Impact of Evaluation of the Vocational Training Institutes in the Punjab Province, Pakistan

By

HUSSAIN, Saqib

THESIS

Submitted to

KDI School of Public Policy and Management

In Partial Fulfillment of the Requirements

For the Degree of

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Committee in charge:

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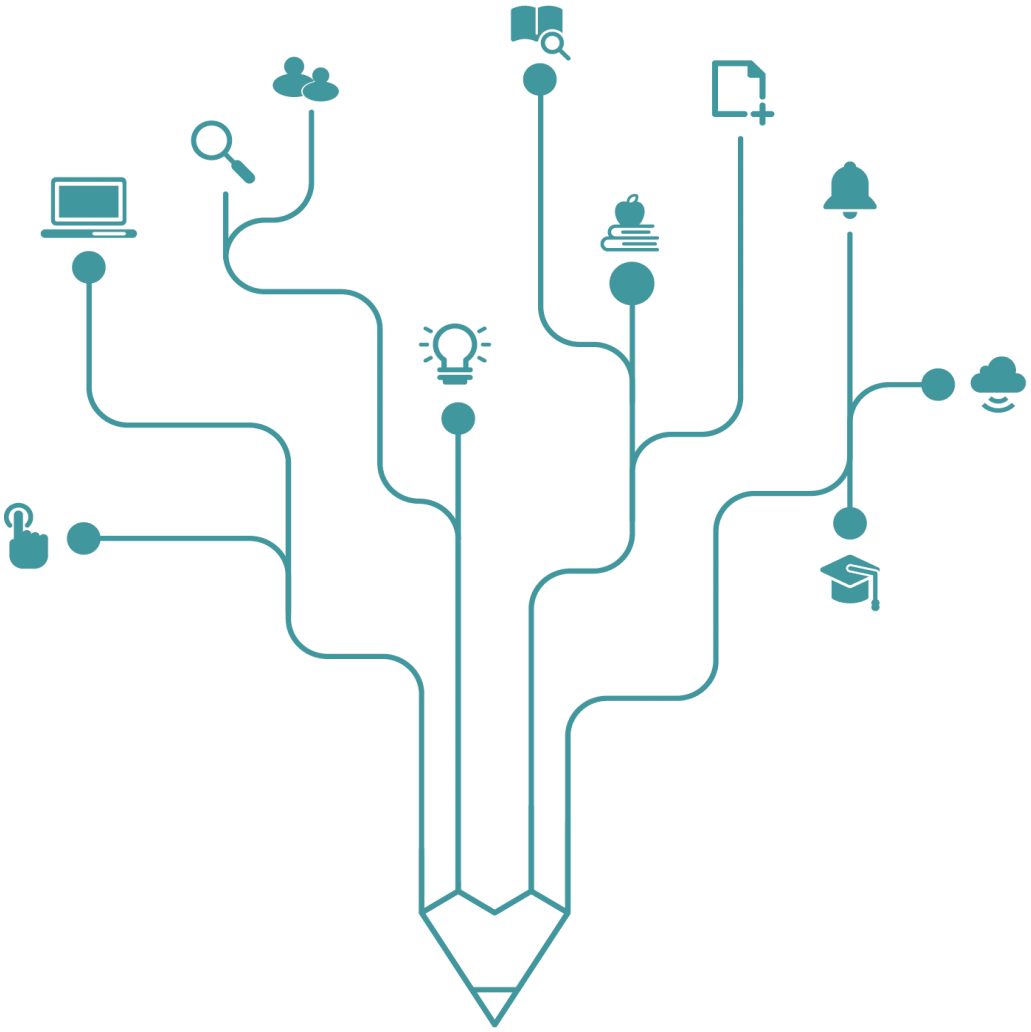
Approval as of December, 2021

IMPACT EVALUATION OF THE VOCATIONAL TRAINING INSTITUTES IN THE PUNJAB PROVINCE, PAKISTAN



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ABSTRACT

This study examines the impact of the Vocational Training Institutes (VTIs) on employment in the Punjab province, Pakistan. I exploit the difference-in-difference and instrumental variable methods using data from Global Data Lab, Pakistan Board of Statistics (PBS) and Punjab Vocational Training Council (PVTC). I find an increase in the employment rate of Punjab province in response to the implementation of the VTIs. The female employment increased significantly, but the male employment did not increase. I also find no increase in the high-level employment as a falsification test. The results suggest that the vocational training program plays a crucial role in improving labor market outcomes and gender gap in developing countries.

***Keywords**: Impact Evaluation, Vocational Training, Employment, Pakistan*

EXECUTIVE SUMMARY

Complexity in employment and limited accessibility to skills development programs have been long-standing issues in developing countries. In Pakistan, except Punjab where a skills development program has been launched, there is no such type of institutes available that can expedite students' skills, knowledge, and abilities. As a crucial step towards the skills development program, the Punjab provincial government had been established Punjab Vocational Training Council (PVTC) in October 1998 with the primary initiative towards an alliance between government and private sector. The entire corporate financial needs are backed up by assistance through Zakat System and Grant in Aid from Government. The PVTC accumulated received over Rs. 20.4 billion in the head of Grant in Aid and Zakat Fund. The basic aim of the establishment is to impart quality knowledge and skill to deprived sectors of the entire Punjab Province by ensuring their job placement and self-employment.

This Research Project titled "*Impact Evaluation of the Vocational Training Institutes in the Punjab Province, Pakistan*" aims to evaluate the impact of the VTIs (Vocational Training Institutes) on employment in the Punjab province. We adopt a quasi-experimental approach to scientifically examine the impact of VTIs on employment in the Punjab province of Pakistan. The basic research question is to explore socio-economic impact assessment before and after the training of the beneficiaries assisted by a tool of socio-economic impact assessment blended with provincial employment including male and female employment rates. The Government of Punjab is the key stakeholder and playing a major role to ascertain the knowledge impartation and enhancing literacy with a blend of skill up-gradation for stronger industrial and academic relationships.

To investigate the impact of VTIs on provincial employment, I used the Difference-in-Differences Fixed Effect Regression coupled with Instrumental Variable Approach. In order to assess the impact , the provincial employment and other relevant data have been collected from Global Data Lab, Pakistan Board of Statistics, and PVTC Staff from 1992 to 2020. Unit of analysis is the provincial employment rate in the provinces either control or treatment. Based on limited resources the researcher couldn't collect the data from individuals' trainees, therefore, the researcher has included falsification test and robustness checks to attain more reliable results. To avoid biases in results the fixed effect regression model and instrumental variable method has been used. The results of this research study are robust even with controlling covariates and time

trends also for area-specific effect. Meanwhile, the professional growth among beneficiaries was observed satisfactory as they gained knowledge, skill, guidance, financial assistance, and better opportunity for a bright future. The impact on female employment is likely to be more reliable than the impact on male employment.

Results of the study shows the program, on average, has increased 1.6% total employment, 2.5% female employment in Punjab province with high significance. The effect of program on male employment is 0.63% but insignificant. The focus of the program was female trainees therefore the results can be observed accordingly.

It is highly recommended to commence the latest highly demanded trades for future growth of PVTC, industrial alliance and enhance the volume of admissions for sustainable development of skills and entrepreneurship for mutual benefit to person and society. Moreover, it is recommended to implement such type of training and skills development programs in other provinces of the country.

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1. INTRODUCTION

1.1. Overview

The creation of jobs is a top priority for developing countries' governments, bureaucrats, and development practitioners all around the world. A lot of effort is currently being paid to programs and development instruments that have the potential to end cyclical unemployment among the poorest, with a specific attention on youth and human capital development. Skills development programs are one such development technique that is getting a lot of attention, with a lot of evidence coming from documented experiences in the global economy. Unemployment of youth is a prevailing issue in developing countries. In fact, in Pakistan, the unemployment rate has been increased by about 4% in the last ten years. To expedite the skills development process and employment in Punjab, the provincial government of Punjab had initiated a large-scale skills development program across Punjab back in 1998 that trains students with both theoretical perspective and practical perspective through practical work and internships at various organizations. The research project aims to evaluate the impact of vocational training institutes on provincial employment.

1.2. Conceptualization

Career and technical education are terms used to describe vocational education (Achilles, 1989) or TVET after 1999 after the World Congress in Seoul, South Korea. Historically, practically all vocational education was done in the classroom and/or on the job, with students learning trade skills and theory from authorized professors or experienced practitioners. However, online vocational education has risen in popularity in recent years, making it easier than ever for students to learn diverse trade skills and soft skills from proven professionals, even if they reside far away from a typical vocational school. Globally, trends in the application of TVET and skill development have emerged. Several governments began to recognize the importance of education in efficiently preparing learners for the workplace beginning in the late 1980s. This school of philosophy, termed "new vocationalism," centered debate on the purpose of public education on the skills demands of industry. TVET and skills development were seen as critical to fostering economic growth in general and reducing youth unemployment in particular (Brodhead, 2000). As a result, UN Sustainable Development Goal 4 argues for expanding equitable access to TVET in order to significantly increase the number of youngsters with

necessary skills for decent jobs (Buzzell, 1987). Vocational education and training are powerful tools for increasing labor mobility, adaptability, and productivity, as well as improving company competitiveness and redressing labor market inequities. (Caillods, 1994). Individuals, businesses, and economies all benefit from the acquisition of skills. Because of their benefits to individual, company, and national productivity and incomes, skill development and, by extension, skill formation systems are significant. Individuals with skills can be more productive and earn more money. Skills in the workforce help businesses become more productive and profitable. Skills aid national economies in increasing output and wealth creation.

1.3. Historical Account

Technical and vocational education and training (TVET) is a type of schooling and training which develops human capital and increases their productivity in a variety of industries (Finch and Crunkilton 1999). TVET builds human capacity and expands people's options in order to encourage start-ups, small businesses, self-employment and entrepreneurship. TVET exists thought to play a significant role in good citizenship and have crucial influence in social development in long run (Jallah, 2004; UNESCO, 2004). For example, Jallah (2004) a vital concern of people in 21st century is social development and the goals defines by United Nationals, a master key for achieving those goals is referred as TVET, Education for Sustainable Development (ESD) is one of the major target of TEVT in current technological era. As a result, worldwide the educational development has high influence of TVET (Grierson and Young, 2002; Tabbron, and Yang, 1997). However, a decade ago UNESCO research reaffirmed by what method TVET be able to help various marginalized populations and groups around the world who lack equal access to resources due to socio-economic disparities. It is often assumed that TVET could be a useful strategy for reducing unemployment in semi-urban areas, hence reducing migration to metropolitan areas (UNESCO, 2010).

Pakistan is a growing country with a rapid rate of population growth, and the youth appear to make up the majority of the population. With the rapidly growing youth population, the TVET sector's capacity to supply demand-driven training services to increase workforce with technical and professional skills is insufficient to address current labor market issues (Shah, 2004; Janjua and Irfan, 2008). Furthermore, as compared to other developing countries in the region, Pakistan's Labor Force Participation (LFP) rate is relatively low. As a result, the majority of the population is unemployed, affecting wellbeing, schooling, and overall living standard (Janjua and Irfan,

2008). Various of the world's most productive countries have made significant investments in skill development. Pakistan, unfortunately, has failed to satisfy the international TVET requirements (GOP, 2009). To meet the expectations of the workforce in a current digital exonomy and international markets, major TVET changes are required.

According to a comprehensive literature review, various scholars (Shah, 2004; Mustafa, 2005; Kazmi, 2007; Hassan, 2007; Janjua and Irfan, 2008) have divided Pakistan's TVET development process into six phases, as illustrated in Table 1 (adapted from Ansari, 2013). Considering current TVET changes and their execution, Ansari (2013) added a new phase called "TVET reforms and implementation" to his review study. In Pakistan's TVET history, the articulated education strategy of 1972-1980 suggested a fundamental shift from general education to the term "world of labor." As a result, agrotechnical researches, agricultural science, and home economics were introduced in both urban and rural populations across the country (Mustafa et al., 2005). Furthermore, with financial assistance from several international donor agencies, major development and extension in Pakistan's TVET industry occurred in the 1970s and 1990s. Vocational Training under the shadow of the Punjab Vocational Training Council and Government of Punjab is a part of this large transition of Pakistan.

Table 1: Development Phases of TVET in Pakistan

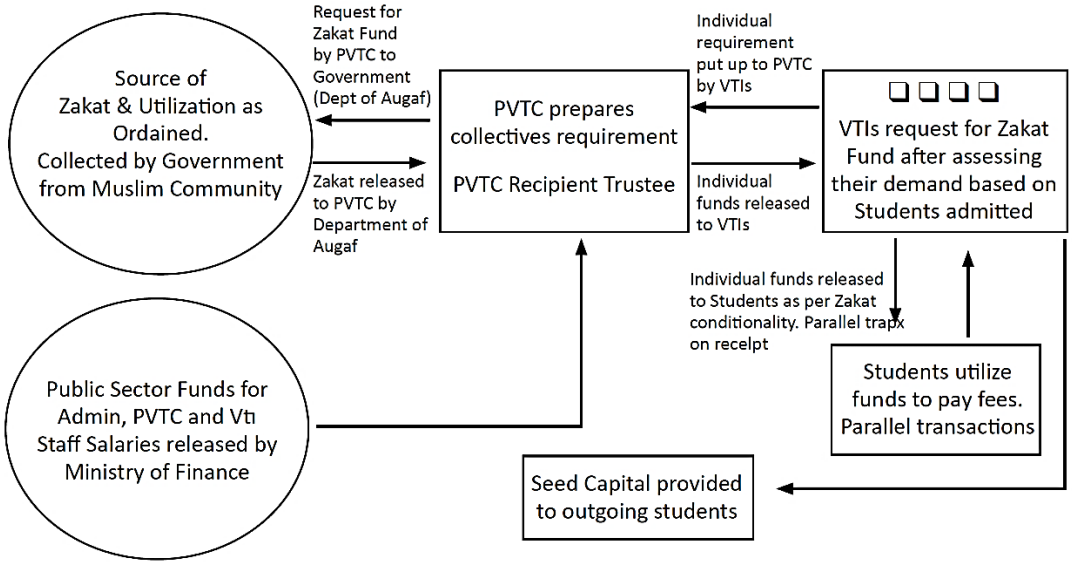
Phase	Implementation period	Level of Implementation
1st	1947-1958	Formulation of Policy
2nd	1959-1970	Development and Expansion
3rd	1971-1977	Period of Experiments
4th	1977-1988	Additional Expansion
5th	1989-1997	Focus on Quality of TVET
6th	1997-2010	Focus on Governance and Financials
7th	2009-2016	Implementation and Reforms

Adopted from Ansari (2013)

1.4. Description of the Project

The government of Punjab had launched Vocational Training Institutes (VTI) under the Punjab Vocational Training Council (PVTC) in 1998 across the province. PVTC had been established with the primary initiative towards an alliance between government and private partnerships. The entire corporate financial needs are backed up by aid through Donations, Zakat, and Grant in Aid, and Rs. 20 billion was allocated in the last 20 years from national and international organizations given in Annexure 1. The basic aim of the establishment is to impart quality knowledge and skill to deprived sectors of the entire Punjab Province by ensuring their job placement and self-employment. Initially, Punjab Vocational Training Council (PVTC) has constituted only two institutes and they have increased the number of institutes across the province at a rapid rate and in 2017 the number of training centers was 326, however, currently, 208 institutes are working and providing the training to the youth. Under the shadow of the Provincial Government of Punjab, the Vocational Training Institutes are working on a large-scale network in all thirty-six districts of Punjab. The model of VTI under the shadow of PVTC is shown in Figure 1 developed by Khan (2014).

Figure 1: VTIs Model under the Shadow of PVTC



Adopted from Khan (2014)

The assessment for the demand of new trade is ascertained by the Training Need Assessment (TNA) tool by the successful completion of demographic data extraction at the Tehsil level. PVTC had designed 100+ market-based trades as aligned with up to dated curricula in the Economic,

Industrial, Health, and Service sector of Punjab. The major fundamental component of the regular vocational study is theoretical work, apprenticeship, practical work like internships, lifesaving skills, and social entrepreneurship, which are an integral part of every entrant. The skill and knowledge of these trades are imparted to students among 326 Vocational Training Institutes (VTIs) which are founded in government premises and in rented buildings in the whole Punjab Province with the turnover capacity of 160,000 students annually which will gradually reach up to 200,000 capable students in 2017 (Munir, 2017). The basic purpose of the VTIs is the enhancement of skills, knowledge, and abilities in youth including males and females (Khan, 2014). Currently, in Punjab, VTIs are offering sixty-five different courses/trades. The ultimate objective of this type of project is to increase the employability of youth in the province through skills development. VTI is a largescale project in Punjab as shown in Annexure 1, the total donations since last twenty years. The key features of the PVTC are given in Table 2.

Table 2: Key Features of the Program

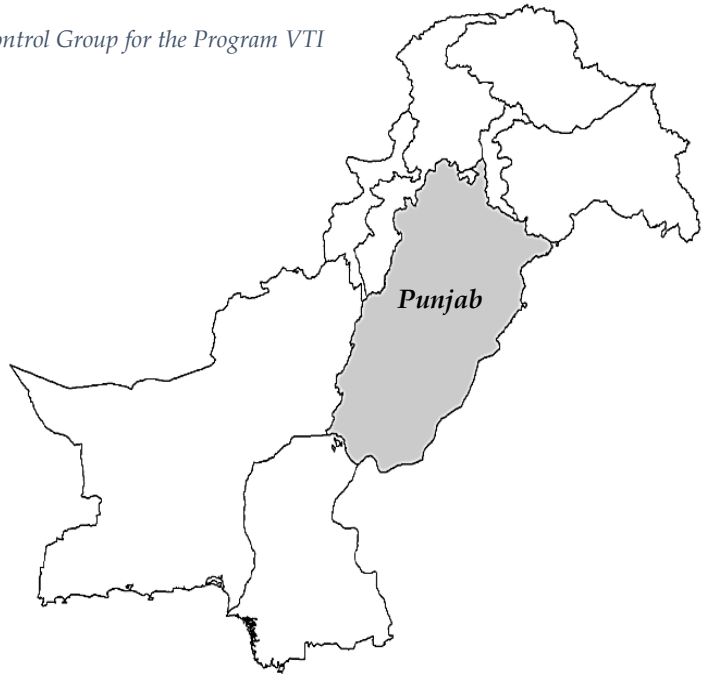
Features	**Volume**
Institutes	208
Courses Offered	65 (108)
Annual Graduates	60,000+
Total Graduates	1,200,000+
Employment Rate of Graduates	98 %
Trainees F:M	51 : 49
Board Members	38

Adapted from VTI Website

1.4.1. Context of the Study Area and VTIs

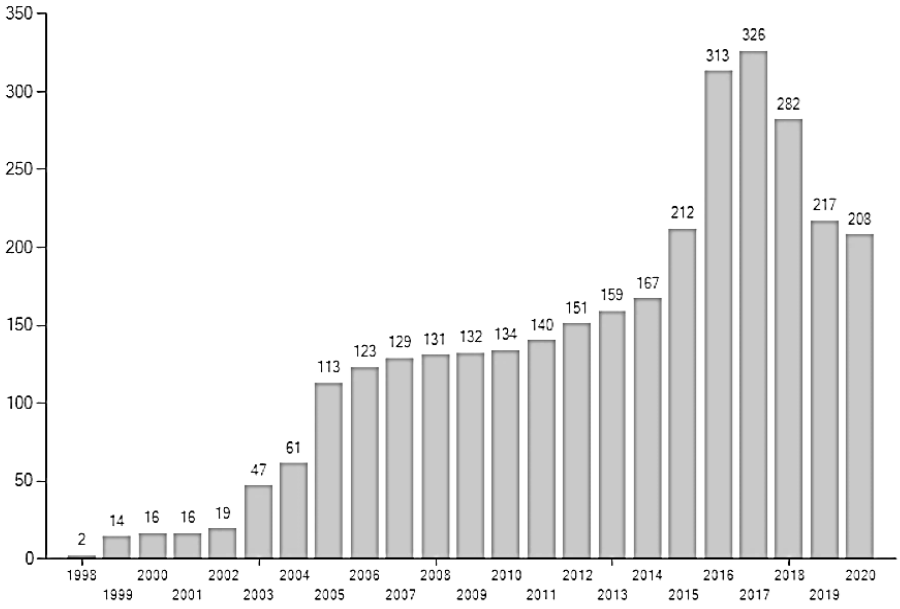
Punjab is the most important province of Pakistan as it has maximum input in the annual GDP of Pakistan. The total area of Punjab is about 205,345 Square Kilometer and it is the most

Figure 2: Treatment and Control Group for the Program VTI



populated province with more than 80 million people which is 55% of the total population of Punjab. Figure 2 shows the program implementation area and Figure 3 shows the number of institutes in Punjab province over the years.

Figure 3: Number of VTI Centers since Initiation



1.4.2. How does the VTI Work?

The analyst in the VTI top-level management perform various analysis based on Training Need Assessment (TNA) and explore the courses that have demand in the industry as well as the trades that have the capacity of entrepreneurship. PVTC has designed curricula for 65 different trades to meet the expanding demands of the industrial, agriculture, health, and service sectors, keeping in mind the newest trends based on market demands through Training Need Assessment (TNA) after performing demography surveys at the tehsil level. Life Skills and Social Entrepreneurship courses are required for all trainees in addition to their regular vocational studies and practical training. The details of all courses and teachers' training statistics are given in Annexure 2 and Annexure 3 respectively. The standard operating procedure of VTI workflow is given in Figure 4.

Figure 4: Workflow of VTI

1.4.3. Objectives of the VTI and PVTC

- To train and equip youth with competitive marketable skills.
- To utilize Zakat Fund in the youth development.
- Management of funding for spending on youth
- Fulfill the demand of Industry

1.5. Theory of Change

The Theory of Change (ToC) can be defined as the set of hypotheses on how the intervention is expected to produce the desired impacts (Vogel, 2012). It describes the cause-effect linkages between the project activities, outputs, outcomes, and expected impacts, as well as the interaction with external factors and the overall context within which the project operates. A properly articulated theory of change, with outcomes defined in such a way that they can be observed and measured, is crucial for a solid impact evaluation. It allows the identification and measurement of the expected short-, medium-, and long-term changes and the relationships among them, aiding to understand what caused the observed impacts and why, or where the causal chain was interrupted if no impacts are observed. The impact evaluation tests the hypothesis of the ToC, helping refine it and improve future interventions.

The VTIs were expected to affect the trainees and other related key variables such as employment, skills development, entrepreneurship. We can categorize all these expected outcomes and the way of outcomes into three categories, institutional mechanism, social mechanism, and behavioral mechanism. Firstly, the institutional mechanism involves the material inputs of the project that causes the effective and efficient results of the program in the long term. The provincial government of Punjab has built above three hundred institutes infrastructure and equipped those institutes with modem tools including trainers, types of equipment for practical work for sixty-five trades/courses, and administrative staff. All these inputs of the project coupled with social efforts such as marketing activities, awareness campaigns, advertisements result in the motivational factor of the youth to take admissions at VTI for better training to secure and boost their future in the shape of employment, income, and living standard. The social mechanism is important as an institutional mechanism because the only social mechanism makes the institutional infrastructure workable. The marketing board of member Miss Bushra Nawaz has contributed efficiently in the social activities across the province, therefore, the institutes gained so high interest of public and they trained millions of students over the two decades. As well as the behavioral side of the change mechanism the social influence with infrastructural development motivated the youth to gain benefits from this program. After starting from one institute to this large network of institutes express that the performance of institutes is so high and on the other hand the more demand of these institutes is a key reason of behavioral change of people who want to take training from the institute. In terms of this impact evaluation, the

interest is on the TOC of the youth skill development and employment level of female and male trainees. For analytical purposes, the impact evaluation constructed TOC for trainees and institutional intervention. The TOC for the Vocational Training Institutes is underpinned by the fundamental hypothesis that the improvement brought about in the quality of institutes through training teachers Annexure 2, providing educational equipment, and raising awareness, Zakat funds, Grant in Aid and collaboration with multiple national and international organizations in various projects (given in Annexure 4) will result in employment impacts. For trainees receiving support through the VTIs, the TOC expects that in the medium term (1-5 Years) changes will be observed in enhanced trainees' performance. In the longer term (5-10 Years), as more students took admissions and the number of institutes also raised and get doubled in 2005. In addition, in the longer term, the number of increased institutes will change the employment level of the province including male and female employment. This, in turn, will encourage other youth to have this training and get industrial jobs. In the longer term, improved overall performance, increased number of institutes, and a greater number of trainees, together with enhanced knowledge, skills, and abilities, will result in the enhancement of provincial employment as the training courses closely associated with the industrial requirements which designed after training need assessment of industries by the board of VTI.

1.6. Literature on Factors Associated with Skills Development and Employment

This study empirically assessed the impact of the Vocational Training Institutes on the employment of trainees in Punjab. In assessing the impact of the program on employment, the analysis was limited to female employment and male skilled workers employment. The inclusion of female employment is well reasoned because, in Pakistan, there are many factors due to which females' education and employability suffered a lot. For instance, the institutes for skills development (especially for females) are not available and/or very limited in Pakistan (Islam, 1970; Johanson, 2003; Kazi & Ivo C, 1987; Roomi & Parrott, 2008), the culture of Pakistan do not allow females to work outside of the home (Dale et al., 2002; Jejeebhoy & Sathar, 2001; Kazi & Ivo C, 1987; Mumtaz et al., 2003; Rehman & Roomi, 2012). As shown in Table 2 the ratio of female trainees is greater than the male, therefore, the PVTC has a significant role in the improvement of female trainees' employment.

Because gender is intertwined with other forms of exclusion in society, women's situation in Pakistan is not uniform. Women's status and role in collective family structures, cultural norms,

and practices vary widely and are occasionally conflicting. Feudal capitalism and social mores might also limit female entrepreneurs' operations throughout their working lives. In comparison to men, a woman's condition is arguably one of systemic subjugation defined by patriarchal factors. These policies severely limit the number of job prospects available to women across Pakistan. Professionally, women must follow two important mores: Pardah (veil)—literally, a 'curtain' signifying a system centered on women's seclusion—and the enforcement of 'high' standards of feminine modesty. In many South Asian countries, female seclusion and gender segregation are the conventions. Papanek (1982) identified the burqa, which is commonly worn by Muslim women, as a movable method of seclusion. Women are regarded the repositories of their families' honor, and their purity and good reputation are greatly prized and guarded, hence female entrepreneurs must adhere to the concept of izzat (honor) (Shaheed, 1990).

In such circumstances, there was the only institute in Punjab that encourages women to take training in a separate education system. It means there are different institutes for females and males. The separate institutes' provision was a key encouraging point for women to take training and get involved in employment in various organizations.

Vocational education develops a student's personality through cultivating creativity, inventiveness, a general personality, and risk-taking personality attributes which are essential for work. General employment competences are also taught in vocational education, which are necessary for obtaining a job in today's competitive labor market. These skills are required for both local and commercial employment. It may be more important to give skills that are required by the region's industry through programs that lead to the establishment of small enterprises and employment. Employment is intertwined with vocational training and technical education. Vocational training courses should be combined with entrepreneurship skills as part of the curriculum in vocational institutes. Individuals and governments around the world are requesting more vocational and entrepreneurship education, according to educationalists (Jack & Anderson, 1999; Atherton, 2004; Caird, 1990; Fayolle, 2004; Gibb, 1996; Solomon, Duffy, & Tarabishy 2002; Hytti & O'Gorman, 2004; Leffler & Svedberg, 2005; Katz, 2003; Klapper, 2004; Plaschka & Welsch, 1990). Some argue that everyone in the modern economy has the potential to be an entrepreneur (Casson 2000), or that everyone should be exposed to TVET (Gibb 2002a, 2002b). Governments have recognized a connection between employment and industrial development and have been developing education policies to promote vocational training in

educational environments — see for instance work by Stevenson & Lundström (2002) on Netherlands, Australia, Finland, and the UK. Many people in political, educational, and academic circles believe that a country's people would gain if they were more creative, vocational, and entrepreneurial, and that entrepreneurship and employment at the vocational level might be a key growth component.

The purpose of this research study is the impact evaluation of the VTIs' performance in the job market in Punjab province. There is a causal relationship between the provincial employment rate and offered courses/services which needs to be evaluated quasi-natural experiments. For the evaluation of this causal relationship, the other provinces of Pakistan i.e., Sindh, KPK, or Baluchistan are treated as a control group based on similar characteristics with Punjab and Punjab itself treated as a treatment group in the study.

The study found that there is a significant and reliable impact of vocational training institutes on female employment and male skilled based workers. The impact on female trainees is highly significant by using the fixed-effect method including region and time control. However, for the male skilled based employment is also significant with some conditions such as the insignificant difference between treatment and control region before the implementation of the program and significant difference after the implementation of the program. Many valid reasons are associated with these results which are explained in discussion section.

In addition to female employment and male skilled employment, this research also includes male upper-level employment. Conceptually, there is no cause-effect between Vocational Training Institutes and Upper-Level Employment because the training of all courses is associated and strongly linked with the skills training, therefore, the insignificant results on the male upper-level employment also support the causation of vocational training institutes with male skills-based employment and female employment.

Based on the mechanisms of change of the program, researcher generate the following questions for evaluating the impact of the VTI:

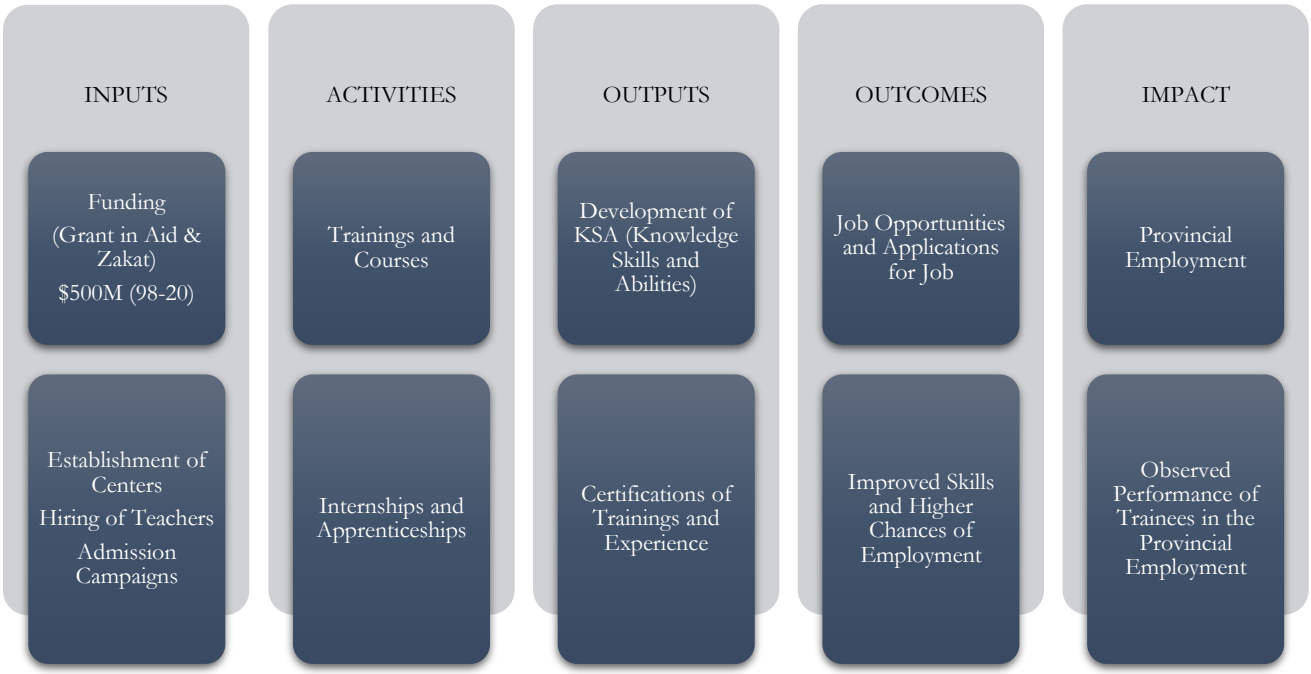
1.6.1. Evaluation Questions

- To what extent the VTIs has improved female employment in Punjab province?
- To what extent the VTIs has improved male skilled employment in Punjab province?

1.7. Result Chain

Based on literature review of multiple sources including project reports, research studies and case studies and after a detailed analysis, the result chain flow is expected to be as shown in Figure 5.

Figure 5: Result Chain of VTIs' Impact Evaluation



2. EVALUATION METHODS

2.1. Systematic Review of TVET & IE Literature

In this research project, initially, the researcher has done the systematic literature review of relevant studies including the studies that are related to the program such as the TVET in various countries, and secondly, the impact evaluation studies of similar programs worldwide. The researcher carried out a detailed search of relevant articles, case studies, reports, and books for exploring relevant literature. The researcher has followed the way of Webster and Watson (2002). As suggested by Schwarz, Mehta, Johnson, and Chin (2007) researcher well illustrated all the relevant material to support the research idea with existing theories. In this research project, the researcher has followed the best way to find the relevant literature for this study. At first, top-level TVET and impact evaluation journals have been explored and found some good studies related to this research and supports the idea of this study. Secondly, the documents of VTI and PVTC have been explored for a better understanding of the project and to figure out the importance of this research study. Thirdly, the relevant cases have been reviewed, and lastly, the scope of research paper worldwide, which means the researcher has reviewed the cases from developing countries coupled with developed countries. For the detailed search Web of Science, Google Scholars and other relevant databases have been explored. In the search inclusion criteria of articles were based on the keywords such as TVET, Vocational Training, Impact Evaluation, and so forth given in Table 3.

The researcher has found various TVET programs that are successfully implemented and boosted the economy in various ways, for instance, employment, entrepreneurship, skills development, and industrial growth. According to Baron Markman (2000), in the UK there is a constitutional obligation on the schools and educational institutes to provide entrepreneurship and vocational training to the learners and in that training, practical work must be included. Entrepreneurship and vocational training are key elements of the whole education system that can support the young generation for start-ups and help in finding suitable employment. In vocational training, practical work is more important for the learner, so the Scottish Government Plan for Practical Education makes the learners more practical. In Cyprus, according to Kuratko (2007), vocational training means practical work is the essence of the conventional education system. Instead of the pure practical work courses, there are some entrepreneurship nonprofessional courses but in the

contents of the courses, practical work is essential. Moreover, The National plan on Entrepreneurship in Education of 2010 included entrepreneurship education in VET education.

Another leading TVET program in Austria is a good example here named "A Learning for Jobs Review". In the program, the key strengths are the dual training including theoretical and practical/on-the-job training (OJT), higher job placement rate, involvement of public and private sector, training need assessment (TNA) before the initiation of a new course, and well-prepared training staff. Parallelly, it also has some challenges including, the criteria is 9th grade for admission which is very easy, therefore, various students pick their track immediately after 9th grade, lack of quality in the apprenticeships, no career guidance for the students during their studies (Hoeckel, 2010).

In Belgium, according to Kis (2010), a range of vocational training programs are available at the secondary and higher secondary level. A famous of them is Flemish Agency for Entrepreneurial Training coupled with the employment department. The Flemish VET activities can train trainees with proper policy development pieces of evidence such as recently "Quality and opportunities for every pupil", the "Competence Agenda" and the "Pact 2020" papers has been used for policies. But some parts of the VET system are lacking behind such straining workplaces and effectiveness of quality of education. In Chile, the vocational system has the strength of a dynamic economy with 6% GDP in the last two decades. In addition to that, the VET system has the support of society and is demanded by a wide population. Another strength is the public administration's dedication to improving and transformation the VET structure is demonstrated by the recent work of the VET Commission and the creation of the National Council for VET. Besides the strengths of the VET system, the institutional and curricular development is a big challenge and workplace training, as part of VET programs, is weakly developed. Many upper secondary VET students do not take part in workplace training and the mechanisms to assure its quality are weak (Kis, V. and S. Field, 2009). The Chinese VET system is another example of strong vocational training and education. In China, VET is the main cause for entrepreneurial development and innovation reform. According to Kuczera, M. and S. Field (2010), a simple model of VET in China involves a variety of specialisms, for instance, a noteworthy range of academic skills in youth, commitment to training, and strong relationships with employers. Higher secondary VET requires a fee but the government of China has introduced many assistantship programs at the national and provincial level to assist trainees in monetary terms. Moreover, the China VET

system has strong methods to transfer the knowledge and teachers must spend one month in a year in the relevant industry. Also, the China VET system has challenges in workplace training, resources, planning, and coordination.

OECD (2015) defined the key features of an effective vocational training system that is based on the policy recommendations including OECD Report named "*Learning for Jobs 2010*" and "*Synthesis Report 2014 – Skills Beyond School*". The key features of a successful TVET or Vocational Training System include deciding the provision and meeting the needs that how a vocational training system has been developed. Secondly, delivery of the quality skills to the learners, thirdly, utilization of the learning outcomes that how skills evaluated, measured and used and lastly the supporting conditions of vocational training system that involves the support through practices, policies, and institutes.

Firstly, the section on meeting needs includes the following.

- Vocational training systems must adopt the mechanisms through which they can ensure vocational provision to the labor market. In some cases of vocational training systems, the courses are developed by the demand of the students or trainees rather than the demand of the respected industry. This way of developing courses may develop the dream skills of students, but those skills are not useful in the job market.
- The vocational skills must be provided coupled with basic academic skills such as literacy and numeracy. Basic skills have a key role in the success of an individual. Therefore, there is a need to evaluate the basic skills needs, strengths, weaknesses and must explore the ways through which basic skills can be added with the vocational training.
- Offered programs or courses must not be dependent on the academic or conventional education achievement of a student. Some types of courses have a good demand in the market that do not require academic qualifications.
- Flexible program structure should be made with the consideration of trainees' work and home needs because many of the trainees have the responsibility of their homes and some of them may work somewhere. Therefore, the programs must be designed according to the flexibility of the trainees and the challenges of trainees must be taken into the consideration.

- There must be variation in various courses according to the academic achievements of the trainees. For instance, if the trainee is highly qualified in academic achievements then there must be high-level courses offered for him, and for the other trainees, another type, of course, must be offered.
- For the high achievers of academic and vocational training, the institutes must offer some special courses that can have management skills, entrepreneurial skills, managing trainees' skills, and so forth.

Secondly, the quality of vocational training educations must include the following features.

- The best model to engage youth in skills development and work-based training is the apprenticeship model. A good apprenticeship model has the characteristics of collaboration with the partners such as industry, public administrators, and the formal education sector.
- The ultimate objective of apprenticeship models is to employ the trainees in the job market which results from a good learning environment. Therefore, it should be systematic, quality-assured, assessed, and credit-bearing.
- The trainers in vocational training institutes must bear balanced teaching skills and fresh knowledge of the industry. For this vocational training, institutes may hire the trainer from the industry professionals and practitioners as part-time for courses.

Thirdly, the skills and abilities of trainees during the training should be accessed and measured critically for improvements.

- During the development of curriculum and activities for trainees, a training news assessment (TNA) must be conducted. Moreover, it must be sure that the curricula of vocational training courses must be aligned with the labor market and fulfills the requirements of the industry.
- In addition to fulfilling labor market needs the curriculum must be enriched with some advanced contents for flexibility and must have the place for improvements for future needs of the industry. Besides the fulfillment of industrial requirements, the vocational training courses must fulfill the requirements of local industry.

- A strong institutional framework and model that can manage all the offered courses. Overwhelming the number of training and activities needs a strong framework to manage all the thighs and it is possible through the inclusion of employers and trade unions.
- Decent quality assessment tool in the shape of exams and skills measurement test is a vital element of the vocational training model. However, a perfect system for complex skills occupations is a difficult job but it is an essential element for the general skills and mandatory for the competency-based qualifications.
- The skills assessment model for competency-based courses must include two types of examinations, firstly, the examination of prior or theoretical learning of the course and secondly, the assessment of practical skills.

Lastly, the supporting conditions for TVET programs through policies and institutions.

- The vocational training model has various stakeholders, for instance, government, industry, the public, trade unions, and conventional educational institutions. The TVET institute needs to develop proper partnerships with all of the stakeholders. Making partnerships with all of the stakeholders reduces the risks in vocational education and improves coordination which is ultimately beneficial for the institutions.
- Career center in all of the educational institutions is a mandatory thing but for vocational education, it has a very important role because the sole purpose of TVET is to employ its trainees. For TVET, professional career guidance is needs that must be systematic, upgraded, and supported according to the information of the labor market.
- TVET, to be strong, must keep the updated data about the market, its trends, and the future of the market. The TEVT must have enough flexibility to adopt changes according to the up gradation of the market.
- Consistent and sufficient funding is a basic need for running a TEVT because almost all the TVET institutions are based on funding, especially the upper secondary vocational education, and grants across the globe. Therefore, the role of resource development is very important in a strong model of TVET.

Table 3: Keywords for Search

Keywords	*Keywords*
TVET	*Impact Evaluation*
Vocational	*Evaluation*
Skills Development	*Difference-in-Difference, DID, DD*
Training	*Employment*
On Job Training	*Female Employment*
Practical Training	*Punjab, Pakistan*
Vocational Education	*Impact*
Vocational Training	*OECD, World Bank*
Vocational Education Training	*Review*

For the development of a strong research framework and to use a strong method for evaluating the impact of VTIs on employment, the researcher has done a detailed literature review of the papers that are related to this topic. Mathur (2018), in his study Impact of Vocational Training on Employability, used a detailed systematic literature review coupled with empirical data to evaluate the impact of vocational training. He collected primary data through questionnaires and used SPSS to evaluate the impact. The source of primary data was the trainees. He found positive impacts of vocational training education on employment. Diwakar & Ahamad (2015), in their study Skills Development of Women through Vocational Training, aimed to measure the importance of females in the job market when the international market is diverse and opportunities are increasing day by day. The relationship between vocational training and industrial growth coupled with territory institutions is also measured by Rasul (2012). Various researchers have reported many types of TVET worldwide, for instance, in an OECD review of vocational training, Hoeckel, (2009) reviewed the TVET of England and Wales in which he mentioned the strengths and weakness of TVET in England. Musset, and Castañeda (2013), reported the strengths and weaknesses of skills beyond school commentary in Iceland. Similarly, Kuczera, and S. Field (2013), reported the skills beyond school review in the USA coupled with strengths, weaknesses, and recommendations. A case study on Vocational Training Institutes in Punjab conducted by Khan (2014). He reported the VTI in Punjab as a perfect example, for instance, during an interview with Mr. Sajid Naseer, he reported that the chairman of PVTS is a volunteer member, and it has 230 board members with diver type of tasks. The BOM is

empowered to introduce new trades after a proper TNA and facilitate the trainees after their graduation. Moreover, he mentions the term "a perfect example of public-private partnership" for VTI. partnership". He further stated that the management chart of the VTI's Board of Management and the PVTC's Council Members are the same. This gives the VTI a genuine sense of self-sufficiency. It has the authority to run the VTI as it sees fit given its surroundings. It also allows individuals to choose a vocation that is in high demand in the area, allowing them to reinforce the demand-driven expertise that is prominent in their geographic location. BOM also assesses and monitors the teaching quality, as well as the personnel and teachers. In some ways, there is a competition among the VTIs to see who is more effective in establishing demand for its graduates. PVTC is always available to guide the VTIs and Board Members if something goes wrong, but PVTC does not feel responsible for these failures because they have empowered the BOMs to design plans to overcome them. In addition to that, the mission statement of VTI includes the utilization of Zakat funds for the welfare of society, alleviate poverty, focus on demand-driven skills, involvement of right stakeholders, involve public and private institutes to build perfect PPP, and lastly focus on the entrepreneurship and employment of graduates.

For the analysis of quantitative data and adopting the best approach for data analysis, various studies have been reviewed. The focus during the search of methods is on the impact of vocational training on employment. Therefore, various well-renowned studies have been reviewed, for instance, Johnson, (2015) published a paper in Basic Research Journal of Education on the topic of women empowerment by vocational training, Amedorme & Fiagbe (2013) researched the challenges of technical education in Ghana, Catherine & Jacob (2014) worked on the youth sills development in the informal sector of the economy in Africa, Audu, Kamin, & Saud, (2013) worked on the attainment of employment through 21st-century skills development in vocational training education, Abas, Imam, & Osman (2013) refers to the employment and skills task performance in the government sector and their main focus was on the relationship of employment skills and task performance. In addition to that, in Nigeria Maigida, Saba, & Namkere (2013), worked on the entrepreneurial skills in vocational training and their impact on the empowerment of youth in the industry. Lastly, in Pakistan Khilji, Kakar, & Subhan (2012) studied the impact of vocational training on economic growth. After the worldwide literature review, the researcher has adopted various strong methods for true impact assessment, for instance, difference-in-difference, and mean differences.

2.2. Quantitative Experimental Design and Methods

Since the VTI institutes program was implemented across the province Punjab and the other provinces have no such program as the VTIs was the initiative of the provincial government, the researcher tried to adopt a quasi-experimental approach including mean differences and differences-in difference with fixed effect with cluster standard errors and robust regression. Also, the research has found the control group for the treatment group Punjab and the control group is having the same social and economic characteristics except this program explained in Figure 2. The control group here in this study are the other provinces including KPK, Sindh, and Baluchistan. This type the VET program and study of impact evaluation the difference-in-difference is the best method as suggested by many well-renowned researchers in practice coupled with fixed effect and cluster standard errors.

2.2.1. Data and Description of Variables

The data of this research study is sourced by Global Data Lab, Punjab Bureau of Statistics, Pakistan Board of Statistics, and Official of PVTC/VTI Ms. Bushra Nawaz (Board Member). After collecting all the relevant data, a panel has been created for data analysis.

- **Employment in Pakistan**

As a developing country, Pakistan is also facing the issue of unemployment (Arslan, 2014). Pakistan is an extremely touchy society in terms of female employment as referred by various authors such as Kazi (1991), Sadaquat (2011), Mumtaz (2003), Isran (2012), and Taib (2014). There are some common problems of female employment in myriad studies including the conservative cultures, male dominance, and collective family system. The collective family system is a major factor that restricts females to get employed because in almost all the family's male goes for work and responsible for earning and females usually take cares of home and children. Especially for the females, in Pakistan, there were no such institutes available that supplies training s and make them eligible for employment (Warwick & Reimers, 1995; Kazmi, & Quran, 2005). But in Punjab, the government of Punjab 1998 has taken this initiative for females, and because of that reason, the ratio of female trainees is more than the male trainees. In the analysis, the researcher has analyzed the impact of the program on three outcomes including female employment, male skills workers employment, and male upper-level employment. Male skills employment is another important outcome of this program as the target of the program was female employment and

male skilled workers employment. To support the argument the researcher has also analyzed the impact on male upper-level employment which is insignificant, and it shows that the impact on female employment and male skilled workers employment is caused by the program. The summary statistics are shown in Table 4.

Table 4: Descriptive Statistics

Variable	N	Mean	Std. Dev.	Min	Max
Province ID	203	4.43	2.45	1	8
Year	203	2006	8.39	1992	2020
No of Centres	29	110.76	108.46	0	382
Grant in Aid	27	324.70M	797.30M	0	4.00B
Zakat Fund	28	416.80M	396.00M	0	962.70M
No of Teachers Training	27	363.48	402.16	0	1012
Conventional Education	140	5.87	2.02	2.93	10.60
Wealth Index	140	55.99	14.89	27.80	80.90
Female Employment	140	17.21	8.73	1.78	34.40
Male Employment	140	43.10	5.03	32.90	49.50
Total Employment	140	30.16	3.83	22.42	36.55

2.2.2. Empirical Strategy and Model

In this research study, the researcher adopted various models that fit the panel data and remove biases such as mean comparison, fixed effect regression model, and robust regression model in the settings of difference-in-difference.

- **Mean Comparison and Kernel Density Plots**

The researcher compared the means of the variables of treatment and control group before the treatment and after treatment. The mean comparison is a straightforward method for measuring the effectiveness of the program. The mean comparison is the best method in the RCTs but in the quasi-experimental approach it has many concerns, but research also plots the data over the years in graphs. These graphs can be used to visualize the mean difference of treatment and control group over the years. T-test has been conducted under the shadow of mean comparison analysis which is significant after the treatment and insignificant before the implementation of the program across the province.

- **Fixed Effect Model – Difference-in-Difference**

Specification of fixed effect model is given below.

Estimation of Program Effect:

$$Y_{it} = \beta_o + \beta_1 DID_{it} + B_2 X_{it} + \gamma_i + \tau_t + \varepsilon_{it} \quad (1)$$

Where

Y_{it}	*Outcome variable i.e., total, male and female employment of province i in year t.*
$DID_{it} = 1$	*If province i is Punjab where the program was implemented when year t is 1998 and afterwards.*
$DID_{it} = 0$	*If province i is not Punjab or year t is before 1998*
X_{it}	*Variables that control for socio-economic characteristics including wealth index and formal education.*
γ_i $(i=1 \ldots n)$	*Province fixed effect.*
τ_t $(t=1 \ldots n)$	*Year fixed effect.*

- **Fixed Effect Model – Continuous Treatment**

Alternate fixed effect model with continuous treatment variable, No. of VTIs. In addition to difference-in-difference model, author used continuous treatment as alternate treatment. The number of institutes used for Punjab in during and after 1998 and 0 for other province and for Punjab before 1998.

$$Y_{it} = \beta_o + \beta_1 VTIs_{it} + B_2 X_{it} + \gamma_i + \tau_t + \varepsilon_{it} \quad (2)$$

Where

Y_{it}	*Outcome variable i.e., total, male and female employment of province i in year t*
$VTIs_{it}$	*Number of VTIs in Punjab after program implementation and takes 0 for other provinces and Punjab before 1998*
X_{it}	*Variables that control for socio-economic characteristics including wealth index and formal education*
γ_i $(i=1 \ldots n)$	*Province fixed effect*
τ_t $(t=1 \ldots n)$	*Year fixed effect*

- ***Strict Exogeneity***

The strict exogeneity of the explanatory variables is a well-known requirement for consistency in the context of panel data models. In this research, the purpose of DID Fixed Effect is too partial out the unobserved factors by using time and group fixed effect. There is no similar program in the treatment group, however, there are some other national/federal level programs but all that programs also available in our treatment group. Moreover, those programs are more related to formal/conventional education in colleges. Therefore, the control and treatment groups are equally exposed to other programs but in the case of provincial government initiative of VTIs, only Punjab is the province that is exposed to the treatment. In addition to that, the implementation of VTI is completely unbiased to the outcome variables.

- ***The Common Trend Assumption***

In the case of employment in Punjab, we can visualize a common trend assumption in the graphs especially in the female employment and male upper-level employment. However, this common trend assumption is weak coupled with another upward trend in female employment in Figure 7. The upward trend in female employment can because of another difference but for the remedy of this thing, we have three shreds of evidence. Firstly, the upward trend is maximum to the 2005 and according to Figure 3, we can visualize that the number of institutions increased in 2004 and 2005 and the huge impact that we were expecting before 2005 can be seen after 2005. Secondly, the means differences between the treatment and control group are insignificant before the implementation of the program in Table 5 (t-test), and the mean difference after the program is significant. Thirdly, the fixed effect regression model also remedial for weak common trend assumption and we used cluster standard errors for more reliable results. The common trend for male upper-level employment is somehow better than female employment but the results on male upper-level employment are insignificant because of no causal relation. Lastly, in the case of male skilled employment, there is no common trend assumption, therefore, we used fixed-effect regression for that.

- **Instrumental Variable Approach**

First Stage:

$$\boldsymbol{No.of\ VTIs_i = \beta_0 + \beta_1 Funding_i + \beta_2 X_i + U_i} \quad \textbf{(3)}$$

Where:
$Funding_i$ is the monetary funding received through Funding.

Second Stage

$$\boldsymbol{Employment_i = \theta_1 No.\widehat{of\ VTIs_i} + \theta_2 X_i + \varepsilon_i} \quad \textbf{(4)}$$

Where:
θ_1 represents the impact of Funding on the Employment through increase in number of intuitions over the years and the employment in above specification is captured by indirect effect of treatment through instrument variable No of VTIs.

Assumptions

- Instrument Relevance: First assumption is the correlation of Funding with Number of Institutes: COV (No. of VTIs, Funding ≠ 0).
- Instrument Exogeneity: No correlation between Funding and Error Term & Outcome COV (Funding, U & Employment) = 0, moreover, there will be no direct effect of Funding on Employment.

3. FINDINGS

In this research, initially, the literature review has been conducted for the identification of strong research methods and to review the impact of existing programs on outcome-related variables such as employment, industrial development, skills development, and so forth. For the quantitative analysis, panel data was formed based on the data collected from the Pakistan Bureau of Statistics, Global Data Lab, and VTI Board Member Ms. Bushra Nawaz. The data has consisted of various variables as shown in Table 4 Summary statistics; outcome variables such as female employment, male employment, covariates including wealth index, poorest household, and formal education; data on institutes including funding, number of institutes, teachers' training, and number of courses; and treatment variables consisted on dummy variables. The data

consisted of twenty-nine years from 1992 to 2020. One limitation on results is the impact of a small number of people on a larger number of the outcome variable. However, in many cases, the government attribute the impact of any new policy on outcome GDP in very next year because it can be assuming that the change in outcome is caused by the intervention.

3.1. Findings from Literature Review

In this research two main categories of literature have been studied. Firstly, the general TVET research and secondly the research studies in which various scholars have done impact evaluation of TVET in various countries. The literature review of this research includes general research studies, reports, case studies, and articles. After reviewing the literature, it can be concluded that the VTIs in Punjab is a perfect example of PPP and it is contributing to various sectors, for instance, job market, industrial development, and youth development.

3.2. Findings from Quantitative Data

In this research, the researcher started the quantitative data analysis from summary statistics and followed by mean comparison, fixed effect regression and instrumental variable approach. The key findings from the quantitative data shows positive impact of Vocational Trainings Institutes on female employment. In the case of male higher-level employment, the results are insignificant even in the case of holding parallel trend assumption. This is obvious and indirectly support the impact on making skill-based employment.

3.2.1. Mean Comparison

The basic purpose of randomized control trials mean comparison analysis is to measure the difference between treatment and control group before and after treatment. Due to lack of resources and difficulty in conduction of natural experiments, researchers use a quasi-experimental approach to measure the real impact of treatment on desired outcome variables. In the Table 5 of Mean Comparison, a researcher reported the difference between the treatment and control group. Along with each variable in Panel 1 of Table 5 Mean compares which shows the difference between treatment and control group before treatment, the difference is insignificant. It means that there are common characteristics between both groups. In Panel 2, the researcher computed the differences after implementation of the program and the results shows there is a significant difference between treatment and control in terms of outcome variables such as female employment, male lower and upper-level employment.

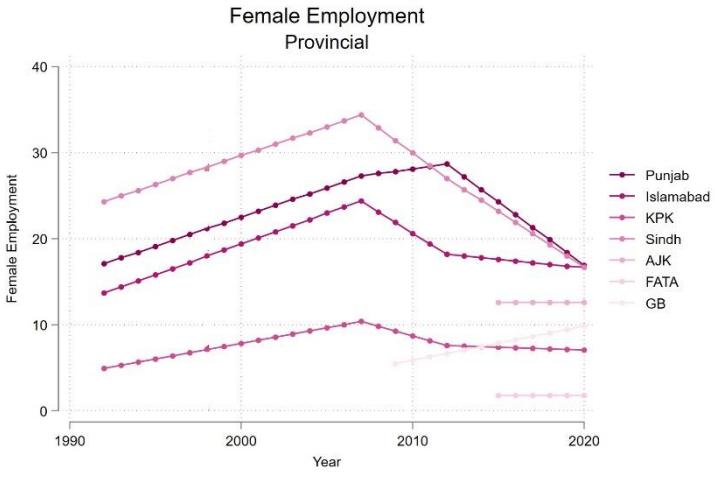
Table 5: Mean Difference between Treated and Control Groups (t-test)

Variables	Control Group		Treatment group		Mean Difference (T-Test)			
	N	Mean	N	Mean	Diff	SE	T-Value	P-Value
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel 1: Before Treatment								
Total Employment	12	27.58	12	29.14	-1.57	1.47	-1.05	0.30
Female Employment	12	15.91	12	17.12	-1.21	3.11	-0.40	0.70
Male Employment	12	39.24	12	41.17	-1.93	2.39	-0.80	0.43
Wealth Index	12	36.66	12	51.97	-15.31	6.36	-2.40	0.03
Formal Education	12	3.56	12	5.48	-1.92	0.61	-3.15	0.01
Panel 2: After Treatment								
Total Employment	70	28.92	46	32.98	-4.07	0.61	-6.65	0.00
Female Employment	70	14.29	46	22.02	-7.72	1.55	-4.95	0.00
Male Employment	70	43.54	46	43.95	-0.41	0.89	-0.45	0.65
Wealth Index	70	53.52	46	65.84	-12.32	2.24	-5.50	0.00
Formal Education	70	5.42	46	7.26	-1.84	0.33	-5.55	0.00

Table 5 shows the mean differences of key outcome variables. The table shows comparison of treatment and control group before and after treatment.
Panel 1 shows the difference of treatment and control group before the implementation of program. It shows that the difference between treatment and control group before program implementation is insignificant. Ultimately it represents the similar characteristics before program implementation in both groups.
Panel 2 represents the difference of treatment and control group after the program implementation and P-Values shows significant difference between treatment and control group after program implementation.

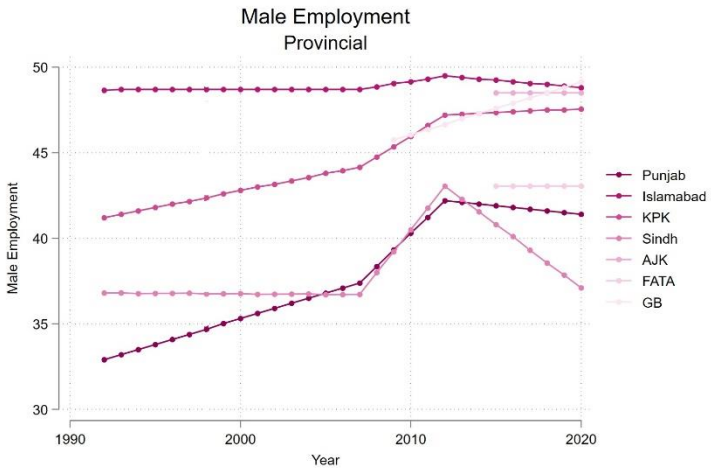
The mean comparison analysis for total and female employment, the most crucial variables of this research, shows the significant difference after the treatment and insignificant difference between the treated and control group before the treatment. The mean difference before treatment is 1.57 and 1.93 given in column (5) which is incredibly low and statistically insignificant. However, the difference of male employment before treatment is insignificant as well as after treatment. The t-test, which measures the difference in means between two groups and considers the standard error for each

Figure 6: Female Provincial Employment



variable shows that the treated group compared to the group that is not exposed to the program has a very low difference in mean. Moreover, the difference is insignificant which provides evidence of common trend assumption before treatment and similar characteristics between treated and control group.

Figure 7: Male Provincial Employment



As shown in Figure 6 there is a common trend in almost all of the provinces, the Punjab and Islamabad is treated however, the common trend is slightly weak and another observable thing is an upward trend in both groups before the treatment. Since the number of institutions increased in 2005 as shown in Figure 3 the change that occurred in 2008 is attributable to the program. This change was expected in the 2000s but due to an increase in the number of institutes in 2004-05 the change can be seen after 2008. Still, we have the strength of t-test and in the next section fixed-effect regression models strengthen the results by controlling socioeconomic factors, time effect and province effect at clustered standard errors. Figure 7 show the provincial employment rates or

Figure 9: Total Provincial Employment

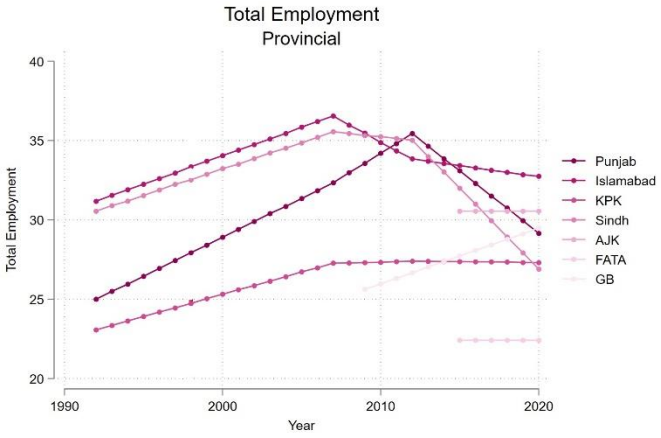
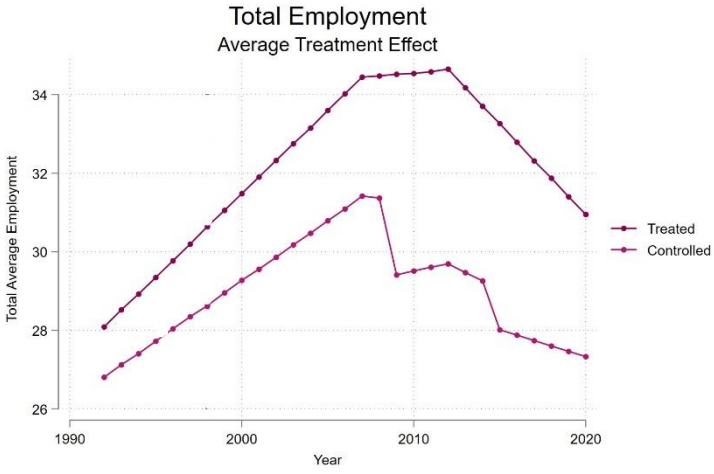


Figure 8: Average Total Employment



females of all provinces and Figure 9 shows the provincial male employment rates across the country.

While taking average of the outcome variables i.e., total, male, and female employment rates we can see a common trend in all three outcomes of interests. Figure 8 shows the total average employment rates for treated and control group. It follows the common trend and hold its assumption. Figure 10 shows the male average employment rates of treated and controlled group. It holds common trend assumption. Lastly Figure 11 shows the average treatment effect on female employment.

Figure 10: Average Male Employment

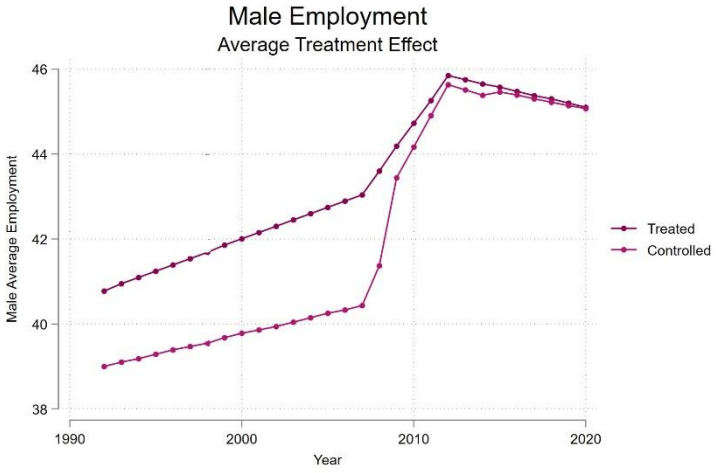
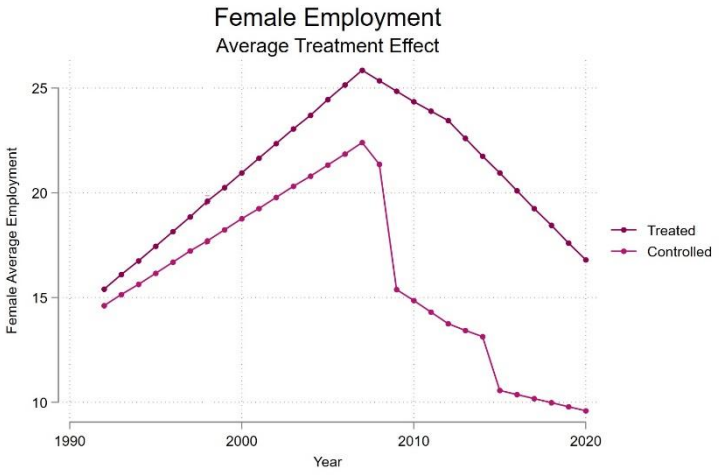


Figure 11: Average Female Employment



In all three figures of average employment rates we can see a sharp change in employment rates in 2008. The program was initiated in 1998 with only two institutions and the number increased in 2004 and 2005 with a sharp rate and they almost doubled the institutes in one year in 2005. At that time we can observe a huge number of enrollment and coupled with number of courses. Therefore, the sharp increase in 2008 is attributable to the institutions.

It is true that this basic mean difference is susceptible to a number of worries, such as confounding variables that affect both groups at the same time, canceling out the program's potential outcome. When data is contaminated with outliers or influential observations, fixed effect regression is an

alternative to least squares regression. It can also be used to detect influencing observations. If there are no outliers, fixed regression will produce findings that are similar to those of standard linear regression (but slightly less precise). When there are outliers, however, fixed regression produces more accurate and less biased findings.

3.2.2. Fixed Effect Regression Model – Difference in Difference

The next approach in this research is the fixed effect regression model which do not require parallel trend assumption. Moreover, this model as shown in equation (2), in all regressions, researcher applied group fixed effect and time fixed effect to control the time and group unobservable characteristics.

Table 6: Fixed Effect Regression Model

	Total Employment	Male Employment	Female Employment
	Panel 1: Difference-in-Difference		
DID	1.598**	0.637	2.559*
	(0.360)	(0.309)	(0.902)
	Panel 2: Continuous Treatment		
No. of VTIs	0.011***	0.001**	0.020***
	(0.000)	(0.000)	(0.001)
Control Variables	✓	✓	✓
Province Fixed Effect	✓	✓	✓
Year Fixed Effect	✓	✓	✓
Dependent Variable Mean	30.16	43.10	17.21
N	140	140	140

Note: We run a fixed effect regression model on total, male and female employment in Pakistan at provincial level including treatment and control group. In this fixed effect regression model, the dependent variable is the percentage of employment while the fixed effect for year and provinces with clusters standard error is used. DID represents a dummy variable shows the interaction of Treatment and After. Value of DID (Difference-in-Difference) holds 1 in case the group exposed to the program after the implementation and 0 otherwise. The province Baluchistan do not follow the similar trend so excluded from the above analysis. Cluster Standard errors at province level are shown in parentheses.
*** p<.01, ** p<.05, * p<.1 Cluster Standard Errors in Parentheses.

As shown in Table 6 the coefficients of DID dummy for VTI is statistically significant for total and female employment. In this model the other variable such as wealth index and formal education is controlled to control the effect of socioeconomic effects. The results shows that an average increase in employment in Punjab due to this program is 1.6 with high significance, second the program also increased the female employment around 2.6 percent across the province and the

results are highly significant. However, the impact of male employment level is insignificant but still there is impact, shown but insignificant. It is possible that the insignificant impact is caused by some other factors that we were unable to observe due to limited resources, therefore, we can still go with the results. While using continuous treatment variable the effect of program on employment is positive and significant despite controlling covariates and applying fixed effects.

3.2.3. Instrumental Variable Approach

Table 7: Instrumental Variable Approach

	No. of VTIs	Total Employment	Male Employment	Female Employment
		Panel 1: Second Stage		
No. of VTIs		0.0324***	0.0377***	0.0272**
		(0.006)	(0.004)	(0.009)
		Panel 2: First Stage		
Fund / 10^6	0.215***			
	(0.000)			
Control Variables	✓	✓	✓	✓
F-Statistics		92.3	92.3	92.3
Durbin		11.6	15.3	7.8
Hausman		17.3	30	9.4
Dependent Variable Mean	111	30.16	43.10	17.21
N	27	27	27	27

Note: We used instrumental variable approach on total, male and female employment in Pakistan at provincial level on time series data of Punjab. In this IV model, the dependent variable is the percentage of employment while the. No. of VTIs represents a number of institutions in Punjab which increased eventually. The instrument variable is the Zakat fund which uses for the enhancement of program and to enroll the new students. Standard errors are shown in parentheses *** p<.01, ** p<.05, * p<.001

Table 7 shows the result of instrumental variable approach. IV is another strong method that is free from biases. The impact on employment is highly significant. Since the funding is an exogenous variable, it is treated as instrument and the number of centers can be used a proxy of enrollment which ultimately increased the employment in Punjab province. First stage regression in Panel 2 shows on average one million funds has increased 0.2% of institutes which is significant positive impact on the increase in number of institutions with an increase in funding. The funds were utilized to improve the infrastructure by increasing number of institutions. IV results show on average the program has increased the total employment 0.032% with high significance, male employment 0.037% and female employment 0.027 with high significance rates.

3.2.4. Falsification Test – Higher-Level Employment

We run falsification test on the male and female higher-level employment which is not related with skills development programs. In this case we hold the common trend assumption but logically and theoretically there is no relationship between vocational training and this type of employment. Because the target of this program was not the university graduates etc. Therefore, the impact of vocational training is negative and insignificant shown in Table 8.

Table 8: Falsification Test - Higher Level Employment

	Total Employment	Male Employment	Female Employment
	Panel 1: Higher-Level Employment		
DID	-1.645*	0.249	-3.538*
	(0.487)	(1.135)	(0.793)
Control Variables	✓	✓	✓
Province Fixed Effect	✓	✓	✓
Year Fixed Effect	✓	✓	✓
Mean of Dependent Variable	19.91	25.67	14.16
	Panel 2: Lower-Level Employment		
DID	3.771***	0.294	7.247***
	(0.489)	(0.702)	(0.688)
Control Variables	✓	✓	✓
Province Fixed Effect	✓	✓	✓
Year Fixed Effect	✓	✓	✓
Mean of Dependent Variable	63.68	71.91	55.45
N	111	111	111

Cluster Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

3.2.5. Robustness Check

In order to check and verify the result, we have done various robustness checks by comparing the treatment group with control groups individually. We run fixed effect regression model with clustered standard error, a more conservative approach for robustness. We have found that most of the coefficients on total and female employment rates are highly significant, however, the impact of male employment is somehow insignificant.

Table 9: Punjab - KPK FE Regression

Punjab-KPK	Total Employment	Male Employment	Female Employment
DID	2.087*	0.211	3.962**
	(0.219)	(0.100)	(0.349)
Control Variables	✓	✓	✓
Province Fixed Effect	✓	✓	✓
Year Fixed Effect	✓	✓	✓
	(0.0325)	(0.0105)	(0.0574)
Mean	30.17	43.76	16.58
N	87	87	87

Cluster Standard Errors in Parentheses
$^{*}\ p < 0.05$, $^{**}\ p < 0.01$, $^{***}\ p < 0.001$

Figure 12: Punjab-KPK Total Average Employment

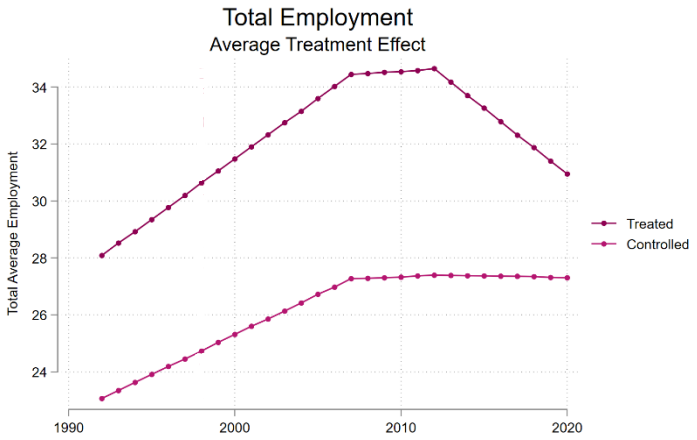


Figure 13: Punjab-KPK Male Average Employment

Figure 14: Punjab-KPK Female Average Employment

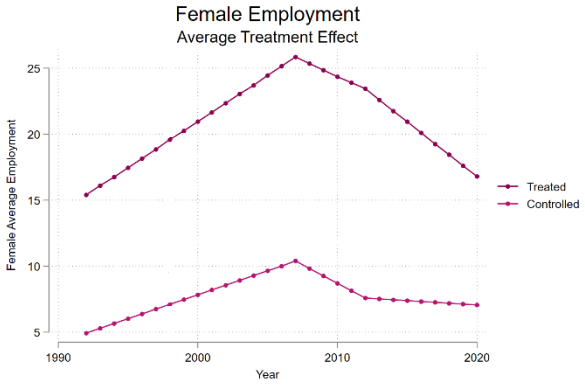


Table 10: Punjab-Sindh FE Regression

Punjab-Sindh	Total Employment	Male Employment	Female Employment
DID	1.907	0.913	2.901
	(0.797)	(0.258)	(1.437)
Control Variables	✓	✓	✓
Province Fixed Effect	✓	✓	✓
Year Fixed Effect	✓	✓	✓
Mean	32.36	41.65	23.07
N	87	87	87

Cluster Standard Errors in Parentheses

$^{*}\ p < 0.05$, $^{**}\ p < 0.01$, $^{***}\ p < 0.001$

Figure 15: Punjab-Sindh Total Average Employment

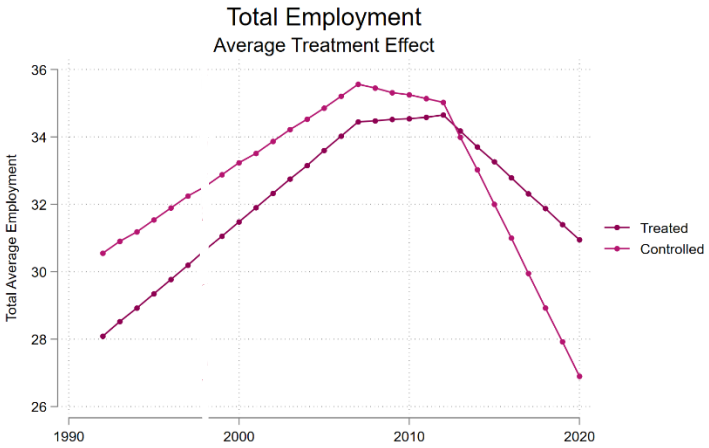
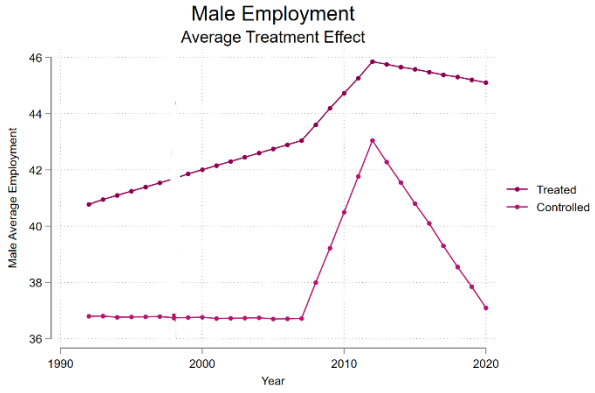


Figure 16: Punjab-Sind Female Average Treatment

Figure 17: Punjab-Sindh Male Average Employment



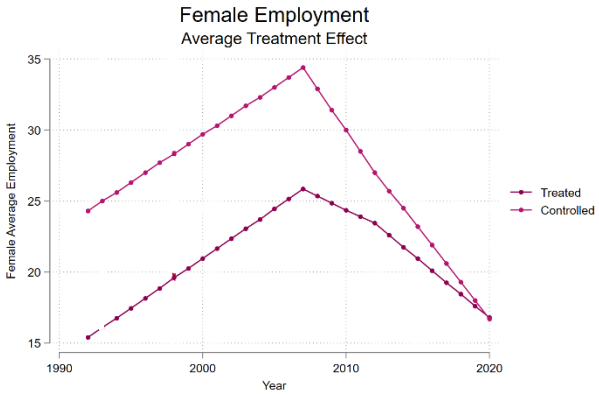


Table 11: Punjab-Baluchistan FE Regression

Punjab-Baluchistan	Total Employment	Male Employment	Female Employment
DID	7.292*	5.267*	9.317*
	(1.070)	(0.910)	(1.234)
Control Variables	✓	✓	✓
Province Fixed Effect	✓	✓	✓
Year Fixed Effect	✓	✓	✓
Mean of Dependent Variable	32.36	41.65	23.07
N	87	87	87

Cluster Standard Errors in Parentheses
$^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

Figure 18: Punjab-Baluchistan Total Average Employment

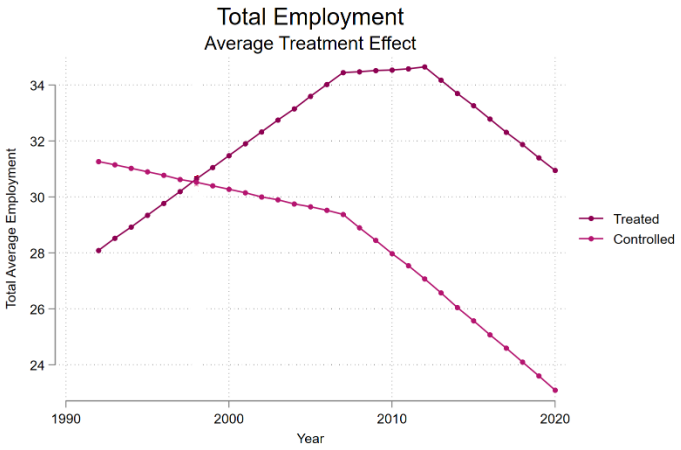


Figure 20: Punjab-Baluchistan Male Average Employment

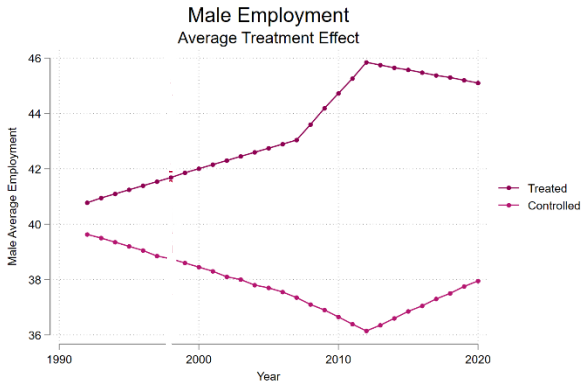


Figure 19: Punjab-Baluchistan Female Average Employment

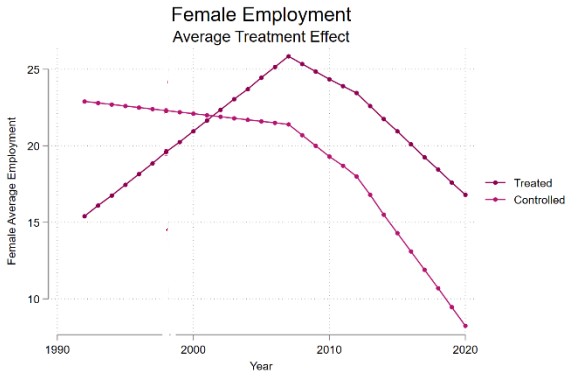


Table 12: Punjab - States Fixed Effect Regression

Employment	Azad Jammu & Kashmir (AJK)			Gilgit Baltistan (GB)			Federally Administrated Tribal Areas (FATA)		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
DID	2.755***	-0.443	5.953***	2.844***	0.346	5.342***	2.844***	0.346	5.342***
	(0.12)	(0.39)	(0.62)	(0.15)	(1.07)	(0.97)	(0.15)	(1.07)	(0.97)
Control Variables	✓	✓	✓	✓	✓	✓	✓	✓	✓
Province Fixed Effect	✓	✓	✓	✓	✓	✓	✓	✓	✓
Year Fixed Effect	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mean of Dependent Variable	32.03	43.85	20.21	31.39	44.06	18.71	31.27	43.34	19.20
N	64	64	64	70	70	70	70	70	70

Cluster Standard Errors in Parentheses
$^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

4. DISCUSSION AND LIMITATIONS

Vocational training in a country or a specific region plays a vital role and has a significant impact on the growth and development of that area. TVET has aligned the benefits of industry growth, employment, and entrepreneurship. Therefore, the tiers of governments also take initiatives of this kind in their governing areas. As we have seen that initially only two institutes were incorporated and gradually it increased and in 2005, they get doubles. Therefore, the impact seen in later years is logically attributable to the vocational training in Punjab. Also, there were more courses as shown in Annexure 3 but currently, the working institutes are 208 and 65 different trades. This is the experience gained by the board of VTI to include and exclude the courses according to training need assessment (TNA). The government of Punjab, national and international organizations invested a lot of money in Punjab vocational training program. Moreover, Zakat has a major role in the incorporation of more institutes and training more trainees. During the literature review of similar programs wit was identified that TVET has a significant impact on employment (Tahir, 2018; Dey, 2019; Tripney, 2013), entrepreneurship (Badawi, 2013; Ismail, 2019; Ogbaekirigwe, 2017), and GDP (Elizar-Del, 2016). This research is a contribution to the series of TVET programs and impact evaluation research studies.

In this research study, a sharp change can be seen in 2008-09 including a sharp decrease in female employment, a sharp decrease in lower-level male employment (treatment group - Punjab), a sharp increase in lower-level male employment (control group), and sharp increase in upper-level male employment. There can be many reasons, identified through history, change in politics, and literature. For instance, Benazir Bhutto (Former Ex-PM) returned to Pakistan after 8-Years and during bidding for third-time elections, assassinated by a bomb blast. This event has increased the insecurity of females in the market. The next winning party (PPP) from 2008 for the government has a majority from Sindh which lies in the control group, therefore, there is a sharp increase in lower-level male employment in the control group and a decrease in the treated group. Moreover, PPP intended to increase the salaries of employees for their interests and clientelism. According to the Ministry of Finance, the PPP Government has increased 20-25% salaries for government employees previous before 2008 this average was 5-10% and the same after 2013. This high change in government employees' wages causes an increase in intention for the job instead of business and ultimately there is a sharp increase in employment. The program has been

expanded in 2005 with 113 institutes and the change captured in 2008 is the only effect of this program because there was no other relevant program in the province.

In this research there are some limitations, for instance, the unit of observation is a highly populated province, but the impact of small policy can be attributable to the GDP of the country in case of no other similar programs and change in GDP. Similarly, there was no other program in Punjab at the same time and there is a big change in the employment level. In addition to that, the impact can be attributed to the outcome variable if research used a strong and rigorous research method. Secondly, the common trend assumption is weak and violated in the case of male skilled workers' employment, however, the fixed-effect model reduces the biases. For future research studies on the impact evaluation of VTI in Punjab, it is highly suggested to use the difference-in-difference-in-difference method as there is more than one control group. In addition, it is recommended to use the individual trainee's data for evaluating the impact of training on employment. Moreover, other outcome variables such as GDP, industrial growth, the income of graduates, and variables related to the livelihood of trainees may be included in future research. Lastly, the cost-benefit analysis and swot analysts are highly recommended.

5. CONCLUSION

The incorporation of VTIs in Punjab has a considerable impact on total employment including female. This impact has been detailed in this research study through various ways including literature review & support, mean differences in treatment and control group before and after treatment, instrumental variable model, and lastly, fixed effect regression model. In order to robust the results, falsification test and various robustness checks are included. By using FE Regression Model, the impact of VTIs on total and female employment is significant, and the impact on male employment is insignificant. However, using continuous the effect of program on male employment is significant. There can be various reasons behind it. Firstly, the culture of female employment is promoted solely due to the launch of VTI Institutes because before that and currently, there is no other program and institutes available at this large scale that provides training for female skills development. The introduction of VTIs in the Punjab province of Pakistan is one such example of transforming growth, employment, and livelihood that is intended to enhance productivity and reduce negative impacts arising from a culture of drastically limited formal education. In addition this type of programs reduces the gender gap in

developing countries by empowering women. However, for future research studies it is recommended to survey the individual trainees and collect data for better analysis coupled with district level data with eventual analysis according to expansion of program.

6. FUTURE PLAN

Aside from the strong statistical evidence, field survey still has an importance in factual results. Therefore, for future research studies few recommendations such as collection of primary data from trainees, use DDD, and include more variables such as industrial growth and GDP and to conduct the analysis at district level and/or city level.

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ANNEXURES

Annexure 1: Yearly Funding Received in the Heads of Zakat & Grant-in-Aid

Year	Zakat Fund	Grant-in-Aid
2002 - 2003	121,809,789	--
2003 - 2004	284,477,774	--
2004 - 2005	263,397,747	65,000,000
2005 - 2006	673,353,936	119,900,000
2006 - 2007	553,346,295	--
2007 - 2008	603,430,011	200,100,000
2008 - 2009	683,589,820	200,100,000
2009 - 2010	685,612,078	60,000,000
2010 - 2011	679,418,675	72,276,000
2011 - 2012	663,920,763	135,338,000
2012 - 2013	827,477,585	200,000,000
2013 - 2014	947,132,544	640,000,000
2014 - 2015	939,569,960	1,000,000,000
2015 - 2016	934,228,212	968,830,000
2016 - 2017	941,603,325	4,000,000,000
2017 - 2018	962,691,000	905,000,000
2018 - 2019	904,456,700	200,000,000

Annexure 2: Number of Institutes and Teachers' Trainings Yearly

Year	No. of Institutes	Teachers Trainings (No.)
2005	113	477
2006	123	268
2007	129	276
2008	131	498
2009	132	954
2010	134	732
2011	140	993
2012	151	904
2013	159	861
2014	167	779
2015	212	658
2016	313	1012
2017	326	937
2018	382	465

Annexure 3: Courses Offered at VTI Centers

Industry / Category	Names of Trades	Entry Level	VTI (Months)	OJT (Months)
Auto/Vehicle & Diesel	Auto Mechanic	Middle	12	2
Agriculture & Live Stock	Motorcycle Mechanic	Middle	12	2
Computer Applications	Auto Electrician	Middle	12	2
Civil Work	Floriculture	Primary	6	2
Electrical	Poultry Farming	Middle	6	2
Electronics	Halal Butcher	Middle	6	2
Health Care	Agriculture Field Assistant	Matric	12	2
Mechanical	Veterinary Assistant	Matric (Science)	12	2
Stitching	Computer Applications (Business)	I-COM	12	2
Textile	Auto CAD Operator	Matric	6	2
Miscellaneous	Computer Application & Office Professional	Matric	12	2
Language & Technology	Web & Graphics Designing	Matric	12	2
Competency Based	Quantity Surveyor	Matric	6	2
Auto & Diesel	Civil Surveyor	Matric	12	2
Auto & Diesel	Building Electrician	Middle	6	2
Agriculture & Livestock	Industrial Electrician	Middle	12	2
Agriculture & Livestock	Refrigeration & Air Conditioning	Matric	12	2
Agriculture & Livestock	Motor Winding	Primary	6	2
Agriculture & Livestock	Solar Technician	Middle	6	2
Computer Applications	R & M – Electrical Appliances	Middle	12	2
Computer Applications	Heating Ventilation Air Conditioning and Refrigeration	Matric	12	2
Computer Applications	Mobile Phone Repairing	Matric	6	2
Civil Work	Electronics Technician	Middle	12	2
EL - Electrical	R & M – Computer Hardware & Network	Matric (Science)	12	2
EL - Electrical	Clinical Assistant	Matric (Science)	12	2
EL - Electrical	Welder / Fabricator	Primary	12	2
EL - Electrical	Plumber	Primary	12	2
EL - Electrical	General Fitter	Middle	6	2
EL - Electrical	Machinist & CNC Lathe	Matric	12	2
ET - Electronics	Domestic Tailoring	Primary	6	2
ET - Electronics	Leather Garments Stitching	Primary	6	2
MC - Mechanical	Dress Making	Primary	12	2
MC - Mechanical	Embroidery	Primary	6	2
MC - Mechanical	Stitching for Industries	Middle	6	2

SG - Stitching	Fashion Designing	Matric	12	2
SG - Stitching	Computer Textile Designing	Matric	12	2
SG - Stitching	Computer Pattern Designing	Matric	6	2
SG - Stitching	Textile Fitter	Middle	12	2
SG - Stitching	Textile Weaving	Middle	12	2
TX - Textile	Safety Officer	Matric	6	2
TX - Textile	Beautician	Middle	6	2
TX - Textile	Food Cooking and Kitchen Organization	Matric	6	2
MS - Miscellaneous	Plastic Blow & Injection Molding	Matric	6	2
MS - Miscellaneous	Import / Export Procedure & Documentation	Intermediate	6	2
MS - Miscellaneous	Life Skills and Entrepreneurship	For All		
MS - Miscellaneous	Hotel Management	Matric	12	2
MS - Miscellaneous	Screen Printing & Computer Designing	Middle	6	2
MS - Miscellaneous	Fine Arts	Matric	6	2
MS - Miscellaneous	Spoken English	Matric	6	2
MS - Miscellaneous	Auto CAD L - 2	HSSC	6	2
Competency Based Courses	Beauty Therapy L - 2	Matric	6	2
Competency Based Courses	Citrus Production L 1 & 2	Matric	6	2
Competency Based Courses	Computer Operator L - 2	Matric	6	2
Competency Based Courses	Cook L - 2	Matric	6	2
Competency Based Courses	Dress Making L - 2	Primary	6	2
Competency Based Courses	E-Commerce L - 4	HSSC	6	2
Competency Based Courses	Electrical Equipment Installation and Repair L - 2	Middle	12	2
Competency Based Courses	Electronics Home Appliances Technician L - 2	Middle	6	2
Competency Based Courses	Fashion Designing L - 3	Matric	12	2
Competency Based Courses	General Electrician L - 2	Middle	6	2
Competency Based Courses	Hair Styling L - 2	Matric	6	2
Competency Based Courses	HVAC (Heating, Ventilation and Air Conditioning) L - 2	Middle	6	2
Competency Based Courses	Industrial Electrician L - 2	Middle	12	2
Competency Based Courses	Livestock Supervisor L - 4	Matric	12	2
Competency Based Courses	Plumbing cum Solar Water Heating Technology L - 3	Middle	12	2
Competency Based Courses	Shoe Technician (Cut to Pack) L - 4	Matric	12	2
Competency Based Courses	Skin Care L - 2	Middle	6	2
Competency Based Courses	Web Designing and Development L - 2	Intermediate	6	2
Competency Based Courses	Welder L - 2	Middle	6	2

Annexure 4: VTI Projects with National & International Organizations

Donor	Project Title	Location	Beneficiaries Allocated
AQEELA ASIFI UNHCR's Nansen Refugee Award winner 2015	Girls Vocational Training at Afghan Refugees Camps Kot Chandna	Afghan Refugees Camp, Kot Chandna Mianwali	50
Government of the Punjab (DWD)	Domestic Workers Training	Lahore, Faisalabad, Multan	690
Government of the Punjab (Labour & HR)	Integrated Project	36 Districts of Punjab	86500
Government of the Punjab (CM)	CM Project	All VTI's	480000
Government of the Punjab (SED)	School IT Labs	300 IT School Labs	37500
Punjab Skill Development Fund (PSDF)	Skills for Punjab Growth Strategy 2015	37 VTIs	925
BRSP	Needy from Baluchistan	VTI Rawalpindi	170
Islamic Relief Pakistan	Needy from poor community	VTI Rawalpindi	500
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)	Training and Demonstration of Green Energy	36 selected VTIs of the entire 03 regions	2700
South Asia Partnership Pakistan	SAP - PK	VTI Chowk Azam, Fazil-Pur	90
Rural Community Development Society (RCDS)	RCDS (Rural Community Development Society)	VTI Fateh-Pur	40
BRSP	Needy from Baluchistan	VTI Rawalpindi	164
World Vision	Needy from poor community	VTI Rawalpindi	30
Punjab Skill Development Fund (PSDF)	Skills for Job 15	Rahimyar Khan, Bahawalpur, Bahawalnagar and Muzaffargarh	350
IRM	Beneficiaries from Sind	VTI Rawalpindi	31
Punjab Skill Development Fund (PSDF)	Skills for Job 14-15	Lahore, Sheikhupura, Faisalabad, Chiniot, Sargodha, Gujranwala, Narowal	2475
Social Welfare Academics and Training (SWAaT)	Skill Training	Swat, District Malakand	60
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)	Training and Demonstration of Green Energy	36 selected VTIs of the entire 03 regions	2700
Punjab Skill Development Fund (PSDF)	Skills for Job 2014	Rahimyar Khan, Bahawalpur and Muzaffargarh	600
Punjab Skill Development Fund (PSDF)	Skills for Garments	Lahore, Sheikhupura, Faisalabad, Chiniot, Gujranwala	1800
National & Vocational Technical Training Commission (NAVTTC)	Prime Minister Youth Skill Development Programme	26 VTIs of Entire 03 Regions	1665
Creative / USAID	Special Project	VTIs of Southern Punjab	4515
Rural Community Development Society(RCDS)	RCDS (Rural Community Development Society)	VTI Fateh-Pur	20
Punjab Skill Development Fund(PSDF)	PSDF (Skills for job 2013-14)	Bahawalpur, Bahawalnagar, Lodhran and Muzaffargarh	950
Social Welfare Academics and Training (SWAaT)	Skill Training	Swat, District Malakand	60
Moujaz	Moujaz	VTI Shah Jamal	50
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)	Halal butcher training to youth of landless rural families	VTI Green Town Lahore	240
National Rural Support Program (NRSP)	NRSP	Muzaffargarh, Layyah, Fazil-Pur, Kot Mithan	1066
IRM	Beneficiaries from Sindh	VTI Rawalpindi	15

Punjab Rural Support Program (PRSP)	PRSP	VTI Kot Addu & Muzaffargarh	96
UNICEF	Building young futures	08 selected districts	600
IOM /USAid	IOM /USAID	VTIs sited in Southern Punjab	1320
Punjab Accelerated Functional Literacy & NFBE Project	Trans Gender (She Male)	VTI Rawalpindi	30
JICA through Literacy Department Govt. of the Punjab	Punjab Accelerated Functional Literacy Program	31 VTIs in Southern Punjab	5580
IRM / PLAN Pakistan International	Youth Economic Empowerment Project	VTI Chakwal	105
Alasar Development Organization	Alasar Development Organization	VTI Fazilpur, Dajal and Kot Mithan	435
Paidar Development Organization	Paidar Development Organization	VTI Bwp (M & F), Ahmer Pur East, Bahawalnagar and Chishtian	386
Lodhran Pilot Project	Lodhran Pilot Project	Ladhran	26
Farmer Development Organization	Farmer Development Organization	VTI Kot Addu	115
Punjab Skill Development Fund(PSDF)	Skills for Job 2012	Bahawalpur, Bahawalnagar, Lodhran and Muzaffargarh	1325
National & Vocational Technical Training Commission (NAVTTC)	Hunarmand Pakistan Programme	VTIs sited in Sargodha and Silanwali	430
Punjab Education Foundation	Punjab Education Foundation	VTIs District Multan & Bahawalpur	225
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)	Welding training to flood affected IDPS	VTI Multan	33
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)	Welding training to flood affected IDPS	VTI Muzaffargarh	33
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)	Welding training to flood affected IDPS	VTI DG Khan	33
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)	Welding training to flood affected IDPS	VTI Rahim Yar Khan	33
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)	Industrial Garments Stitching Training to poor women and transgender	VTI Green Town Lahore	120
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)	Industrial Garments Stitching Training to poor Christian community	VTI Walton Lahore	120
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)	Industrial Garments Stitching Training to poor women and transgender	VTI Chunian	120
Punjab Skill Development Fund (PSDF)	Skills for Employability	Bahawalpur, Bahawalnagar, Lodhran and Muzaffargarh	2550
Punjab Skill Development Fund (PSDF)	Skill Training in 06 Model Villages	District Muzaffargarh	500
JICA through Literacy Department, Govt of the Punjab	PLLP	VTIs sited in Southern Punjab	7500
Islamic Relief Fund	Islamic Relief fund	VTIs sited in Northern Punjab	550
National & Vocational Technical Education Commission (NAVTEC)	Hunarmand Pakistan Programme	28 selected VTIs	4436

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