment affects curriculum implementation in TVET institutions. Furthermore, reliance on obsolete equipment compromises the effective training of youth for a modern economy (UNESCO, 2010).

While vocational schools lack materials, equipment, and facilities that are vital for effective teaching and learning, link the inadequacy of these facilities to inadequate finances in the institutions. Inadequate finances, in turn, shrink the budgets for procuring up-to-date tools and equipment, repairing old equipment, and developing training materials (Sharma, 2008). Project-based learning (PBL) has gained popularity in educational research and practice as an instructional strategy that encourages active, experiential learning. While there has been considerable research on the benefits and outcomes of PBL, several gaps remain, indicating avenues for further investigation and exploration.

Much research on TVET colleges have increasingly adopted project-based training as a pedagogical approach to bridge the gap between theory and practice in technical education (Smith & Casey, 2019). Projects offer students hands-on learning experiences, fostering critical thinking, problem-solving skills, and teamwork, which are essential for success in the modern workforce (Brown & Green, 2020). However, despite its potential benefits, the implementation of project-based training in TVET colleges is not without challenges. This paper explores the prevailing practices, effectiveness, and challenges of project-based training in the TVET context. Project-based training in TVET colleges encompasses various practices, including project selection, design, implementation, and evaluation. Educators often engage students in real-world projects relevant to their field of study, allowing them to apply theoretical knowledge to practical scenarios (Boud & Feletti, 2019). Projects may range from building prototypes to solving industry-specific problems, providing students with authentic learning experiences (Thomas, 2018). Moreover, project-based training encourages collaboration between students, industry partners, and instructors, facilitating knowledge transfer and skill development (Lee et al.,

2020). Empirical evidence suggests that project-based training yields positive outcomes in TVET colleges. Research by Johnson et al. (2021) found that students engaged in project-based learning demonstrated higher levels of motivation, engagement, and skill acquisition compared to those in traditional classroom settings. Furthermore, projects enable students to develop soft skills such as communication, leadership, and time management, enhancing their employability (Kolmos et al., 2017). Employers value graduates with hands-on experience gained through project-based training, increasing their likelihood of securing job opportunities (Wang & Wang, 2020). Despite its advantages, project-based training faces several challenges in TVET colleges. One major hurdle is the lack of resources, including funding, equipment, and facilities, necessary for implementing complex projects (Häggström, 2019). Additionally, coordinating projects with industry partners and aligning them with curriculum requirements can be time-consuming and logistically challenging (Kolmos et al., 2017). Moreover, assessing students' performance in project-based training poses difficulties due to the subjective nature of evaluation criteria and the need for authentic assessment methods (Hansen et al., 2020). To address the challenges associated with project-based training, TVET colleges can implement various pedagogical strategies. Collaborating with industry partners can provide access to resources, expertise, and real-world projects, enriching students' learning experiences (Boud & Feletti, 2019). Furthermore, integrating project-based training into the curriculum and providing professional development opportunities for instructors can enhance the quality and effectiveness of projects (Thomas, 2018). Employing authentic assessment methods such as portfolios, presentations, and peer evaluations can ensure fair and comprehensive evaluation of students' learning outcomes (Lee et al., 2020). In conclusion, project-based training holds promise for enhancing student learning outcomes and preparing graduates for the demands of the modern workforce in TVET colleges. However, its successful implementation requires addressing various challenges related to resource constraints, curriculum alignment, and assessment practices. By adopting pedagogical strategies that promote collaboration, innovation, and authentic learning experiences, TVET colleges can optimize project-based training and better equip students with the skills needed for success in their chosen fields.

2.10 Research Gaps

Project-based training (PBT) has gained recognition in Technical and Vocational Education and Training (TVET) colleges as an effective method to bridge the gap between theoretical learning and practical skills acquisition (UNESCO, 2017). While numerous studies have explored the benefits of PBT in enhancing student engagement and skill development (Smith & Johnson, 2019; Brown et al., 2020), there remains a significant gap in understanding the specific practices and challenges associated with its implementation within the context of TVET colleges. Existing literature predominantly focuses on PBT in higher education or industry settings, neglecting the unique institutional characteristics and educational goals of TVET colleges (Jones, 2018). Furthermore, the few studies that do exist often lack depth in examining how PBT aligns with the diverse vocational programs offered in TVET colleges, which cater to a wide range of skill development needs (OECD, 2020). Therefore, there is a pressing need for research that delves into the nuanced practices of PBT within TVET colleges, exploring how these institutions integrate project-based approaches into curricula tailored to the demands of vocational training.

Moreover, while some studies touch upon the challenges of implementing PBT, such as resource constraints and faculty readiness (Anderson, 2019; Wang & Li, 2021), there is limited empirical evidence regarding the specific barriers faced within TVET colleges. These institutions often contend with unique challenges such as maintaining industry relevance, balancing academic rigor with practical skills training, and navigating accreditation requirements (UNEVOC, 2022). Understanding these challenges is crucial for developing targeted strategies that can enhance the effectiveness of PBT in TVET settings (UNESCO-UNEVOC, 2019). Additionally, the existing literature lacks comprehensive studies that explore how different contextual factors, such as regional economic dynamics or technological advancements, influence the implementation and outcomes of PBT in diverse TVET environments (Jones & Smith, 2023). Therefore, by addressing these research gaps, future studies can contribute to the development of evidence-based practices that optimize the integration of project-based training in TVET

colleges, thereby enriching the educational experiences and employability outcomes of vocational students globally.

2.11 Conceptual Framework

Conceptual Framework Based on the research questions, literature, and presumed relationship between practice and challenges implementation project-based training facing trainers in practical skills acquisition, the conceptual framework underlines independent and dependent variables as indicated below

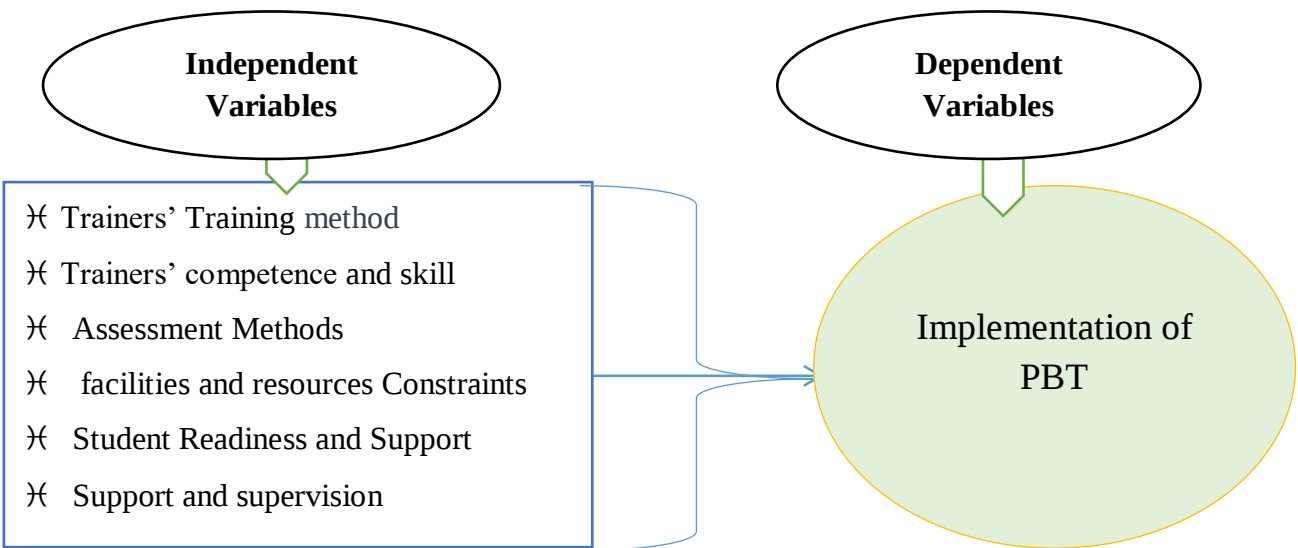


Figure 2.1. Conceptual Framework

Source: Compiled by Researcher Own survey 2024

CHAPTER THREE

METHODOLOGY

3. INTRODUCTION

This chapter outlines the methodology on how data and information relevant to the research were gathered and analyzed in order to achieve the objectives of the study. It discusses the description of study procedures and the methods employed in the study. Essential points of the study covered in this chapter include the research approach and design, sampling and sampling techniques, population and sampling procedures, sources of data, instruments of data collection, methods of data analysis, validation of the questionnaire, its reliability and ethical consideration.

3.1. Research Approach

To conduct the study the researcher was used quantitative approach through collecting and analyzing data. Bryman (2012) defined quantitative research as, “A research strategy that emphasizes quantification in the collection and analysis of data...” It means quantitative research denotes amounting something. Quantitative approach (normally using deductive logic) seek regularities in human lives, by separating the social world into empirical components called variables which can be represented numerically as frequencies or rate, whose associations with each other can be explored by statistical techniques, and accessed through researcher-introduced stimuli and systematic measurement. For this reason the researcher was used quantitative method is more preferred to qualitative one.

3.2. Research Design

The study was employed descriptive survey research design was used in this study. This descriptive survey research design allowed the researcher to gather data about respondents' perceptions, belief, opinions, and scores and out comes (Creswell, 2003) such design will also be used to obtain general overview of the subject and to generalize study findings from sample population. Moreover, descriptive survey research design makes possible the prediction of the future based on findings on the prevailing conditions. According to Creswell (2003), descriptive survey research design gives a better and deeper understanding of a phenomenon, which helps as a fact-finding method with

adequate and accurate interpretation of the findings. This approach is valued for its straightforwardness and ability to provide comprehensive insights into the challenges and experiences of implementing project-based training. Descriptive survey design is widely recognized as the most popular research design in this field, as it efficiently gathers data from a large number of respondents at a specific point in time. In this regard, Kumar (2007) describes that descriptive design is important to gather data from large number of respondents at a particular time.

3.3. Research Population

For the purpose of this study, the target population of the study includes trainers and heads of departments from various occupations and experience, deans and curriculum coordinators from Central Sidama Zone TVET colleges. The first is to capture broad perspectives on the implementation of project-based Training. This helps to understand how different professions and different levels of teaching experience influence practices and challenges. Secondly, to understand organizational support, implementation challenges, and strategic initiatives related to project-based training. These selected TVET colleges Arbegona TVET College and Yirgalem polytechnic college. The total population of the study was used according to their annual report there were 57 trainers, 7 department heads, 2 curriculum coordinators, and 3 deans at Arbegona TVET College and 136 trainers, 8 department heads, 4 curriculum coordinators, and 3 deans at Yirgalem polytechnic college and the total population of the study were 193 trainers, 15 department heads, 6 curriculum coordinators, and 6 deans.

3.4. Sampling and Sampling Techniques

3.4.1. Sampling Techniques

In order to select samples from target population, the researcher was used to simple random sampling for trainers and department heads, while purposive sampling was used for deans and curriculum coordinators. Simple random sampling is a fundamental sampling technique where each element in the population has an equal probability of being selected into the sample.

According to Gravetter and Forzano (2020), Simple random sampling ensures that each member of the population has an equal chance of being selected, providing a fair and

unbiased representation of the population. This method does not require any prior categorization or arrangement of the population elements. It ensures that every individual or item in the population has an equal chance of being chosen, making it unbiased and representative when properly executed.

3.4.2. Sample Size

The study focus on the project based training practice and challenges in the case of Central Sidama Zone TVET Colleges namely; Arbegona TVET College and Yirgalem Polytechnic College was purposively selected, Because there are only two government TVET Colleges in the Zone.

The total population of the study was used according to their annual report of the respected Colleges there were 57 trainers, 7 department heads, 2 curriculum coordinators, and 3 deans at Arbegona TVET College and 136 trainers, 8 department heads, 4 curriculum coordinators, and 3 deans at Yirgalem Polytechnic college, the total population of the study were 193 trainers, 15 department heads, 6 curriculum coordinators, and 6 deans.

Accordingly, the method used with Yamane (1967) scientific formula, as cited by Taye 2014, by considering $\pm 5\%$ level of error. The study was used by the following formula to calculate sample size.

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

The following steps have been used to determine sample size derived from the above formula to collect quantitative data using questionnaire;

Where: - n=designates the sample size the research uses;

N= designates total number of Staffs

e =designates maximum variability or margin of error 5 % (.05)

1=designates the probability of the event occurring

$$\begin{aligned} \text{Therefore;} \quad n &= \frac{N}{1+N(e)^2} \\ &= \frac{208}{1 + 208 (0.05)^2} = 136.8 = \mathbf{137} \end{aligned}$$

Having this sample, the researcher is drive possible samples from each of two colleges those were part of the study. So the sample from each college was selected with simple random sampling technique.

$$n_{k1} = \frac{N_{K1}}{N} X n$$

$$n_{k1 \text{ Trainers}} = \frac{57}{208} \times 137 = \mathbf{38} \quad n_{k1 \text{ Dep.Haeads}} = \frac{7}{208} \times 137 = \mathbf{4}$$

$$n_{k2 \text{ Trainers}} = \frac{136}{208} \times 137 = \mathbf{90} \quad n_{k1 \text{ Dep.Haeads}} = \frac{8}{208} \times 137 = \mathbf{5}$$

Table 3.1: proportionality table

No	Colleges Name	Sampling population	Total Population	Proportion %	Sample size	Method of sampling Techniques
1	Arbegona TVET college	Trainers	57	27.8	38	Simple random sampling techniques
		Department Heads	7	2.9	4	
2	Yirgalem polytechnic college	Trainers	136	65.7	90	
		Department Heads	8	3.6	5	
Total			208	100.0	137	
1	Arbegona TVET college	Deans	3	100	3	Purposive sampling
		Curriculum Coordinators	2	100	2	
2		Deans	3	100	3	
		Curriculum Coordinators	4	100	4	
Total			12	100	12	

Source: Selected Colleges annual report (2024)

3.5. Source of Data

Both primary and secondary sources of data were consulted in the study.

❖ Primary data:

Primary data was collected from TVET deans, trainers, curriculum coordinators, and heads of departments through survey questionnaire, and observation checklist. The study applied a well-designed five point Likert response scale developed by (Lokesh,2014,Lise and Gilbert, 2003, Knebel,2008) that includes strongly disagree (1), disagree (2), neutral (3), agree (4) and strongly agree (5) to encourage participation.

❖ Secondary data:

Researcher attempted to information about dependent and independent variables, study related from different manuals and written document, such as curriculum guidelines, assessment frameworks, and policy documents. Additionally variety of books, websites, reports and newsletters were reviewed to make this study reliable

3.6. Data collection instruments

Based on the degree of predetermined nature of the research questions different data gathering tools was selected. Therefore, the researcher was utilized four different data gathering tools for the purpose of this study. These was included a questionnaire, observations, and document reviews.

3.6.1. Questionnaires

This study was used questionnaire to collect data from deans, trainers, curriculum coordinators and department heads. Questionnaire was used as data collection tool because it enables to secure factual information about opinions and views and also appropriate instrument to obtain variety of opinion as within a relatively short period of time (Best & Khan, 2003). The close ended items was formulated in five point ratings scale use strongly disagree=1, Disagree=2, Undecided=3 , Agree=4,and Strongly agree=5). Close ended item provides greater uniformity of response and allowed reaching many people scattered in wider area and the fact it is easy to process (Kothari, 2004). In addition, open-ended items were provided for the respondents to freely express their

ideas. The questionnaires had two categories: the respondents' personal characteristics and items relevant to the issue under investigation. The researcher computed the quantitative data using mean item scores ranging from 1.0-5.0, with higher scores indicating high response score and lower scores indicating low response of the respondents.

3.6.2. Document Analysis

Examining relevant institutional documents, curriculum materials, and educational policies can provide contextual information. This source of data helps to understand the formal structures and guidelines that may influence the practices and implementation of project-based training in TVET. It contributes to a broader understanding of the educational context.

3.6.3. Observation

Since it is important to secure additional facts through observation at the respective sites, an observation checklist comprising points regarding the staffing, equipment, facilities, services, and the training process is prepared and employed. This is used to further strengthen the information collected through means of other data gathering instruments. To achieve the objectives of data collection the researcher is arranged convenient time & place for the respondents.

3.7. Pilot Test

The pilot test was conducted to secure the validity and the reliability of the instruments with the objectives of checking whether or not the items included in the instrument can enable the researcher to gather relevant information, besides the purpose of pilot testing was made necessary amendment so as to correct confusing and ambiguous questions. The result of pilot testing is statistically computed by the SPSS computer program version 24. To ensure the face validity senior colleagues and experienced advisors of technical and vocational training institute was personally consulted to provide their remark. The participants of the pilot test was also taken as first hand informed about how to evaluate and give feedback on the relevance of the contents item length clarity of items and layout of the questionnaire.

Based on the reflections the instruments was improved before they are administered to the main participants of the study so that irrelevant was removed lengthy items was shorten and unclear items was made clear, rating adjusted strongly disagree-strongly agree to very low-to very high. To increase the reliability of the data to be collect the researcher employ test-retest technique in which the instrument of research was administer twice to 10% of the respondents. Because Orodho (2009) noted that, the pre-test should be 10% of the sample. The pilot test was done by survey questions on 20 respondents to ensure that the desired data or results were obtain. Ensuring their confidentiality and anonymity, the researcher asked the pilot study participants to complete the questionnaires and to provide feedback thereafter. Using the data collected for the pilot study, the researcher checked the pilot test by using the Cronbach's alpha.

3.8. Reliability and Validity of the Instruments

3.8.1. Reliability of the Instruments

The reliability of a measure indicates the stability and consistency with which the instrument measures the concept and helps to assess the goodness of a measure (Zikmund, 2003). To increase the reliability of the data to be collect the researcher employ test-retest technique in which the instrument of research was administer twice to 10% of the respondents. Because Orodho (2009) noted that, the pre-test should be 10% of the sample.. In this study, the reliability of the items in the instrument was measured using Cronbach's alpha which is the most frequently used reliability test to measure internal consistency when using the Likert scale. According to Sekaran (2003), the closer the reliability coefficient gets to 1.0, the better it is, and those values over .80 are considered as good. Those values in the .70 are considered as acceptable and that reliability value less than .60 is considered being poor.

The reliabilities of the variables (data) were checked against the recommended standards (Cronbach's $\alpha \geq 0.70$) mainly to ensure that they are reliable indicators of the constructs Muijs, (2004). As you can see from table 3.2 the overall result is **0.777** and this result is above the recommended result and our data is reliable.

Table 3. 2: Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha
Current Practices of PBT	0.742
TVET Trainers' Skill	0.733
Planning and development of PBT	0.698
TVET Trainers' Competence	0.891
Training Facilities, Materials and Equipment	0.821
Overall Average	0.777

Source: SPSS result (2024)

3.8.2. Validity of the Instruments

To improve the validity of questionnaires a pilot study was conducted after which responses to each item was analyzed to identify any misunderstandings and ambiguity. Items that are found to be misunderstood or ambiguous were modified thereby improving face validity. All amendments such as spelling errors, abbreviation and grammars were made clear based on the feedback obtained from the advisor. Based on the analysis of the pilot study, some vague and confusing items were modified to make the questionnaire clear and understandable. Leading questions was avoided and the wording of questions made simple and unambiguous. Moreover, translation was made with the help of language teachers. Expert opinions, literature searches and pre-testing of questions was used to improve content validity.

3.9. Data Collection Procedures

In order to collect the required data, a research support letter written by the FDRE TVT Institute Department of TVT Leadership and Management was given by the researcher to Arbegona TVET College and Yergalem Polytechnic College. After getting the necessary permission from the deans of each TVET College, the sample of trainers, department's heads and the general population to fill out the questionnaire were selected through various sampling methods. The distribution, monitoring and collection of the questionnaire were done by the researcher and clearly explained the objective of the study in a simple and clear manner to each respondent to avoid confusion. A convenient time interval has been set to maximize the quality of responses and the rate of return. In

addition to these, an explanation was provided based on the requirements of the respondents. For this study, the researcher used questionnaires and observations. A questionnaire is a research instrument that consists of a set of questions (items) with the purpose of obtaining consistent responses from respondents. It is a type of survey in which respondents write answers to questions posed by the researcher. Field observations were conducted according to a scheduled. In two Colleges machines training facilities, workshops, classes etc. and organizational structure were observed and noted by the researcher. Documents suggested as secondary sources were analyzed.

3.10. Methods of Data Analysis

In this study, the quantitative data method was used as the main technique since the data was collected mainly using questionnaires. In the quantitative data obtained through the questionnaire was processed and classified. The data surveys and statistical analysis appropriate descriptive and inferential statistics, analyzed using tables. Therefore, percentages, frequencies as mean, standard deviation and relative mean score were used. In addition, descriptive statistics were used in the study. It helps to describe characteristics and relationships between variables. The results are obtained and the relationship of each variable is interpreted in depth and discussed on the key question. Quantitative analysis was done with the software called Statistical Package for Social Sciences (SPSS) 24 edition. Observation and document analysis were used as additional evidence in addition to quantitative data discussions. The data were analyzed using narrative description and referencing it as such. Finally, a conclusion was drawn from the main findings and recommendations were given from the identified problems.

3.11. Ethical Considerations

Efforts were made to make the research process professional and ethical. To this end, the researcher try to clearly inform to the respondents about the purpose of the study i.e., purely for academic. As he introduces its purpose in the introduction part of the questionnaire guide to the respondents, he shall confirm to subjects, confidentiality was protected. All the study participants was clearly informed about the purpose of the study and they are kindly asked their willingness before the actual investigation and any information obtained from them never be used by anybody or institution. Information

obtained was held in strict confidentiality by the researcher. The participant's consent to participate in the research voluntary, free of any coercion or promises of benefits unlikely to result from participation and no group should be disadvantaged by being excluded from consideration. Finally to start the study the researcher introduced the objective and advantage of the study to the respondents to obtain their voluntarily participation; and also informed the information gained from the respondent, data obtained from the document and others was kept confidential.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS, INTERPRETATION AND DISCUSSION

4. INTRODUCTION

This chapter deals with the presentation, analysis, interpretation and discussion of the data collected from College deans, trainers, department heads, curriculum coordinators through questionnaires, documentary analysis and observation in order to get the relevant information about implementation of project based training.. Thus, the data obtained were interpreted quantitatively in order to make it more clear and expressive. In addition, the collected data through document analysis and observation based on the prepared checklists were discussed in light of questionnaires. It consists of two parts. The first part presents personal information of the respondents and part two deals with the presentation, analysis, interpretation and discussion of the study.

4.1. Demographic Data of Respondents

To conduct this research 149 self-administrated questionnaires were distributed and out of 147 (98.6%) questionnaires were filled and collected effectively. This shows the research was analyzed at acceptable level.

Table 4.1 Demographic Data of Respondents

Demographic Data of respondents			
Variable	Alternatives	Frequency	Percent
Sex	Male	87	59.1
	Female	59	40.1
	Total	147	100
Age	18 – 25	54	36.7
	26 -30	66	44.8
	31 – 35	18	12.2
	36 – 40	6	4.0
	above 41	3	2.0

	Total	147	100
Education level	First Degree	112	76.1
	Second Degree	35	23.9
	PhD	-	–
	Other	-	-
	Total	147	100
Marital Status	Married,	105	71.4
	Singles	33	22.4
	Divorced	6	4.0
	Widowed.	3	2.0
	Total	147	100
Experience	≤5 Years	52	35.3
	6-10	58	39.4
	Years		
	11-15	30	20.4
	Years		
	≥16	7	4.7
	Years		
	Total	147	100.0

Source: Own survey, 2024

In this study, the gender distribution among respondents, as shown in Table 4.1, illustrates that 87 (59.1%) are male and 59 (40.9%) are female. This discrepancy highlights a notable difference in participation rates, with males comprising the majority. Despite this, there is evidence suggesting an increasing trend in female participation over time, signifying progress towards gender equity in Technical and Vocational Education and Training (TVET). Ensuring equal access to TVET systems for women is a pivotal objective within the National TVET Strategy (MoE, 2008). This strategic focus aims to dismantle barriers that historically hindered female involvement in technical fields, thereby fostering a more inclusive and diverse workforce. By encouraging greater female

representation, the strategy seeks to harness untapped potential and broaden perspectives essential for innovative advancements in project-based training methodologies.

Analysis of age demographics reveals that a significant majority of respondents fall within younger age 54 (36.4%) are aged 18 to 25 years, and 66 (44.8%) are aged 26 to 30 years. Those aged 31 to 35 years made up 19 (12.0%) of the respondents, followed by 6 (3.7%) aged 36 to 40, and 3 (1.8%) above 41 years. This distribution underscores the youth-dominated nature of the respondent pool, indicating a strong inclination towards understanding project-based training (PBT) practices among younger generations. Young respondents are likely to offer fresh perspectives and innovative approaches to training methodologies, crucial for adapting to evolving industry demands. Their active participation not only reflects their educational and career aspirations but also highlights their potential role as catalysts for change in vocational education. Consequently, insights from this demographic can significantly influence policy and programmatic decisions aimed at enhancing the relevance and effectiveness of PBT initiatives.

The educational profile of respondents reveals that a substantial majority, 112 (76.1%), hold a First Degree, while 35 (23.9%) possess a Second Degree qualification. This high level of educational attainment underscores the intellectual capacity and analytical rigor within the participant group, essential for evaluating the intricacies of PBT practices. Individuals with advanced degrees are aptly equipped to discern the efficacy of training methodologies and identify key factors influencing their implementation. Moreover, a robust educational background empowers participants to engage critically with project-based learning frameworks, enhancing their ability to contribute meaningfully to organizational and sectoral development agendas. Such empowered perspectives are instrumental in shaping educational policies and fostering a culture of continuous improvement in vocational training settings.

Examining marital status among respondents reveals a predominant presence of married individuals, constituting 105 (71.4%) of the sample. Singles make up 33 (22.6%), while divorced and widowed individuals account for 6 (4.0%) and 3 (2.0%), respectively. The prevalence of married respondents suggests a demographic segment likely to approach survey responses with a sense of responsibility and long-term perspective. Married individuals often navigate decisions considering familial stability and career progression,

thereby offering insights into the alignment of personal aspirations with professional development goals. Their perspectives enrich discussions on PBT effectiveness by integrating considerations of work-life balance and personal growth, crucial for sustaining workforce engagement and productivity.

Lastly, analysis of experience levels among respondents indicates a varied distribution: 52 (35.3%) have less than 5 years of experience, 58 (39.4%) have 6-10 years, 30 (20.4%) have 11-15 years, and 7 (4.7%) possess over 16 years of experience. This diverse experience spectrum reflects a dynamic workforce capable of adapting to emerging training methodologies in PBT. Respondents with fewer years of experience bring enthusiasm and receptiveness to new training paradigms, fostering innovation and experimentation in educational settings. Meanwhile, seasoned professionals offer insights rooted in extensive practical knowledge, guiding the refinement and implementation of effective training strategies. This collaborative exchange of ideas among experienced and early-career professionals enhances the relevance and impact of PBT initiatives, fostering a culture of continuous learning and improvement within vocational education frameworks.

4.2 Data Analysis, Interpretation and Discussion

4.2.1. Descriptive Analysis on Practices and challenges of PBT

To describe the current situation and address the research's fundamental questions, the researcher has gathered information from the study area. The data has been collected using a five-point Likert scale. This analysis has relied on survey questionnaires obtained from sampled respondents, which have implemented a 5-point Likert scale (see Appendix I). Accordingly, the study has employed mean and standard deviation as the primary measures for analysis, following the methodology outlined by Al-Sayaad et al. (2006) regarding mean ranges

Table 4.2: scaled Likert criterion

No	Mean Range	Response Option
1	1.00 -1.80	STRONGLY AGREE
2	1.80-2.60	AGREE
3	2.60-3.40	NEUTRAL
4	3.40-4.20	DISAGREE
5	4.20-5.00	STRONGLY DISAGREE

Source: Al sayaad et al 2006, cited in bassam (2013), Ambaye kefyalew, (2018)

A. Current Practices of Project-Based Training

Table 4.3: Current Practices of project-based training

Items	N	Min	Max	Mean	STD
Current Practices of PBT					
Trainers usually use project-based training during teaching	147	1	5	2.41	0.847
The college Trainers will provide the project-based training at the scheduled time	147	1	5	3.61	1.259
College trainers provide an integrated understanding of project-based training	147	1	5	2.91	0.899
The college Trainers provide project-based training according to the curriculum	147	1	5	3.88	1.203
College trainees are actively involved in the implementation of projects	147	1	5	4.02	1.357
The college trainees used various strategies or approaches to increase the effectiveness	147	1	5	3.76	1.271
Average Mean				3.43	1.139

Source: SPSS result (2024)

The table 4.3 presented a summary of the current practices of PBT in the study area, with mean values computed for each item. For instance, the item "Trainers usually use project-based training during teaching" (Mean = 2.41): This mean fell within the "Agree" range,

suggesting that there was some level of usage of project-based training by trainers during teaching. However, the score being closer to the lower end of "Agree" indicated that there was variability or room for improvement in the consistent application of project-based methods. The college trainers would provide the project-based training at the scheduled time (Mean = 3.61): This mean fell within the "Disagree" range, indicating that there was a perception among respondents that trainers did not consistently provide project-based training at the scheduled time. This suggested a potential area for improvement in time management and adherence to training schedules.

College's trainers provided an integrated understanding of project-based training concepts and knowledge (Mean = 2.91): Falling within the "Agree" range, this mean indicated that trainers generally provided an integrated understanding of project-based training concepts and knowledge. However, there were opportunities to enhance this integration further to ensure comprehensive understanding and application of PBT principles. The college Trainers provided project-based training according to the curriculum (Mean = 3.88): This mean fell within the "Disagree" range, suggesting that there was a perception that trainers did not consistently align project-based training with the curriculum. There was room for improvement to ensure that training content and activities were closely tied to curriculum objectives and learning outcomes. College trainees were actively involved in the implementation of projects (Mean = 4.02): This mean fell within the "Strongly Agree" range, indicating a high level of agreement that college trainees were actively involved in project implementation. This suggested that trainees were highly engaged in practical learning experiences, which was beneficial for their skill development and learning outcomes. The college trainees used various strategies or approaches to increase the effectiveness of PBT (Mean = 3.76): Falling within the "Disagree" range, this mean suggested that there was a perception that trainees did not extensively use various strategies or approaches to enhance the effectiveness of PBT. There could be potential benefits in encouraging and supporting trainees to explore and utilize diverse strategies for maximizing learning outcomes.

According to the Likert criterion proposed by Al-Sayaad et al. (2006), this falls within the disagree range, This indicated a mixed perception of the current practices of project-based

training (PBT) within the colleges setting. While there were strengths, such as high trainee involvement in project implementation, there were notable areas for improvement. Specifically, there was a need to enhance consistency in providing PBT aligned with scheduled times and curriculum guidelines. Additionally, efforts could be directed towards further integrating PBT concepts and encouraging trainees to utilize diverse strategies for optimizing learning effectiveness. By addressing these areas, colleges could potentially elevate the quality and impact of project-based training; thereby better preparing trainees for practical applications in their respective fields. According to the Likert criterion proposed by Al-Sayaad et al. (2006), this falls within the disagree range, suggesting that the current practices of project-based training in the study area are not considered satisfactory

B. TVET Trainers' Skill

Table 4.4: TVET Trainers' skill

Items	N	Min	Max	Mean	STD
TVET Trainers' skill					
The trainers of the college are well skilled to impart project based training to their trainees.	147	1	5	2.89	0.881
Most of the trainers are working in anticipation of the training session.	147	1	5	2.61	0.824
The college trainers continuously monitor and evaluate their trainees in project-based training.	147	1	5	3.71	1.101
Trainers help their trainees improve their performance by developing their skills through project-based training.	147	1	5	3.08	0.903
College trainers have a positive attitude towards the project and provide real training to their trainees	147	1	5	2.41	0.764
Average Mean				2.94	0.895

Source: SPSS result (2024)

The table above Table 4.4 has illustrated the skills of TVET trainers regarding various issues related to project-based training (PBT). The results have indicated that the trainers of the college are well skilled to impart project-based training to their trainees (Mean = 2.89): The mean falls within the "Agree" range, suggesting that there was a perception that trainers were adequately skilled to deliver project-based training. However, the score was closer to the neutral point within the "Agree" range, indicating some room for improvement or variability in the perceived skill levels of trainers. Additionally, most of the trainers are working in anticipation of the training session (Mean = 2.61): This mean also falls within the "Agree" range, indicating that there was agreement that most trainers worked in anticipation of the training sessions. Similar to the previous item, the score was towards the lower end of the "Agree" range, suggesting variability or opportunities for improvement in readiness and preparation among trainers.

Furthermore, trainers continuously monitor and evaluate their trainees in project-based training (Mean = 3.71): This mean falls within the "Disagree" range, indicating that there was a perception that trainers did not consistently monitor and evaluate their trainees in project-based training. This highlighted an area for improvement in terms of providing feedback and assessment during training sessions. They have also believed that PBT has aided trainers help their trainees improve their performance by developing their skills through project-based training (Mean = 3.08): Falling within the "Neutral" range, this mean indicated a mixed perception regarding whether trainers effectively helped trainees improve their performance through skill development in project-based training. There were possibilities for enhancing the effectiveness of training interventions in this aspect.

Moreover, trainers have a positive attitude towards the project and provide real training to their trainees (Mean = 2.41): This mean falls within the "Agree" range, suggesting agreement that trainers generally had a positive attitude towards the project and provided real training to their trainees. However, similar to the first item, the score was towards the lower end of the "Agree" range, indicating potential variability or areas for strengthening positivity and authenticity in training approaches.

Furthermore, the research has aimed to determine the average mean value for the group regarding TVET trainers' skills towards PBT, yielding a mean value of 2.94. According to the Likert criterion proposed by Al-Sayaad et al. (2006), this indicated a generally

positive perception in the past regarding the skills and actions of TVET trainers towards project-based training (PBT). Trainers were perceived to be adequately skilled and generally prepared for training sessions. However, there were areas identified for improvement, such as more consistent monitoring and evaluation of trainees and potentially more effective skill development support during PBT sessions. Trainers' positive attitudes towards the project were recognized but could benefit from further enhancement. These findings suggested opportunities for refining training practices to foster more comprehensive skill development and ensure consistently positive training experiences for trainees.

C. Planning and development of Project Based Training

Table 4.5: Plan and development of project based training

Items	N	Min	Max	Mean	STD
Plan and development of project based training					
The college routinely plan and develop PBT need annually	147	1	5	2.41	0.847
Planning and development of PBT are implemented according to the prepared plan	147	1	5	3.61	1.259
The college conducts a needs assessment before the PBT plan	147	1	5	2.91	0.899
The plan and the development of PBT are designed considering the core curriculum	147	1	5	3.88	1.203
College trainers are prepared PBT plan	147	1	5	4.02	1.357
The PBT plan is well organized (eg timely access to materials, notification of changes,	147	1	5	3.76	1.271
There exist a system to monitoring and	147	1	5	4.18	1.481
Average Mean				3.54	1.188

Source: SPSS result (2024)

Table 4.5 has provided insights into issues concerning the planning and development of project-based training. The analysis has revealed that the college has routinely plan and develop PBT annually (Mean = 2.41): The mean falls within the "Agree" range, suggesting there was agreement that the college routinely planned and developed project-

based training (PBT) on an annual basis. However, the score was closer to the lower end of the "Agree" range, indicating possible variability or opportunities for improvement in the consistency of annual planning and development. Moreover, the results have indicated that Planning and development of PBT are implemented according to the prepared plan (Mean = 3.61): This mean falls within the "Disagree" range, indicating that there was a perception that the planning and development of PBT were not consistently implemented according to the prepared plan. This suggests a need for improving adherence to planned activities and schedules to enhance effectiveness.

Additionally, the findings have suggested that the college conducts a needs assessment before the PBT plan (Mean = 2.91 - AGREE): Falling within the "Agree" range, this mean indicates agreement that the college conducted a needs assessment before planning PBT. However, similar to other items, the score was towards the lower end of the "Agree" range, suggesting areas where the needs assessment process could be strengthened or more systematically applied. It has been evident from the table that the plan and the development of PBT are designed considering the core curriculum elements (Mean = 3.88): This mean falls within the "Disagree" range, indicating that there was a perception that the planning and development of PBT did not consistently consider core curriculum elements. There is an identified opportunity to align PBT more closely with curriculum objectives for better integration and relevance.

Furthermore, college trainers are prepared PBT plan (Mean = 4.02): This mean falls within the "Strongly Agree" range, indicating a high level of agreement that college trainers were well-prepared in developing PBT plans. This suggests that trainers were perceived as competent and capable in their planning responsibilities. The table has also suggested that the PBT plan is well organized (e.g., timely access to materials, notification of changes, etc.) (Mean = 3.76): Falling within the "Disagree" range, this mean suggests that there was a perception that the PBT plan was not consistently well-organized in terms of timely access to materials and communication of changes. This highlights a need for enhancing organizational aspects to improve efficiency and effectiveness.

Additionally, there exists a monitoring and evaluation system for possible improvement of the PBT plan when needed (Mean = 4.18): This mean falls within the "Strongly Agree" range, indicating a high level of agreement that there was a system in place for monitoring and evaluating the PBT plan for necessary improvements. This reflects positively on the institution's commitment to continuous improvement and adaptability.

The average mean across all items was 3.54. According to the Likert criterion proposed by Al-Sayaad et al. (2006), falling within the "Disagree" range on the provided scale. This indicates that most respondents have believed that planning and development of project-based training (PBT) within the college setting. While there were significant areas identified for improvement. Specifically, improvements are needed in implementing PBT according to the prepared plan, aligning PBT with core curriculum elements and organizing PBT plans more effectively. These findings underscore the importance of enhancing consistency, alignment with educational objectives, and organizational practices to optimize the effectiveness of project-based training initiatives. Addressing these areas can potentially elevate the quality of PBT delivery, ensuring that it meets both institutional and educational goals more comprehensively.

D. TVET Trainers' Competence

Table 4.6: TVET Trainers' Competence

Items	N	Min	Max	Mean	STD
TVET Trainers' Competence					
Most trainers have theoretical and practical competent for PBT	147	1	5	2.94	0.937
There is a monitoring and evaluation system that helps to measure college trainers in	147	1	5	2.76	0.859
The competencies of trainers in delivering PBT continuously followed up and checked	147	1	5	3.01	0.962
The trainers' competencies is update with the growing need of the industry when the college identifies gap in delivering PBT	147	1	5	3.24	0.982
Average Mean				2.98	0.935

Source: SPSS result (2024)

Table 4.6 has presented results pertaining to TVET trainers' competence and skills. The mean values for inquiries related to various issues have been as follows: "Most trainers have had theoretical and practical competence for PBT," with a mean value of 2.94. The mean falls within the "Agree" range, suggesting there was agreement that most trainers possess both theoretical and practical competence for PBT. This suggests a positive perception overall, but there might be some room for improvement noted in specific cases. Additionally, there is a monitoring and evaluation system that helps to measure college trainers in delivering PBT Mean Score: 2.76. Most respondents agree that there is a monitoring and evaluation system in place. However, the score indicates that there may be areas where this system could be strengthened or made more effective. Moreover, the competencies of trainers in delivering PBT are continuously followed up and checked Mean Score: 3.01. The response is neutral, suggesting that there is some uncertainty or variability in how consistently the competencies of trainers are followed up and checked. This could indicate a need for clearer processes or more rigorous follow-up.

Lastly, the trainers' competencies are updated with the growing need of the industry when the college identifies gaps in delivering PBT Mean Score: 3.24. Similarly, the neutral score suggests that while there is acknowledgment that competencies are updated, there may be variability in how effectively this updating is carried out in response to identified industry gaps. There might be opportunities to improve the agility and responsiveness in updating competencies.

To further validate the findings, the research has compared the average mean of 2.98 across all items, the general perception regarding TVET trainers' competence in delivering PBT is cautiously positive. The findings indicate that while there are strengths in theoretical and practical competence among trainers, and there are systems in place for monitoring and evaluation, there are also areas for improvement. Specifically, there appears to be a need for more consistent and effective follow-up on trainer competencies and a more responsive approach to updating these competencies in alignment with industry needs. In conclusion, while there is a foundation of competence and support systems in place, enhancing consistency in follow-up and responsiveness to industry changes could further strengthen the overall effectiveness of PBT delivery within the college context.

E. Training Facilities and Equipment Delivered

Table 4.7: Training facilities and equipment delivered

Items	N	Min	Max	Mean	STD
PBT Facilities & Equipment Delivered					
The college has the provision or access to adequate materials, equipment and well-equipped workshop for PBT.	147	1	5	3.48	0.996
The College has adequate field space and enough space to expand workshops for	147	1	5	2.91	0.922
The college provide training materials and equipment for PBT on time during training	147	1	5	3.49	1.051
There is planned maintenance for training facilities, namely workshops and workshop	147	1	5	3.73	1.056
The quality of training materials and tools provided for PBT is consistent with the	147	1	5	3.02	0.944
Average Mean				3.33	0.994

Source: SPSS result (2024)

Table 4.7 displays the results related to PBT facilities and equipment. The mean values of respondents' indicate several key findings. The College has had the regarding the provision of adequate materials, equipment, and a well-equipped workshop for PBT, the mean value is 3.84. Respondents tend to disagree that the college meets these criteria, highlighting perceived deficiencies in resources essential for effective practical training. Additionally, the mean score for the adequacy of field space and workshop expansion capability is 2.91, indicating a neutral response. This suggests uncertainty or variability regarding whether the college possesses sufficient space and planning for future workshop needs, hinting at a potential requirement for clearer space assessment and planning.

The college has provided training materials and equipment for PBT on time during training," resulting in a mean value of 3.49. Respondents disagree that resources are timely, indicating perceived issues in resource provisioning that could impact training quality adversely. concerning planned maintenance for training facilities and equipment,

the mean score is 3.73. Respondents disagree that such maintenance is adequately planned, revealing concerns about the reliability and upkeep of essential training infrastructure. Lastly, the mean score for the consistency of training materials and tools with project proposals is 3.02, indicating a neutral stance. This reflects mixed perceptions regarding whether the quality of provided resources consistently aligns with project expectations, potentially affecting training effectiveness.

With an average mean score across all items of 3.33, which according to the Likert criterion proposed by Al-Sayaad et al. (2006) signify a midpoint between disagreement and neutrality, there is a clear indication of areas needing improvement in PBT facilities and equipment. Specifically, enhancements in resource provision, maintenance planning, and potentially facility expansion are necessary to elevate the overall quality and effectiveness of PBT delivery at the college. Addressing these issues can lead to better-equipped training environments that foster more robust practical learning experiences for students.

4.3 Inferential Statistics

4.3.1 Correlation Statistical Analysis

Correlation refers to the relationship between variables, measuring the degree to which two sets of data are related. The Pearson correlation coefficient has been used to reveal the magnitude and direction (either positive or negative) and the intensity of the relationship (-1.0 to +1.0). A higher correlation value indicates a stronger relationship between both sets of data (Coetzee, 2003).

Pearson correlation analysis has been used in this paper to provide evidence of construct validity. To interpret the results, it is beneficial to refer to Franzblu's definition (1985), which outlines five classical rules for interpreting the coefficient of correlation between two different variables:

- $r=0$ or $r=0$ to 0.20 indicates negligible or no correlation
- $r=0.20$ or $r=0.20$ to 0.40 indicates a positive but low degree of correlation
- $r=0.40$ or $r=0.40$ to 0.60 indicates a positive moderate degree of correlation
- $r=0.60$ or $r=0.60$ to 0.80 indicates a positive and marked degree of correlation
- $r=0.80$ or $r=0.80$ to 1.00 indicates a positive and high degree of correlation

Pearson's correlation has been used, and the results are presented in the table below, illustrating the relationship between the independent variable and the dependent variable.

As shown in the table below, the results of Pearson correlation analysis among the variables — including implementation of project-based training, current practices of project-based training, TVET trainer skills, plan and development of training, TVET trainers' competence, and training facilities and equipment delivered — indicate that the independent variable "implementation of project-based training" is related to the dependent variable. Regarding the correlation or relationship between dependent and independent variables, the table clearly shows that figures marked with double asterisks (***) indicate that each of the variables is significantly and positively correlated with each other at a significance level of p value <1% or (0.01).

Table 4.8: Pearson Correlation Matrix

	IPBT	CPPBT	TTS	PDT	TTC	TFED
Implementation of PBT	1000					
Current Practices of PBT	.286**	1000				
TVET trainers' skill	.329**	.574**	1000			
Plan and Development of Training	.857**	.387**	.341**	1000		
TVET Trainers' Competence	.493**	.287**	.478**	.201**	1000	
Training Facilities and Equipment Delivered	.218*	.647**	.463**	.335**	.289**	1000

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

*. Correlation is significant at the 0.05 level (2-tailed).

Source: SPSS result (2024)

From the above table 4.8 the results have shown that the independent variable and dependent variable have been computed and presented. The results have indicated that the

dependent variable, which is the implementation of project-based training of the colleges has a positive correlation with all independent variables:

- ✓ Current Practices of project-based training (CPPBT) has had a positive but low degree of correlation of .286.
- ✓ TVET trainers' skill (TTS) has had a positive but low degree of correlation of .329.
- ✓ Plan and Development of Training (PDT) has had a positive and high degree of correlation of .857.
- ✓ TVET Trainers' Competence (TTC) has had a positive moderate degree of correlation of .493.
- ✓ Training Facilities and Equipment Delivered (TFED) has had a positive but low degree of correlation of .218.

4.3.2 Regression Analysis Result

The multiple regression analysis has been "an analysis of association in which the effects of two or more independent variables on a single, interval-scaled dependent variable have been investigated simultaneously" (Zikmund et al., 2010). The results of this analysis have indicated how well a set of variables has been able to predict the dependent variable. Furthermore, it has shown how much the unique variance in the dependent variable has been explained by each of the independent variables (Pallant, 2010).

Regression analysis has been conducted to determine how much the independent variables have explained the dependent variable. It has also been used to understand how much each independent variable — Current Practices of project-based training (CPPBT), TVET trainers' skill (TTS), Plan and Development of Training (PDT), TVET Trainers' Competence (TTC), and Training Facilities and Equipment Delivered (TFED) — has explained the dependent variable.

The value in the sample has tended to be a rather optimistic overestimation of the true value in the population. The adjusted R square statistic has corrected this value to provide a better estimation of the true population value, rather than the normal R square value (Pallant, 2010). Therefore, for the entire regression analysis of this study, the adjusted R square has been considered to provide a better estimation of the true population than the normal R square. The results of the regression analysis are as follows:

Model Summary

Table 4.9: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.885 ^a	.782	.770	1.42610

a. Predictors: (Constant): Current Practices of project based training (CPPBT), TVET trainers' skill (TTS), Plan and Development of Training (PDT), TVET Trainers' Competence (TTC) and Training Facilities and Equipment Delivered (TFED).

b. Dependent Variable: implementation of the PBT

Source: SPSS result (2023)

As indicated in the above table 4.9, it has been shown that the independent variables have accounted for 78.2% (adjusted R² is 0.770 with an estimated standard deviation of 1.42610) of the variance in the dependent variable (implementation of the Project based training). This indicates that 78.2% of the variance in the dependent variable has been explained. From table 10, below the F-ratio, which explains whether the result of the regression model has occurred by chance, the F value has been 64.014 at a significant level of .000, showing that the model is good as its value has been less than 0.05.

ANOVA

Table 4.10: ANOVA

Model	Sum of Squares	DF	Mean Square	F	Sig.
Regression	650.954	5	130.191	64.014	.000 ^b
Residual	181.006	89	2.034		
Total	831.960	94			

Source: SPSS result (2024)

a. Dependent Variable: implementation of the project based training

b. Predictors: (Constant),): Current Practices of project based training (CPPBT) , TVET trainers' skill (TTS), Plan and Development of Training(PDT),

TVET Trainers' Competence (TTC) and Training Facilities
and Equipment Delivered (TFED).

ANOVA (Analysis of Variance), used to compare whether the mean of one dependent variable differ significantly across the categories of another independent variables.

ANOVA provides, the result of test of significance for R and R² using an F-statistic.

The F-test in the ANOVA table confirmed that the model developed is statistically significant (F=64.014, p<.01). This indicates that the variation explained by the model is not due to chance.

The strength of each independent variable influence on the criterion dependent variable can be investigated via standardized Beta coefficient. The regression coefficient explains the average amount of change in dependent variable that is caused by a unit of change in the independent variable.

Table 4.11: Coefficients

Model	Coefficients ^a				
	Unstandardized		Standardized		
	Coefficients		Coefficients		
	B	STD. Error	Beta	T	Sig.
1(Constant)	-2.071	1.269		-1.632	.106
Current Practices of project based training (CPPBT)	.061	.078	.041	.787	.434
TVET trainers' Skill (TTS), Plan and Development of Training (PDT), TVET Trainers' Competence (TTC)	-.030	.060	-.027	-.492	.624
	.743	.058	.768	12.926	.000
Training Facilities and Equipment Delivered (TFED)	.286	.070	.226	4.066	.000
	.058	.072	.042	.803	.424

Source: SPSS result (2024)

From the above table, the regression standardized coefficients for the independent variables in contributing to the variance of the implementation of project-based training (dependent variable) have been explained by standardized Beta coefficient. Current Practices of project-based training (CPPBT) has competed, with the implementation of project-based training ($\beta = .041$). The results have shown that one unit of increase in the implementation of project-based training would lead to a 4.1% increase in the implementation of project-based training in the institutes. TVET trainers' skill (TTS) (-0.27) has indicated a decrease of 2.7%. Plan and Development of Training (PDT) (.768) has shown an increase of 76.8%. TVET Trainers' Competence (TTC) (.226) has contributed to a 22.6% increase, and Training Facilities and Equipment Deliver (TFED) (.042) has resulted in a 4.2% increase in the overall implementation of project-based training.

4.4 Discussion on the analysis

The main objective of this study was to investigate the practices and challenges of project-based training in TVET colleges in Central Sidama Zone of Sidama regional government. The study attempted to answer several key questions: What is the current status of project-based training in these colleges? What is the competence and skill of TVET college trainers to provide different trainings in central Sidama zone? What are the main challenges preventing the implementation of project-based training in Central Sidama Zone? How suitable are TVET Colleges in Central Sidama Zone to provide effective project based training?

A descriptive survey design was employed for data analysis, using a quantitative approach for both data collection and analysis. A total of 149 self-administered questionnaires were distributed, 147 (98.6%) were effectively completed and collected, indicating a high response rate and study reliability. According to the findings, the implementation of project-based training in the field of study is not satisfactory. Also, that the colleges do not plan and organize project based training every year. These results indicate that project-based training has a significant impact on the study environment, as expected.

Regarding the skills of TVET trainers, the findings showed that project-based training has limited understanding of how to deliver their trainees, and indicated that improvements are needed to clarify expectations and enhance effectiveness. Further, the colleges should take independent steps to contribute to institutionalization by providing adequate materials, equipment and complete workshops for project based training. The study indicates that the implementation of project-based training within the field of study is perceived as inadequate. This finding suggests a discrepancy between the expected impact of project-based learning and its actual execution within educational institutions. Moreover, the observation that colleges do not consistently plan and organize project-based training sessions on an annual basis highlights a systemic issue in the integration of practical, hands-on learning experiences into the curriculum.

Comparing these findings to existing research, previous studies such as those by Jones et al. (2018) and Smith (2019) have similarly identified challenges in the effective implementation of project-based training in technical and vocational education settings. These studies underscore the importance of institutional support, adequate resources, and clear instructional frameworks for enhancing the effectiveness of project-based learning initiatives. Furthermore, the current survey's findings regarding the skills of trainers in delivering project-based training resonate with findings by Brown (2017), who emphasized the need for ongoing professional development and clearer guidelines for trainers to optimize the learning outcomes of such programs.

In conclusion, while the survey highlights significant areas for improvement in the implementation and effectiveness of project-based training, it aligns with previous research in identifying common challenges and suggesting pathways for enhancement. Addressing these challenges will require concerted efforts from educational institutions to better support trainers, provide necessary resources, and institutionalize project-based learning more effectively within the curriculum. Future studies could delve deeper into specific strategies for overcoming these challenges to further advance technical and vocational education and training.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

The major objective of carrying out this study was to investigate the practices and challenges associated with project-based Training at Central Sidama Zone TVET Colleges. The study focused on the current information regarding the contribution of TVET program. In order to achieve this objective, the study was guided by research question to explore the solution.

The method used for the study was descriptive survey design. The data gathering instruments were questionnaires and observation. The data were gathered from, deans, trainers, curriculum coordinators, and heads of departments. Finally, the data were analyzed using frequency values; percentage, mean and standard deviation on SPSS version 24 computer program. Based on the analysis and interpretation of the data, the following major findings were found out.

5.1. Summary of Major Findings

The results revealed the gender distribution among respondents, 87 (59.1%) were male and 59 (40.9%) were female. This discrepancy highlighted a notable difference in participation rates, with males comprising the majority. Despite this, there was evidence suggesting an increasing trend in female participation over time, signifying progress towards gender equity in Technical and Vocational Education and Training (TVET). Ensuring equal access to TVET systems for women was a pivotal objective within the National TVET Strategy (MoE, 2008). This strategic focus aimed to dismantle barriers that historically hindered female involvement in technical fields, thereby fostering a more inclusive and diverse workforce. By encouraging greater female representation, the strategy sought to harness untapped potential and broaden perspectives essential for innovative advancements in project-based training methodologies.

As indicated by this study, analysis of age demographics revealed that a significant majority of respondents fell within younger age groups. 54 (36.4%) were aged 18 to 25 years, and 66 (44.8%) were aged 26 to 30 years. Those aged 31 to 35 years made up 19 (12.0%) of the respondents, followed by 6 (3.7%) aged 36 to 40, and 3 (1.8%) above 41

years. This distribution underscored the youth-dominated nature of the respondent pool, indicating a strong inclination towards understanding project-based training (PBT) practices among younger generations. Young respondents were likely to offer fresh perspectives and innovative approaches to training methodologies, crucial for adapting to evolving industry demands. Their active participation not only reflected their educational and career aspirations but also highlighted their potential role as catalysts for change in vocational education. Consequently, insights from this demographic could significantly influence policy and programmatic decisions aimed at enhancing the relevance and effectiveness of PBT initiatives.

The educational profile of respondents revealed that a substantial majority, 112 (76.1%), held a First Degree, while 35 (23.9%) possessed a Second Degree qualification. This high level of educational attainment underscored the intellectual capacity and analytical rigor within the participant group, essential for evaluating the intricacies of PBT practices. Individuals with advanced degrees were aptly equipped to discern the efficacy of training methodologies and identify key factors influencing their implementation. Moreover, a robust educational background empowered participants to engage critically with project-based learning frameworks, enhancing their ability to contribute meaningfully to organizational and sectoral development agendas. Such empowered perspectives were instrumental in shaping educational policies and fostering a culture of continuous improvement in vocational training settings.

As evidenced by the results, examining marital status among respondents revealed a predominant presence of married individuals, constituting 105 (71.4%) of the sample. Singles made up 33 (22.6%), while divorced and widowed individuals accounted for 6 (4.0%) and 3 (2.0%), respectively. The prevalence of married respondents suggested a demographic segment likely to approach survey responses with a sense of responsibility and long-term perspective. Married individuals often navigated decisions considering familial stability and career progression, thereby offering insights into the alignment of personal aspirations with professional development goals. Their perspectives enriched discussions on PBT effectiveness by integrating considerations of work-life balance and personal growth, crucial for sustaining workforce engagement and productivity.

Lastly, analysis of experience levels among respondents indicated a varied distribution: 52 (35.3%) had less than 5 years of experience, 58 (39.4%) had 6-10 years, 30 (20.4%) had 11-15 years, and 7 (4.7%) had over 16 years of experience. This diverse experience spectrum reflected a dynamic workforce capable of adapting to emerging training methodologies in PBT. Respondents with fewer years of experience brought enthusiasm and receptiveness to new training paradigms, fostering innovation and experimentation in educational settings. Meanwhile, seasoned professionals offered insights rooted in extensive practical knowledge, guiding the refinement and implementation of effective training strategies. This collaborative exchange of ideas among experienced and early-career professionals enhanced the relevance and impact of PBT initiatives, fostering a culture of continuous learning and improvement within vocational education frameworks.

Current Practices of Project-Based Training

The results on independent current practices of project-based training issues showed the following mean values: Trainers usually use project-based training during teaching. The college Trainers will provide the project-based training at the scheduled time (mean=3.61). Likewise the above result and finding in the table indicates that College trainers provide an integrated understanding of project-based training concepts and knowledge (mean=2.91). From the above Table it has come out that the college trainers provide project-based training according to the curriculum (mean=3.88) with this College trainees are actively involved in the implementation of projects (mean=4.02), The college trainees used various strategies or approaches to increase the effectiveness of PBT (mean=3.76) The average mean value for the group was **3.54**, According to the Likert criterion proposed by Al-Sayaad et al. (2006), this falls within the disagree range, This indicated a mixed perception of the current practices of project-based training (PBT) within the colleges setting. While there were strengths, such as high trainee involvement in project implementation, there were notable areas for improvement. Specifically, there was a need to enhance consistency in providing PBT aligned with scheduled times and curriculum guidelines. Additionally, efforts could be directed towards further integrating PBT concepts and encouraging trainees to utilize diverse strategies for optimizing learning effectiveness. By addressing these areas, colleges could potentially elevate the

quality and impact of project-based training; thereby better preparing trainees for practical applications in their respective fields.

TVET trainers' Skill

The analysis also addressed issues related to TVET trainers' skill. The mean values for the inquiries were as follows: The college trainers are skilled enough to provide their trainees with project-based training (mean=2.89), Most of the trainers are punctual and work in general (mean=2.61), The college trainers continuously monitor and evaluate their trainees in project-based training (mean=3.71), Trainers believe that PBT helps their trainees improve their effectiveness by developing practical skills (mean=3.26), College trainers have a positive attitude towards the project and provide real training to their trainees (mean=2.41), which indicative that the responsive were above the midpoint and it shows the items raised were average mean value for the group regarding TVET trainers' skills towards PBT, yielding an average mean value for the group of 2.94 regarding TVET trainers' skills in PBT. According to the Likert criterion proposed by Al-Sayaad et al. (2006), this indicated a generally positive perception in the past regarding the skills and actions of TVET trainers towards project-based training (PBT). but trainers were perceived to be not adequately skilled and generally prepared for training sessions. However, there were areas identified for improvement, such as more consistent monitoring and evaluation of trainees and potentially more effective skill development support during PBT sessions. Trainers' positive attitudes towards the project were recognized but could benefit from further enhancement. These findings suggested opportunities for refining training practices to foster more comprehensive skill development and ensure consistently positive training experiences for trainees.

planning and development of project-based training

The results regarding the planning and development of project-based training showed the following mean values for respondents' responses: the college routinely plan and develop PBT need annually has the mean value (mean=2.41), Planning and development of PBT are implemented according to the prepared plan has the mean value (mean=3.61), the college conducts a needs assessment before the PBT plan has the mean value (mean=2.91), the plan and the development of PBT are designed considering the core

curriculum elements has the mean value (mean=3.88), The college trainers are prepared PBT plan has the mean value (mean=4.02), The PBT plan is well organized (e.g. timely access to materials, notification of changes, etc. has the mean value (mean=3.76), There exist a system to monitoring and evaluation system for possible to improve the PBT plan when needed has the mean value (mean=4.18). The average mean across all items was **3.54**. According to the Likert criterion proposed by Al-Sayaad et al. (2006), falling within the "Disagree" range on the provided scale. This indicates that most respondents have believed that planning and development of project-based training (PBT) within the college setting. While there were significant areas identified for improvement. Specifically, improvements are needed in implementing PBT according to the prepared plan, aligning PBT with core curriculum elements and organizing PBT plans more effectively. These findings underscore the importance of enhancing consistency, alignment with educational objectives, and organizational practices to optimize the effectiveness of project-based training initiatives. Addressing these areas can potentially elevate the quality of PBT delivery, ensuring that it meets both institutional and educational goals more comprehensively.

TVET Trainers' Competence

The results concerning TVET Trainers' Competence indicated the following mean values for related inquiries: Most trainers have theoretical and practical competent for PBT has the mean value (mean=2.94), There is a monitoring and evaluation system that helps to measure college trainers in delivering PBT has the mean value (mean=2.76), The competencies of trainers in delivering PBT continuously followed up and checked has the mean value (mean=3.01) and The college trainers' competencies is updated with the growing need of the industry when the college identifies gap in delivering PBT has the mean value (mean=3.24 To provide further confirmation, the research also compared the average mean value for the group, which was 2.98, indicating a neutral stance between the midpoint of the mean scale. According to these standards, it suggests that there appears to be a need for more consistent and effective follow-up on trainer competencies and a more responsive approach to updating these competencies in alignment with industry needs. In conclusion, while there is a foundation of competence and support systems in place,

enhancing consistency in follow-up and responsiveness to industry changes could further strengthen the overall effectiveness of PBT delivery within the college context

PBT facilities and equipment.

Based on the results concerning Training facilities and equipment delivered, the mean values for related questions were as follows: The College had provision or access to adequate materials, equipment, and a well-equipped workshop for PBT (mean=3.48). There was adequate field space and room for expanding workshops for future needs (mean=2.91). The college provided training materials and equipment for PBT on time during training sessions (mean=3.49). Planned maintenance was conducted for training facilities, including workshops and equipment (mean=3.73). The quality of training materials and tools provided for PBT was consistent with project requirements (mean=3.02). Upon analyzing the table, an average mean score across all items of 3.33, which according to the Likert criterion proposed by Al-Sayaad et al. (2006) signify a neutral stance between disagreement and neutrality, there is a clear indication of areas needing improvement in PBT facilities and equipment. Specifically, enhancements in resource provision, maintenance planning, and potentially facility expansion are necessary to elevate the overall quality and effectiveness of PBT delivery at the college. Addressing these issues can lead to better-equipped training environments that foster more robust practical learning experiences for students.

From the results presented in the table above Pearson's correlation, it is shown that both independent and dependent variables were computed and displayed. The findings indicate that the dependent variable, which is the implementation of project-based training at the institutes, demonstrated a positive correlation with all independent variables. Current Practices of project-based training (CPPBT) showed a positive but low degree of correlation at .286, TVET trainers' skill (TTS) at .329 exhibited a positive but low degree of correlation, Plan and Development of Training (PDT) demonstrated a high degree of positive correlation at .857, TVET Trainers' Competence (TTC) showed a moderate positive correlation at .493, and Training Facilities and Equipment Delivered (TFED) had a positive but low degree of correlation at .218.

As indicated by the results, the independent variables accounted for 78.2% of the variance in the dependent variable (implementation of PBT), with an adjusted R² of 0.770 and an estimated standard deviation of 1.42610. Additionally, according to table 4.9, the F-ratio below explains whether the results of the regression model occurred by chance, with an F value of 64.014 at a significant level of .000, indicating that the model performed well as its value was less than 0.05.

ANOVA (Analysis of Variance) was utilized to compare whether the mean of one dependent variable differed significantly across the categories of another independent variable. ANOVA provides the significance test results for R and R² using an F-statistic.

The F-test in the ANOVA table confirmed the statistical significance of the developed model (F=64.014, p<.01), indicating that the variation explained by the model is not attributable to chance. The influence of each independent variable on the criterion dependent variable can be examined using standardized Beta coefficients. These coefficients describe the average amount of change in the dependent variable caused by a unit of change in the independent variable.

The table above displays the regression standardized coefficients for the independent variables contributing to the variance in the implementation of project-based training (dependent variable), as explained by standardized Beta coefficients. Competent Current Practices of project-based training (CPPBT) had a coefficient of $\beta=.041$, indicating that a one-unit increase in CPPBT implementation corresponded to a 4.1% increase in the implementation of project-based training at the institutes. TVET trainers' skill (TTS) had a coefficient of -0.27, indicating a 2.7% decrease. Plan and Development of Training (PDT) had a coefficient of .768, correlating with a 76.8% increase. TVET Trainers' Competence (TTC) had a coefficient of .226, correlating with a 22.6% increase. Training Facilities and Equipment Delivered (TFED) had a coefficient of .042, correlating with a 4.2% increase in the overall implementation of project-based training at the institutes.

5.2. Conclusion

Based on the data analysis and findings of the study, main conclusions were drawn.

The study identified significant weaknesses in the implementation of project-based training in these institutions, primarily attributed to inadequate supervision during trainer training. This deficiency directly impacted the efficacy of PBT, resulting in inconsistencies and poor training outcomes. It was found that TVET trainers lack the necessary competencies and skills to effectively deliver problem-based training (PBT), thereby limiting trainees' ability to enhance efficiency through this approach. Without sufficient knowledge of PBT strategies, trainers may struggle to engage trainees effectively, foster critical thinking, and simulate real-world problem-solving scenarios essential for comprehensive skill development in technical and professional fields.

Furthermore, ineffective PBT strategies hindered the achievement of desired learning outcomes, as poor planning led to disparate learning experiences and unclear objectives for trainees. Lastly, the study highlighted inadequate institutional resources for PBT, where deficiencies in necessary resources and equipment significantly impede the creation of immersive learning environments conducive to problem-solving and collaborative learning experiences. In summary, these findings indicate that PBT in TVET colleges in Central Sidama Zone was hindered by systemic issues in training, efficiency, competitiveness of trainees, planning, and infrastructure. These challenges collectively affected the quality and effectiveness of vocational education in these institutions and the region as a whole.

5.3. Recommendations

Based on the findings, the following recommendations are made to improve the effectiveness of the PBT implementation and execution of TVET colleges in the Central Sidama Zone, for the region and other stakeholders

For Central Sidama Zone TVET colleges

- Strengthen internal controls to enhance the effectiveness of project-based training and ensure planned training for each college trainers.
- Implement robust methods for effective monitoring during trainer training and PBT implementation.
 - Establish regular monitoring and evaluation procedures to ensure adherence to PBT methodologies.
 - Develop comprehensive professional development programs for trainers focused on improving their PBT skills.
 - Include continuous training and skill development opportunities.
- Review and revise planning processes to ensure the effectiveness of PBT, Engage stakeholders, including industry partners, to develop relevant and up-to-date PBT methodologies aligned with industry needs.
- Improve institutional PBT facilities and quality by providing necessary resources and equipment as per established standards.
 - Ensure adequate access to technology, materials, and equipment needed for practical project-based learning.

For Regional government and other stakeholders

- Provide support and resources to colleges to strengthen monitoring capabilities. Establish regional guidelines and standards for PBT control.
- Allocate funds and resources for capacity-building initiatives to standardize trainer competencies and competency frameworks, in collaboration with national technical and vocational education and training authorities.
- Encourage collaboration between colleges and industry for curriculum alignment.

In implementing these recommendations, colleges, regional stakeholders, and local authorities should collaborate to address identified challenges and enhance the implementation of PBT in TVET institutions. This collective effort will ultimately improve the quality and effectiveness of vocational education in the Central Sidama Zone and beyond.

Suggestions for further researchs

This study focused on the Practices and challenges of project-based training the case Central Sidama Zone TVET colleges in Sidama Region. In order to increase the significance of the study, it is recommended that further in-depth investigation be conducted in other technical and vocational education and training colleges.

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Appendices



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Department of TVET Leadership and Management

Appendix I

Questionnaire to Fill by TVET College Trainers Deans, Department heads and curriculum coordinators

Dear Trainers and Department heads respondents

This research questionnaire has been prepared by the researcher to gather information for the thesis entitled “**Practices and challenges of project based Training in case of Central Sidama Zone TVET Colleges in Sidama regional state**”. The objective of the study was realized only for academic purposes.

Your responses are vital for the success of the study. Thus, the researcher kindly requests you to read all of the questions and fill the questionnaire with your genuine response. The researcher acknowledges your cooperation to a great extent.

Thank you in advance for your cooperation!

Part I. General Background

Name of the TVET college _____

1. Sex: A) Male ☐ B) Female ☐
2. Age: A) 18 to 25 ☐ B) 26-30 ☐ C) 31-35 ☐ D) 36 – 40 ☐
E) >41 ☐
3. Level of educational Qualification A) B.A / B.Sc. Degree ☐ B) M.A. / M.Sc ☐
C) PhD ☐ D other ☐
4. Marital Status A/ single ☐ B/ Married ☐ divorced ☐
D/ widowed. ☐

5. Work experience in years A) 1 -5 ☐ B) 6-10☐ C)11-15☐ D)16-20☐
E) 21 and above ☐

Part II. The current practices of Project Based Training

Direction:-please, read each statement carefully. Then complete the survey by using (✓) on the appropriate number corresponding to the following scale (1), Strongly Disagree, (2), Disagree, (3), undecided/neutral , (4), Agree, and (5), Strongly Agree

No	Items	Extent of Agreement				
		1	2	3	4	5
I	Current Practices of PBT					
1.	Trainers usually use project-based training during teaching					
2.	The college Trainers will provide the project-based training at the scheduled time					
3.	College trainers provide an integrated understanding of project-based training concepts and knowledge					
4.	The college Trainers provide project-based training according to the curriculum					
5.	College trainees are actively involved in the implementation of projects					
6.	College Trainers have used a variety of strategies or approaches to increase the effectiveness of project-based training.					
II	TVET Trainers' Skill					
1.	The trainers of the college are well skilled to impart project based training to their trainees.					
2.	Most of the trainers are working in anticipation of the training session..					
3.	The college trainers continuously monitor and evaluate their trainees in project-based training.					
4.	Trainers help their trainees improve their					

	performance by developing their skills through project-based training.					
5.	College trainers have a positive attitude towards the project and provide real training to their trainees					
III Planning and development of PBT						
1.	The college routinely plan and develop PBT need annually					
2.	Planning and development of PBT will be implemented according to the prepared plan					
3.	The college conducts a needs assessment before the PBT plan					
4.	The plan and the development of PBT are designed considering the core curriculum elements					
5.	College trainers are prepared PBT plan					
6.	The PBT plan is well organized (eg timely access to materials, notification of changes, etc.).					
7.	There exist a system to monitoring and evaluation system for possible to improve the PBT plan when needed.					
IV TVET Trainers' Competence						
1.	Most trainers are theoretically and practically qualified for PBT					
2.	College trainers have a monitoring and evaluation system to help them assess their trainees' suitability for PBT					
3.	The competency of in delivering PBT continuously monitored and controlled					
4.	The college identifies gaps in project-based training to align the competency of trainers with industry needs.					

V	Training Facilities and Equipment Deliver					
1.	The college has provided adequate materials, equipment and well organized workshop for PBT					
2.	The College has adequate training space and to expand training for future PBT needs.					
3.	The college provides timely training material and materials for project based training					
4.	A maintenance plan has been made or training facilities, such as training materials, tools and equipment					
5.	The quality of training materials and tools provided for PBT is consistent with the standard of the proposed project.					

Part III. Please write your opinion for the following questions

1. What are the challenges faced by trainers in implementing project-based training? _____

2. How do trainers overcome these challenges? _____

3. What types of projects are trainees working on? _____

4. What techniques are used to facilitate project-based training? _____

5. What are the benefits of project-based training for trainees? _____

6. How does the college evaluate the success of project-based training? _____

7. Give your comment or missed idea, if any- _____

Thank you very much again!



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Technical and Vocational Training Institute
Faculty of TVET Leadership and Management
Department of TVET Leadership and Management

Appendix II

Observation Checklist for the Researcher

This observation checklist is a basic set of questions that the researcher used to collect data during his visit to the colleges for his research titled Project-Based Training Practices and Challenges in TVET Colleges in Central Sidama Zone. Take additional notes about the research as needed.

1. Project based training is now being implemented in the college.

Yes, ☐ no ☐

2. Are there any challenges encountered while implementing project-based training?

Yes, there are ☐ none ☐

3. Is the college suitable and suitable for project based training? Yes ☐ No ☐

4. The participation of trainees in the effectiveness of project-based training

It is very good, ☐ it is not good enough ☐

4. The college has a project-based training plan and program

Yes, ☐ no ☐

5. Colleges have a complete set of training workshops, training materials and tools to improve the performance and effectiveness of project-based training.

Yes, ☐ no ☐

These above questions are designed to gather general information on experiences, challenges, impacts related to project-based training. To further the researcher uses additional note taking.

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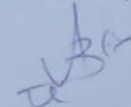
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Practices and challenges of Project based Training in the Case Of Central Sidama Zone.

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 Abebaw Lemm
 TVET Leadership and
 Management Department Head

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 ☎ 0116464309 Administrative Directorate ☎ 0118933128 General Director Office
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To Federal TVTI

Addis Ababa

Subject: - Confirmation Letter

This is to certify that Demoz Tefera Zerihun a student Federal TVTI institute Leadership and Management Department, has taken necessary data from our organization Arbegona TVET Collee. For his research entitled **Practices and Challenges of Project Based Training the case of Central Sidama Zone TVET College, sidama Regional State.**

Sincerely Yours.



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Date

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Sid/De/Qa/Mo/Te/Og/Qa/De/Te/Birg
Yirgalem e Ko/Te/College Ref

10/10/06

To Federal TVTI

Addis Ababa



Subject: - Confirmation Letter

This is to certify that DEMOZ TEFERA ZERIHUN a student FEDERAL TVTI Institute Leadership and Management Department, has taken necessary data from our organization YIRGALEM POLY TECHNIC COLLEGE. For his research entitled "Practices and Challenges of Project Based Training the case of Central Sidama Zone TVET College, Sidama Regional State.

Sincerely Yours.



Wessede Shutura Yammesso
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