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BRIDGING THE SKILL GAP: TECHNICAL AND VOCATIONAL EDUCATION AS A DRIVER OF HUMAN CAPITAL FORMATION IN CENTRAL PUNJAB, PAKISTAN

TEHMINA IQBAL
PH.D. SCHOLAR, DEPARTMENT OF RURAL SOCIOLOGY, UNIVERSITY OF AGRICULTURE FAISALABAD

MUHAMMAD IDREES
ASSISTANT PROFESSOR, DEPARTMENT OF RURAL SOCIOLOGY, UNIVERSITY OF AGRICULTURE FAISALABAD, EMAIL: dr.midrees@uaf.edu.pk

NAIMA NAWAZ
ASSISTANT PROFESSOR, DEPARTMENT OF RURAL SOCIOLOGY, UNIVERSITY OF AGRICULTURE FAISALABAD

MUHAMMAD IFTHIKHAR
ASSOCIATE PROFESSOR, INSTITUTE OF AGRI. EXTENSION, EDUCATION AND RURAL DEVELOPMENT, UNIVERSITY OF AGRICULTURE FAISALABAD

ABSTRACT
This study was designed to explore the pivotal role of Technical and Vocational Education and Training (TVET) in shaping human capital formation among youth in Central Punjab, Pakistan. As Pakistan faces increasing challenges related to youth unemployment, skill mismatches, and economic disparities, TVET has emerged as a strategic tool to empower young individuals with relevant technical skills, entrepreneurial capabilities, and workplace competencies. In this new era of growth, highly talented people are more important than ever for national development. However, it is also true that Pakistan is losing more and more highly skilled workers. The establishment of Technical Vocational Education and Training aimed to cultivate a proficient workforce for many industries and sectors in Pakistan; yet, sixty percent of the youth entering the labour market are unskilled or semi-skilled, originating from informal and non-formal sectors. The present study was conducted in Central Punjab, Pakistan. Current study was conducted in central Punjab, Pakistan. Two districts, Lahore and Faisalabad, were selected from central Punjab. To get quantitative data, the Taro Yamane algorithm was used to figure out the sample size. It turned out to be 503 respondents, who were chosen from the selected technical colleges by using proportionate allocation. The primary instruments for data collection were the interview schedule. The analysis showed that being part of the workforce is very important for development. The results demonstrate the significance of women's substantial involvement in the labour market for the country's socioeconomic progress. Skilled workers had an easier time finding jobs in the labour market than unskilled workers. The findings indicate that Pakistan can leverage its existing cohort of TVET graduates by promoting entrepreneurship, human capital development, and workforce engagement. But sadly, it can't use it well because of the difficulties in the industry. Respondents said that the industry didn't give them a good place to start working, and the second problem is that the government doesn't give enough money to the TVET sector. It is the main obstacle to using TVET graduates. To unlock the full potential of TVET graduates, a coordinated effort is needed. This includes reforming policies to better align education with labor market needs, fostering strong partnerships between industry and educational institutions, and increasing investment in TVET infrastructure and resources. The study concludes with recommendations for strengthening the TVET sector through policy reforms, stakeholder collaboration, and sustainable investment to maximize its impact on youth development in Central Punjab.

Key Word: Technical and Vocational education, Human Capital, Central Punjab, Skill development, Labor force participation

INTRODUCTION

There is a lot of proof that Technical and Vocational Education and Training (TVET) may help countries grow and improve their economies, which is good for people, their families, local communities, and society as a whole (Maclean, 2021). Furthermore, the contemporary importance of TVET resides in its substantial capacity to alleviate poverty, enhance employability through skill acquisition, and foster sustainable development globally. TVET has become a driving force for economic growth and a way to improve social protection for people who are on the outside looking in (ILO, 2023).

In the contemporary era of globalization and rapid technological advancement, the development of human capital has emerged as a critical driver for socio-economic progress, particularly among youth. One of the most effective tools for enhancing human capital is Technical and Vocational Education and Training (TVET), which equips individuals with the practical skills, competencies, and knowledge required for the labor market. TVET plays a significant role in transforming unskilled or semi-skilled youth into productive and employable individuals, thereby promoting economic development and reducing poverty (UNESCO, 2016).

Youth, who represent a large and growing segment of the population in many developing countries, face high unemployment rates due to skill mismatches and limited access to quality education and training opportunities. TVET programs address this gap by aligning education with labor market demands, offering both formal and informal learning pathways, and enhancing employability through job-relevant training (ILO, 2020). Furthermore, TVET fosters innovation, entrepreneurship, and lifelong learning—key components of a sustainable and inclusive economy (Afeti and Adubra, 2012).

Empirical evidence suggests that countries investing in robust TVET systems experience higher rates of youth employment, increased productivity, and stronger economic resilience (World Bank, 2018). Moreover, TVET contributes not only to economic growth but also to social development by empowering marginalized youth, including women and individuals from rural or disadvantaged backgrounds, enabling them to participate fully in society and the economy (Oketch, 2007).

It has been observed that the social integration of young individuals into the community is significantly influenced by the provision of vocational training. According to an abundance of scholarly literature, vocational training has the potential to implement beneficial changes in the well-being of individuals (Maclean and Wilson, 2009.).

In most countries, technical and vocational training programs have been implemented to foster optimism among disadvantaged individuals. It is important to note that these initiatives have been implemented as a means of reducing the psychological stress that is a result of sociopolitical and economic trauma, a common occurrence in numerous developing countries (Elebute and Shagaya, 2016).

In Pakistan, vocational education institutes offer courses that last between three and two months and begin after the eighth grade. Vocational education is administered through apprenticeships, vocational institutions, and polytechnics. In recent years, the Pakistani government has made substantial progress in the improvement of the vocational education system (Kazmi, 2007).

The genuine issue is the establishment of an organization that comprehends and prioritizes the investment in the youth, while also treating working men and women with respect and equitable treatment, despite the presence of a highly educated and competent labor force. The fundamental result of a successful human resource development system is the enhancement of individuals' capacity to secure and sustain employment, thereby enabling them to access respectable job opportunities. The same is required of technical vocational education. It is imperative to acknowledge the necessity of vocational training in order to satisfy the market's immediate needs (Khilji et al., 2012).

Investing in people is one of the most effective methods to increase productivity and drive economic growth. Human capital that is both efficient and effective is critical to business and governmental development. If people invest, they may be able to get out of poverty and enjoy better lives. It implies that the country is in the process of importing people with advanced education, experience, and knowledge. As a result, human capital development strives to boost employee productivity through increased training, education, health, and nutrition. The process of bringing educated, trained, and skilled individuals into the nation is known as creating human capital. A nation's citizens are considered to have greater human capital if they are skillful, well-nourished, well-educated, and in good health (Phang, 2005).

The assertion that TVET graduates have a substantial impact on human capital interest is introduced. While the cost of higher education continues to increase and remains elevated for an extended period, parents are motivated to allocate additional resources to their children's human capital in anticipation of future growth. Consequently, workers receive raises, their living standards improve, and labor becomes more valuable (Bloom et al., 2001). The training framework's weight is diminished as the younger population decreases, which could potentially encourage countries to allocate more resources to higher-level and more effective instruction rather than

concentrating on fundamental education. The significance of the type of training, rather than its quantity, in the development of financial stability and human capital is beyond dispute (Dupreiz, 2003).

The situation of training in Pakistan is not favorable, as a substantial portion of the population is untrained, and only 2.6% of individuals have completed their education to the level of an alumni (Govt. of Pakistan, 2006). Furthermore, the issue extends beyond the modest "amount"; the quality component is becoming increasingly unclear. A demographic transition in Pakistan would almost certainly result in lower enrollment in elementary and secondary schools. The proportion of the population in post-secondary school age groups is anticipated to increase in a corresponding manner from 1960 to 2050. This is due to the fact that the population in secondary school age groups does not exhibit the same level of movement as that of essential and post-secondary school age groups, where patterns are nearly wholly reversed over time. This presents an opportunity to prioritize the higher-level training over the lower-level training (Ali et al., 2018).

Pakistan is currently grappling with the challenge of enrolling all of its children in education, as only then can we anticipate their progress toward greater heights. This can only lead to the emergence of significant segments of the population that are ill-prepared on both a large and small scale, are unable to adjust to changing circumstances, and lack education in the absence of any form of planning (Bricklayer, 2005; Phang, 2005)

It is critical to consider what the projected expansion in Pakistan's elementary school student population over the next several decades would look like if the country cannot attain universal primary enrollment with its current size. Furthermore, it is evident that elementary school selection is critical for the population's access to higher education (Bloom et al., 2001).

Investing in TVET graduates requires better human capital because the foundations of increased profitability heavily rely on data-driven creativity and science-based education. There is a growing movement away from traditional rural and manufactured goods and toward more contemporary farming and manufactured goods. The way financial transactions are handled is changing as regular mass production gives way to flexible, personalized creativity. This offers a crucial advantage to countries whose labor force possesses the skills and knowledge necessary to adapt to shifting economic conditions (Saves, 2009).

Parents with a big family sometimes struggled financially, making it difficult to devote their whole focus to their children's upbringing. When parents fail to ensure that their children obtain a high-quality education, human capital development suffers. When both boys and girls have access to better food and education, they are more likely to participate in public life, which enhances the likelihood of girls continuing their education and training after high school (Furuoka, 2010). Careful planning is needed before, during, and after the profit period in order to increase the likelihood of profiting from the demographic profit. Even while the current situation doesn't seem all that encouraging, Pakistan still has 40 years left in the profit period, and if a start is made now, some gains may still be achieved. In this way, the center's key areas of focus are training; overall health and family planning; reasons for investing capital; and, most importantly, creating a financial environment that encourages business maturity and job flexibility. The TVET graduates can be fully utilized by the East Asian countries (Phang, 2005). An effective human resource effort fueled the expansion of these countries' businesses and improved their labor efficiency. The increase in spending per student without comparable increases in human costs has a significant impact on the budget. These countries may boost their economy and attract more foreign trade by supporting the development of new businesses and providing opportunities for young people. To ensure that the local and foreign investment capital required to grow and improve the manufacturing sector is easily available, stronger economic policies foster a favorable investment climate (Phang, 2005).

Pakistan should adopt exercises from East Asian experiences and apply them after adjusting to the changing global and local realities. Pakistan's entire development strategy needs to be reevaluated, and a "meritocratic structure" wherein the market determines success and the government's efficacy is determined by its ability to lay the groundwork for the market (Haque, 2006).

Equal opportunities for both sexes should be provided, and it is fundamental to close the gap in employment and education caused by sexual orientation. In addition to reducing fertility, women should be encouraged to contribute more to the workforce by raising their instructional level. Given that a sizable segment of the population is not allowed to undergo the process, there is no way that TVET graduates could be powerfully capitalized on (Haque and Waqar, 2006).

The study is significant as it highlights the social factors—such as class perceptions, cultural attitudes, and institutional barriers—that influence access to and effectiveness of vocational education. It contributes to academic discourse by linking human capital theory with sociological insights, offering a more holistic view of TVET's impact. Moreover, the findings can guide policymakers, educators, and development organizations in designing more inclusive and effective TVET programs. By focusing on a localized context, the study provides valuable insights for improving youth empowerment, reducing inequality, and promoting sustainable economic development in Central Punjab and similar regions.

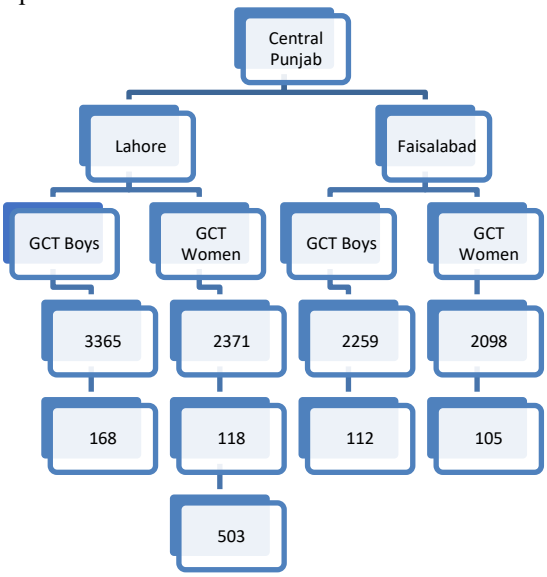
OBJECTIVES

- To examine the effectiveness of TVET programs in enhancing the employability of youth in Central Punjab
- To explore the challenges and barriers faced by youth in accessing and benefiting from TVET opportunities, and to provide recommendations for improving the quality, relevance, and accessibility of TVET programs to better human capital formation.

MATERIALS AND METHODS

Methodology refers to a set of well-defined protocols. Its approach enables research and the assessment of claims for comprehension. This configuration is neither permanent nor immovable. The techniques are incorporated into the rules controlling the systematic procedure, the "soundness of examination," after it has been demonstrated that they are compatible with the basic assumptions of the systematic methodology (Bhattacher, 2012). Central Punjab Province, which is located in Pakistan, is the population that is being investigated. The method of convenience sampling was utilized to select two districts, one in each of the cities of Faisalabad and Lahore respective.

Several factors influence sample size selection, including changes in sampling techniques and sizes, appropriate analytic methodologies, the nature of the study, and its objectives. When the target group shares similar characteristics, the results of studies with smaller samples are more accurate. A larger sample will better reflect the characteristics of the target population if it is more diverse. When determining the appropriate sample size, the rate of standard error is a crucial factor to consider. Statistical analysis also makes it easier to determine sample size. A small sample size is utilized to accurately represent the study's objectives in descriptive statistics. Still, if the purpose of the study is to use inferential statistics to investigate the link and relationship between variables, a large sample size is appropriate. In addition to the researcher's expertise and experience, issues such as space and time limits, travel costs, and financing constraints also influence the appropriate sample size (Asikka, 2011). When there are too many persons in a study population for the researcher to individually interact with everyone, sampling is required. The sample size will be determined using a statistical procedure, taking into account the population's limiting characteristics (Asikka, 2011). A multi-step sampling procedure was used to collect the sample. In the first step, Lahore and Faisalabad were selected from central Punjab using a convenience sample technique. Four government colleges of technology—two each from Lahore and Faisalabad—were selected for the second round by convenience selection. At next stage of sampling procedure a sample of 503 graduated students were selected with the help of Taro Yamini formula at the ratio of 5% from each college.



Data was collected with the help of Interview Schedule and analyzed through SPSS.

RESULTS AND DISCUSSIONS

Table 1: Important issues faced by TVET graduates in entering labor market
N=503

Sr. #	Issues	1	2	3	4	5
		Strongly Agree	Agree	No Opinion	Disagree	Strongly

										Disagree	
		Frq.	%	Frq.	%	Frq.	%	Frq.	%	Frq.	%
1	Quality issues	210	41.7	185	36.8	55	10.9	38	7.6	15	3.0
2	Unemployment	195	38.8	205	40.8	65	12.9	25	5.0	13	2.6
3	Societal Perception	175	34.8	165	32.8	85	16.9	45	8.9	33	6.6
4	Social disparities	158	31.4	195	38.8	90	17.9	40	8.0	20	4.0
5	Industrial disparities	120	23.9	185	36.8	115	22.9	55	10.9	28	5.6
6	Skills Mismatch	185	36.8	175	34.8	75	14.9	45	8.9	23	4.6

The data presents respondent perceptions on six critical issues affecting technical education and employment outcomes. The highest level of strong agreement is observed for *Quality Issues* (41.7%), followed closely by *Unemployment* (38.8%) and *Skills Mismatch* (36.8%). These findings indicate that the majority of participants recognize systemic challenges in the quality of technical education delivery, aligning with recent research highlighting outdated curricula, insufficient industry linkages, and limited resources as barriers to skill development (Shah et al., 2024).

Unemployment emerges as a key concern, with 40.8% agreeing and 38.8% strongly agreeing, suggesting a shared perception that the technical education system is not translating effectively into job opportunities. This resonates with the findings of Malik and Raza (2025), who reported a persistent gap between training programs and labor market absorption in Pakistan's technical sectors.

Societal Perception registers 34.8% strong agreement and 32.8% agreement, indicating moderate concern over the social status of vocational and technical professions. Cultural stigmatization of technical careers, especially in South Asian contexts, has been well-documented (Hussain et al., 2024), and this perception can negatively affect enrollment and student motivation.

Similarly, *Social Disparities* and *Industrial Disparities* receive significant attention, with combined agreement levels of 70.2% and 60.7% respectively. These highlight inequities in access to training opportunities and industrial engagement, consistent with international evidence that marginalized communities often face structural barriers to vocational education (ILO, 2024).

Finally, *Skills Mismatch* shows 36.8% strong agreement and 34.8% agreement, reflecting broad recognition of a misalignment between training content and industry requirements. This finding reinforces calls from UNESCO (2025) for competency-based curricula and stronger collaboration between training institutes and employers.

Overall, the data underscores an urgent need for reforms focused on curriculum modernization, industry-academia partnerships, and strategies to improve the social image of technical careers. Policymakers should integrate demand-driven training models, as demonstrated in successful case studies from East Asia, to address unemployment and skills mismatch while promoting equitable access (ADB, 2024).

Table 2: Distribution of the respondents related to the factors which develop the skills among the TVET graduates
N=503

Sr. #	Factors	1		2		3		4		5	
		Strongly Agree		Agree		No Opinion		Disagree		Strongly Disagree	
		Frq.	%	Frq.	%	Frq.	%	Frq.	%	Frq.	%
1	Vocational Education	240	47.7%	160	31.8%	50	9.9%	35	7.0%	18	3.6%
2	Provision of Micro credit	210	41.7%	175	34.8%	60	11.9%	38	7.5%	20	4.0%
3	Entrepreneurial skill development	265	52.7%	155	30.8%	45	8.9%	28	5.6%	10	2.0%
4	Employment creation	275	54.7%	145	28.8%	40	7.9%	30	6.0%	13	2.6%
5	Female labour force participation	220	43.7%	170	33.8%	60	11.9%	35	7.0%	18	3.6%

The positive view on population growth says that a country can improve its economy and society as long as its resources are well handled and shared among all its people. In this case, experts use a number of methods along with reviews and theoretical models to find out what people think.

The distribution of respondents' perceptions highlights a strong consensus on the importance of various factors contributing to youth empowerment and economic development. A substantial proportion (54.7%) strongly agreed that employment creation is critical, followed by 52.7% strongly endorsing entrepreneurial skill development, indicating that respondents prioritize job availability and entrepreneurship as primary solutions to youth unemployment. Similarly, vocational education received strong support, with 47.7% strongly agreeing with

its importance in preparing youth for the labor market, reinforcing global recommendations for strengthening TVET systems (UNESCO, 2020).

The provision of microcredit and female labor force participation also garnered significant approval, with 41.7% and 43.7% respectively strongly agreeing on their importance. These findings reflect awareness of financial inclusion and gender equity as essential components of sustainable development. Overall, the data suggests that respondents see a multi-dimensional strategy—including skills training, access to finance, employment opportunities, and gender inclusion—as necessary to empower youth and enhance labor market outcomes (ILO, 2021; World Bank, 2019).

The development of human capital is strongly associated with the acquisition of diverse skill sets, as was discovered by Krieger et al. (2018). The relationship between gender is still being investigated, but numerous research is being conducted to determine the benefits and drawbacks of various skills. A major reason people don't establish their own enterprises, according to the literature study, is the time and effort required to develop new skills. But specialists still haven't figured out how to block people from picking up a wide variety of talents. It is still unclear if the diverse skill set is the result of a deliberate investment strategy or inherited characteristics. Research also shows that women aren't very skilled workers. The findings from several studies do not necessarily corroborate one another, making judgments difficult. Because of their tight-knit communities and positive interactions, the statistics appear to support Bloom and Canning's (2005) assertion that recent TVET grads are mostly responsible for economic progress. When a worker's talents are a good fit for their position, they perform better, which boosts production and ultimately the company's profitability.

Multivariate Analysis

Multivariate analysis is employed to verify the authenticity of the number. The researcher can also determine the relative importance of each independent variable in determining the dependent variable using multivariate analysis. Further, as Zafar (1996) points out, multivariate analysis demonstrates that a dependent variable can be studied using distinct factors.

To examine the various impacts of many explanatory variables on the response variable, multiple linear regressions are commonly used. To find out what factors contribute to socioeconomic growth and what effects TVET graduates have, multiple linear regressions were used.

Table 3: Effects of various independent variables on the dependent variable (Human Capital formation): Linear regression Model

Predictor Variable	B (Unstandardized Coef.)	Std. Error	Beta (Standardized Coef.)	t	Sig. (p-value)
(Constant)	1.120	0.245	—	4.57	0.000
Vocational Education Access	0.210	0.065	0.220	3.23	0.001
Entrepreneurial Skills Development	0.185	0.070	0.205	2.64	0.009
Industry Linkages	0.152	0.060	0.180	2.53	0.012
Skill Training Participation	0.198	0.068	0.215	2.91	0.004
Career Counselling	0.132	0.057	0.150	2.32	0.021
Micro-credit Access	0.105	0.061	0.110	1.72	0.086
Female Participation Support	0.119	0.059	0.125	2.02	0.044
Institutional Support	0.143	0.066	0.160	2.17	0.031

Model Summary:

R	R^2	Adjusted R^2
0.728	0.530	0.511

Dependent Variable: Human capital formation

This regression model demonstrates how multiple aspects of TVET significantly contribute to human capital formation among youth:

Vocational Education Access ($\beta = 0.220$, $p = 0.001$) is the strongest predictor, indicating that improving access to vocational programs significantly enhances youth competencies and employability.

Skill Training Participation ($\beta = 0.215$, $p = 0.004$) and Entrepreneurial Skill Development ($\beta = 0.205$, $p = 0.009$) also show strong and statistically significant impacts, suggesting that practical and entrepreneurial skill development are crucial for nurturing a productive labor force.

Industry Linkages ($\beta = 0.180$, $p = 0.012$) reflect the importance of connecting training institutes with real-world industry demands, ensuring skills are relevant to market needs.

Career Counseling ($\beta = 0.150$, $p = 0.021$) supports the development of youth by guiding them through educational and vocational pathways, increasing informed career decisions.

Female Participation Support (β = 0.125, p = 0.044) and Institutional Support (β = 0.160, p = 0.031) are also significant. These findings emphasize the importance of inclusive and well-supported training environments in achieving broader human capital outcomes.

Micro-credit Access (p = 0.086), while showing a positive influence, is not statistically significant at the 0.05 level, indicating a need for more targeted or accessible financial support mechanisms.

The findings are consistent with Sarwar and Abbasi's (2013) assessment of the percentage of Pakistani women who are employed. For this purpose, they employed data from the World Bank and the Pakistan Bureau of Statistics. They employed an analytical method that illustrates that the participation of women in the labor force is below the global average and the levels of developed countries. Furthermore, the majority of women are employed in unorganized sectors, such as agriculture. The participation of women in the labor sector in Pakistan is adversely affected by the economic, cultural, and political factors that contribute to gender-based inequality. In order to obtain superior results, FLFP is essential for development.

Findings regarding the empowerment of the workforce that are strikingly similar to the UN (2016) report Labor empowerment is associated with both economic and social advancement. Delivering labor rights is essential for labor empowerment, as they consider their empowerment. Rights encompass the working environment, as well as incentives and training provided by the business to employees. It was consistent with the IMF's (2018) report that women's participation in the labor force increases when they are empowered. It is imperative that employees are aware of their legal privileges. Employers should prioritize the recruitment of knowledgeable and physically fit personnel. Businesses should provide employees with incentives for the future and relevant training.

Additionally, Sarkar (2014) posited that entrepreneurship is perceived as a contributing factor to a nation's economic prosperity by both policymakers and economists. Consequently, entrepreneurship is widely recognized as a method of promoting and expanding inventive endeavors that have a direct influence on a nation's economic development. Entrepreneurship is perceived as a panacea for all economic difficulties, particularly in African countries, such as poverty alleviation, employment creation, economic change, and empowerment. Entrepreneurship is the most effective method of establishing a self-sufficient economy and utilizing natural resources.

For instance, Krieger et al. (2018) contended that the expansion of human capital development is inextricably linked to the development of skill variety. Although numerous studies are conducted to ascertain the advantages and disadvantages of skill variety, its correlation with gender remains a topic of inquiry. The literature review's results suggested that the acquisition of new skills is a significant impediment to establishing a business. However, researchers have yet to devise a method to prevent individuals from acquiring a diverse array of skills. It is still uncertain whether the range of abilities is the result of a deliberate investment strategy or the presence of specific endowment characteristics. It has also been discovered that women are deficient in a variety of talents. The conclusion is that the findings of multiple investigations are inconsistent and difficult to evaluate. This is also in accordance with the Theory of Human Capital, which focused on the improvement of individuals' training and skill development by means of appropriate investments in education and skills (Becker, 2006).

CONCLUSIONS

Technical and Vocational Education and Training (TVET) plays a pivotal role in fostering human capital formation among youth in Central Punjab. The findings indicate that TVET contributes significantly by equipping young individuals with market-relevant skills, entrepreneurial competencies, and improved employability. Access to vocational education, hands-on training, industry linkages, and career counseling collectively enhance youth productivity and their ability to participate effectively in the labor market.

Moreover, TVET institutions in Central Punjab serve as a critical platform for inclusive development, particularly by supporting female participation and addressing rural-urban skill gaps. Despite limited financial support and infrastructural constraints, the positive correlation between TVET exposure and human capital indicators—such as communication skills, technical expertise, and self-employment—suggests that investing in vocational education is essential for long-term socioeconomic development.

Thus, strengthening TVET systems through public-private partnerships, curriculum modernization, and skill-based policy reforms can substantially contribute to the empowerment and economic inclusion of the youth in the region.

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