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Assessing the Effect of Technical and Vocational Education and Training (TVET) on Household Income: A Case Study of Pul-e-Khumri, Afghanistan

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Abstract

Vocational training provides practical and skill-based learning that enables individuals to acquire competencies relevant to labor market requirements. This study examined the effect of vocational training on household income in Pul-e-Khumri District, Baghlan Province. The study population comprised 980 individuals who had completed vocational training programs. Based on Morgan's sampling table, 280 participants were selected using convenience sampling. Data were collected through a researcher-developed questionnaire employing a five-point Likert scale ranging from very high to very low. The instrument demonstrated satisfactory reliability, with a Cronbach's alpha coefficient of 0.882. Its validity was established through the expert judgments of three scholars specializing in Social Sciences, Mathematics, and Dari Language and Literature. Descriptive findings revealed that 23.2% of respondents held a bachelor's degree, while most had a diploma or lower qualification. Tailoring was the most common vocational skill (20.7%), followed by mobile-phone repair (19.3%), plastering and metalwork (12.5% each), solar installation (12.1%), and furniture-making and carpentry (11.4% each). Overall, 72.1% of participants obtained employment after completing their training. CFA and SEM analyses showed that vocational training significantly improved household income through both direct and indirect pathways, particularly by strengthening occupational skills, attitudes, goal orientation, and employment opportunities. All hypotheses were supported. The findings indicate that expanding vocational training can be an effective approach to promoting employment and strengthening household livelihoods.

Keywords: Household Income; Pul-e-Khumri District; Vocational Training.

Introduction

Unemployment, low wages, and the increasing incidence of income poverty among households are among the most critical socio-economic challenges, particularly in

developing countries (Van Vu, 2020). These challenges not only reduce household welfare but also increase economic vulnerability, social inequality, and the persistence of intergenerational poverty. One of the fundamental factors contributing to the emergence and persistence of this situation is the mismatch between the skills of the labor force and the actual demands of the labor market, as well as the lack of practical technical and vocational skills (Yar & Azimi, 2025). Skills deficiencies hinder individuals' sustainable entry into the labor market and, even when employment is secured, often lead to job instability and low earnings. In response to this issue, technical and vocational education and training (TVET) has been widely recognized as one of the most effective development tools for enhancing workforce skills, improving employability, and achieving better labor market outcomes (Chakravarty et al., 2019). These training programs comprise a set of structured educational activities designed to prepare individuals for employment, specialized occupations, or entrepreneurship. By improving capabilities, efficiency, and labor force adaptability, such training plays a significant role in strengthening human capital (Valian et al., 2025; Ansari et al., 2020). Skill development through TVET institutions can enhance the productivity of economic activities, thereby contributing to increased output, national wealth, and improved household livelihoods (Shahnoushi et al., 2010). Given the growing importance of advanced skills in knowledge-based economies, the European Union, in the Bruges Communiqué, has placed technical and vocational education on par with academic education (Brunello & Rocco, 2015). However, if these training programs are not aligned with labor market needs and technological changes, their effectiveness remains limited (Hanushek et al., 2017), and their success varies depending on countries' economic and institutional contexts (Stöterau et al., 2022).

In Afghanistan, unemployment, income poverty, and unstable household livelihoods have become major socio-economic challenges. Baghlan Province, particularly Pul-e-Khumri as its administrative and economic center, faces issues such as population concentration, internal migration, return of migrants, and limited labor market capacity. These factors have directly and negatively affected household income and livelihoods. One of the main reasons for the persistence of this condition is the significant gap between the skills of the local workforce and the actual needs of the labor market (Nguyen, 2024). Under such circumstances, technical and vocational education and training emerges as a key instrument for enhancing human capital and improving employability. This type of training can play a crucial role in increasing skills, improving employment opportunities, and raising household incomes. However, in the study area, there is a lack of coherent and sufficient empirical field evidence regarding the impact of TVET on household income. Therefore, the objective of this study is to examine the impact of technical and vocational education and training on household income in Pul-e-Khumri District of Baghlan Province. The findings of this research can provide the scientific evidence necessary for improving policy-making, aligning skills with local labor market needs, and increasing the effectiveness of TVET programs, ultimately contributing to the improvement of the economic conditions and livelihoods of households in the province.

Given the importance of technical and vocational education and training (TVET), domestic studies in Afghanistan remain limited. Therefore, several important international studies that have examined different dimensions of this type of education are reviewed below. In this regard, Hashimi and Safi (2025), in a study entitled *"The Impact of Vocational Training on Household Economies in Afghanistan,"* investigated the effects of TVET on household

economies in Afghanistan. The findings indicated that vocational training enables individuals to acquire the skills necessary to enter the labor market and to produce goods for local markets, thereby improving household livelihoods and overall welfare. The study further emphasizes that TVET plays a significant role in enhancing social stability and promoting economic empowerment, ultimately contributing to broader socio-economic development. Similarly, Khan et al. (2025), in their study *"Economic Growth through Determinants of Education and Vocational Training in Pakistan,"* conducted in Pakistan, employed human capital theory and analyzed data collected from students of technical institutions across five districts of Balochistan using Structural Equation Modeling (SEM). Their findings demonstrated that TVET programs can foster economic growth, particularly when human capital development functions as a mediating variable. In a comparable context, Chang (2021), in the study *"The Impact of Vocational Training on Income Growth and Employment in Western Kenya,"* concluded that TVET can enhance employability in the short term. Notably, even individuals without prior work experience experienced higher income growth compared to those with previous experience. The study highlights that the effectiveness of TVET in improving household income depends on the quality of training and the degree of alignment between acquired skills and labor market needs. Furthermore, Mirabel et al. (2022), in a study conducted in Johannesburg, South Africa, examining the role of TVET in empowering students from low-income backgrounds, found that the provision of skill-based programs through vocational training can reduce dependency on government support and facilitate financial independence as well as successful integration into the labor market. On the other hand, Bairagya (2021), in an empirical study of rural self-employed individuals in India, demonstrated that participation in formal TVET programs has a positive and statistically significant effect on individual income. In the same vein, Okafor (2011) emphasized the importance of TVET, arguing that such programs can develop a skilled and self-reliant workforce, reduce labor wastage, and contribute to lowering unemployment and increasing income levels.

Ansari et al. (2020), in a study conducted in West Azerbaijan Province, examined the relationship between technical and vocational education and training (TVET) and labor market needs from the perspectives of training center managers, employers, and managers of industrial and service units. The findings indicated that alignment between TVET programs and labor market demand plays a significant role in increasing employment opportunities and enhancing workforce productivity. The study emphasizes that a mismatch between acquired skills and actual market needs can reduce the effectiveness of training programs. Similarly, Khademi Kallelou et al. (2023), in their study entitled *"Correspondence between Vocational Education and Training and Employment Distribution in Iran,"* found that, at the national level, there is no significant alignment between TVET and the structure of employment. The results suggest that this mismatch is particularly pronounced in the industrial and agricultural sectors and has contributed to increased unemployment among educated and skilled individuals. The study highlights the need to revise educational policies and align them with actual labor market demands. Furthermore, Naderi et al. (2022), in a study titled *"Developing Vocational Training Aligned with Labor Market Needs: The DICOM Model in Pottery,"* demonstrated that both the quantitative and qualitative development of skill-based training—when aligned with labor market needs—can lead to professional advancement and increased employment and income opportunities. On the other hand, Yousaf and Bhatti (2022), in their study *"The*

Impact of Vocational Training on Poverty Reduction through Skill Acquisition in Developing Countries," found that TVET has a significant impact on poverty reduction, with adult skill acquisition serving as an important mediating factor in strengthening this effect. The findings further indicate that even at lower levels of adult skill acquisition, TVET exerts a meaningful effect, underscoring the importance of expanding such programs across all segments of society. Studies with similar themes consistently demonstrate that TVET plays a crucial role in economic empowerment. In this regard, Mirabel et al. (2022), in Johannesburg, South Africa, showed that such training reduces dependency on government support and facilitates financial independence. Likewise, Bairagya (2021), in India, found that participation in these programs leads to a statistically significant increase in individual income. Similarly, Okafor (2011) demonstrated that TVET contributes to reducing unemployment and increasing income by developing a skilled workforce.

Material and Method

The present study is quantitative and applied in nature. It aims to examine the extent to which technical and vocational education and training (TVET) affects household income in Pul-e-Khumri District of Baghlan Province. The study is based on data collected through a researcher-developed five-point Likert-scale questionnaire, ranging from "very high" to "very low."

According to the statistics provided by the Baghlan Provincial Statistics Office, the statistical population of the study consists of 980 individuals who have completed technical and vocational training through one of the formal, non-formal, or informal forms of training in Pul-e-Khumri District and are currently engaged in the occupation for which they received training.

The sample size was determined as 280 participants based on Morgan's sample size table. Due to the unavailability of a comprehensive list of individuals who had received technical and vocational training, convenience sampling was employed to collect the required data. The data collection instrument was a researcher-developed five-point Likert-scale questionnaire. The reliability of the questionnaire was assessed using Cronbach's alpha, yielding a coefficient of 0.882, which indicates a satisfactory level of internal consistency and coherence among the questionnaire items. To establish the content validity of the instrument, the opinions of three experienced experts were obtained: one PhD holder in Social Sciences, one PhD holder in Mathematics, and one PhD holder in Persian Language and Literature.

To assess the adequacy of the data for factor analysis, the Kaiser–Meyer–Olkin (KMO) measure and Bartlett's test of sphericity were employed. The KMO value was 0.870, while the significance level of Bartlett's test was less than 0.001. These results indicate that the collected data were appropriate and sufficiently adequate for factor analysis.

For data analysis, the collected information was first organized, coded, and subjected to preliminary calculations using SPSS version 27. Subsequently, Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM) were conducted using AMOS version 24 to examine the relationships among the study variables in greater depth. This analytical approach made it possible to simultaneously assess the relationships among the questionnaire items, independent and dependent variables, and to obtain findings supported by statistically valid evidence.

Findings

Descriptive Findings

This section provides a brief overview of the respondents' characteristics, including their educational level, fields of vocational training, and employment status before and after receiving technical and vocational education and training. Accordingly, the effects of these demographic characteristics on household income are not examined in this section. Instead, the inferential analysis focuses specifically on assessing the effect of vocational training on household income.

Table 1. Frequency Distribution of Respondents' Educational Level

Education Level	Frequency	Percentage	Cumulative Percentage
Illiterate	15	5.5	5.4
Secondary school	41	14.6	20
High school	159	56.8	76.8
Bachelor	65	23.2	100
Total	280	100	

Source: Research Findings

Trained Professions

As shown in Table 2, among the respondents, tailoring accounted for 56 individuals (20.7%), mobile repair for 54 individuals (19.3%), plastering and metalworking each for 35 individuals (12.5%), solar installation for 34 individuals (12.1%), and furniture making and carpentry each for 32 individuals (11.4%). Tailoring had the highest frequency, while carpentry had the lowest. The distribution of professions reflects the diversity of technical skills provided through vocational training, with a greater focus on skill-based and market-oriented occupations.

Table 2. Frequency Distribution of Trained Professions

Field of Training	**Frequency**	**Percentage**
Tailoring	58	20.7
Plastering	35	12.5
Solar System Installation	34	12.1
Carpentry	32	11.4
Metalworking	35	12.5
Mobile Phone Repair	54	19.3
Furniture and Upholstery	32	11.4
Total	280	100.0

Source: Research Findings

Employment Status Before and After Vocational Training

As shown in Table 3, 72.1% of the respondents entered the labor market after completing the training, while 27.9% were employed before undergoing the vocational training.

Table 3. Frequency of Respondents' Employment Status Before and After Training

Employment Status	**Frequency**	**Percentage**
Employed before training	78	27.9
Employed after training	202	72.1
Employed after training	280	100.00

Source: Research Findings

Analytical Findings of the Research

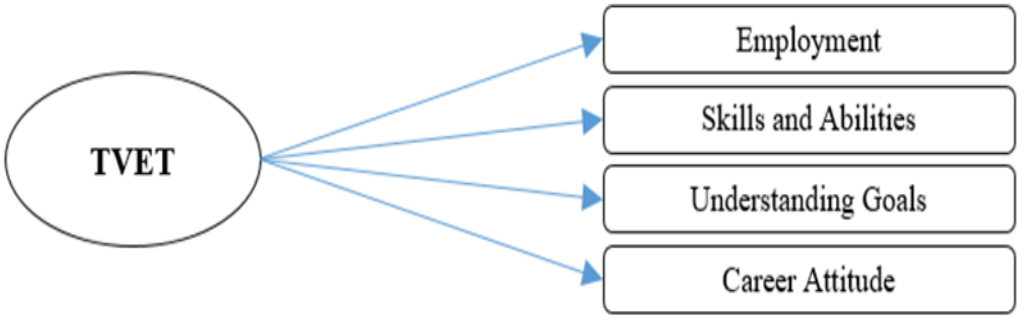


Figure 2: Conceptual Model of the Impact of Vocational Training on Household income

The theoretical foundation of this study is based on Human Capital Theory, which holds that education and occupational skills enhance individuals' capabilities, employability, and productivity, thereby increasing their income-generating opportunities. From this perspective, technical and vocational education and training strengthens skills, improves employment prospects, and ultimately contributes to higher household income. Thus, the conceptual model explains the relationship between vocational training and household income within the framework of Human Capital Theory

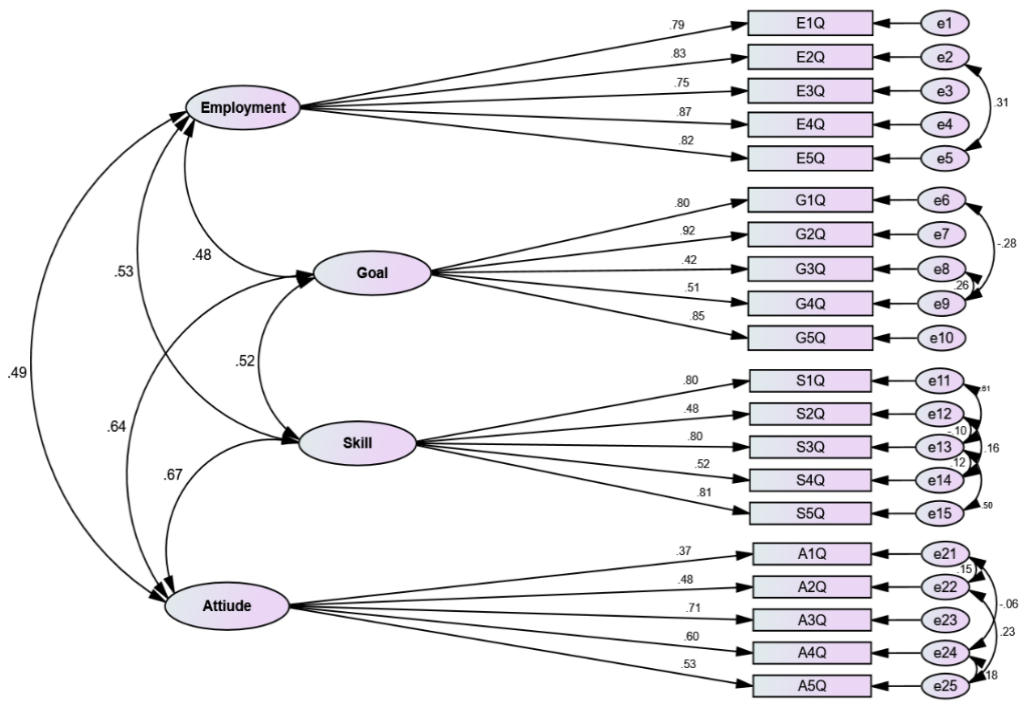
Model Fit Indicators of the Measurement Model (First-Stage Factor Analysis)

Table 4. Fit Indicators of the First-Stage Confirmatory Factor Analysis Examining the Impact of Vocational Training on Household Incom.

Indicators	Acceptable Range	Observed Value
x^2		254.421
x^2/df	≤3	1.674
RMSEM	≤0.8	0.049
CFI	0.9≥	0.960
NFI	0.9≥	0.908
GFI	0.9≥	0.917
IFI	0.9≥	0.961
PGFI	0.5≥	0.664
PNFI	0.5≥	0.736

Source: Research Findings

To assess the fit of the empirical data with the vocational training model, model fit indices were calculated within the framework of confirmatory factor analysis. The chi-square value (χ^2) was 254.421. Considering the sensitivity of this index to sample size, the ratio of chi-square to degrees of freedom (χ^2/df = 1.674) was examined, which is below the threshold of 3, indicating a good model fit. The RMSEA value was 0.049, which is below 0.08, suggesting an acceptable fit. Additionally, comparative fit indices (CFI, NFI, GFI, IFI) were all above 0.90, and parsimonious fit indices (PGFI, PNFI) were above 0.50, indicating that the data fit the model well and the constructs have strong explanatory power.



Chi-Square=254.421 , df=152 , Pvalue=.000 , =RMSEA=.049

Figure 1: First-Stage Confirmatory Factor Analysis of the Impact of Vocational Training on Household Income

To assess the construct validity and ensure the adequacy of the measurement model, a first-stage Confirmatory Factor Analysis (CFA) was conducted. According to theoretical foundations and prior research, factor loadings greater than 0.3 are considered acceptable, indicating the indicators' ability to represent the latent constructs. The results showed that all factor loadings exceeded 0.3 and were statistically significant, with correlations among factors at an acceptable level. Therefore, the measurement model of vocational training demonstrates good fit, and its four-factor structure aligns well with the theoretical framework of the study.

Table 5. Fit Indices of the Second-Stage Confirmatory Factor Analysis Using the Structural Equation Model (SEM) for the Impact of Vocational Training on Household Income.

Indicators	Acceptable Range	Observed Value
x^2		273.187
x^2/df	≤3	1.740
RMSEM	≤0.8	0.052
CFI	0.9≥	0.955
NFI	0.9≥	0.901
GFI	0.9≥	0.913
IFI	0.9≥	0.955
PGFI	0.5≥	0.683
PNFI	0.5≥	0.745

Source: Research Findings

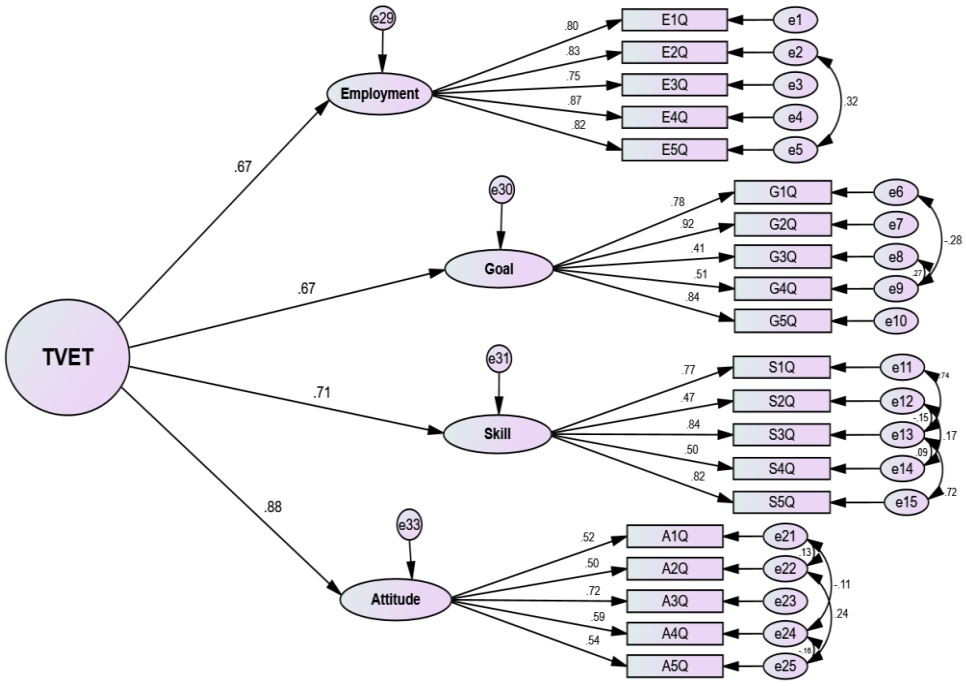
The indices presented in Table 5 were calculated to assess the fit of the empirical data with the structural model examining the impact of vocational training on household income. The chi-square (χ^2) value was 273.187. Given the sensitivity of this statistic to sample size, the chi-square to degrees of freedom ratio (χ^2/df) was considered, which was 1.740—well below the threshold of 3—indicating a good model fit. The RMSEA value was 0.052, which falls within the acceptable range. In addition, the PGFI and PNFI values exceeded 0.5, while other fit indices (IFI, GFI, NFI, CFI) were all above 0.9, further confirming the adequacy of the structural model fit.

Table 6. Regression Coefficients of Factors Affecting Vocational Training

			Estimate	S.E.	C.R.	P
Employment	<---	TVET	1.000			
Goal	<---	TVET	1.000			
Skill	<---	TVET	1.000			
Attitude	<---	TVET	1.000			
E1Q	<---	Employment	1.000			
E2Q	<---	Employment	1.005	0.062	16.15	***
E3Q	<---	Employment	0.979	0.069	14.142	***
E4Q	<---	Employment	1.046	0.06	17.297	***
E5Q	<---	Employment	0.994	0.063	15.85	***
G1Q	<---	Goal	1			
G2Q	<---	Goal	1.144	0.064	17.912	***
G3Q	<---	Goal	0.476	0.07	6.824	***
G4Q	<---	Goal	0.538	0.068	7.929	***
G5Q	<---	Goal	1.096	0.068	16.181	***
S1Q	<---	Skill	1			
S2Q	<---	Skill	0.499	0.069	7.237	***
S3Q	<---	Skill	1.019	0.106	9.645	***
S4Q	<---	Skill	0.618	0.078	7.884	***
S5Q	<---	Skill	1.145	0.092	12.449	***
A1Q	<---	Attitude	1			
A2Q	<---	Attitude	0.954	0.128	7.455	***
A3Q	<---	Attitude	1.215	0.119	10.224	***
A4Q	<---	Attitude	0.869	0.105	8.296	***
A5Q	<---	Attitude	0.973	0.127	7.666	***

Source: Research Findings

The regression coefficients in Table 6 indicate that the vocational training construct is composed of four main dimensions: employment, skills and abilities, attitude, and goal perception. Each dimension is measured through five observable items. For model identification, one reference path in each latent construct was fixed at 1, while the other coefficients were freely estimated. Examination of the factor loadings showed that all items have positive and statistically significant coefficients ($P < 0.001$). The high values of the critical ratio (C.R.) for all paths indicate the strong explanatory power of the items and the good fit of the measurement modil.



Chi-Square=273.187, df=157, Pvalue=.000, =RMSEA=.052

Figure 2: Second-stage confirmatory factor analysis (structural model) examining the impact of vocational training on household income.

Figure 2 illustrates the structural model showing the impact of vocational training on four mediating factors: employment, career goal awareness, skills, and attitudes. The path coefficients are positive and relatively high (employment and career goal awareness: 0.67, skills: 0.71, attitudes: 0.88), indicating a strong effect of training on strengthening these mediating factors. The factor loadings show that all observed variables adequately represent their respective mediators. These findings suggest that investment in vocational training can improve the economic situation and reduce household poverty by enhancing skills, work-related attitudes, career awareness, and job opportunities.

Discussion

The findings of the present study indicate that technical and vocational education and training (TVET), through strengthening employment, skills and abilities, occupational attitudes, and understanding of career goals, can contribute to improving individuals' economic conditions and household income. The increase in employment following training and the diversity of training fields, including tailoring, mobile phone repair, plastering, metalwork, solar installation, and carpentry, indicate that a considerable proportion of the training programs are related to practical occupations and local labor-market opportunities. The structural model further showed that TVET has positive and statistically significant effects on occupational attitudes (β = 0.88), skills and abilities (β = 0.71), employment (β = 0.67), and understanding of career goals (β = 0.67). Therefore, the contribution of TVET to household income does not occur solely through the acquisition of

technical skills; rather, skills, attitudinal, and employment-related factors jointly contribute to this process.

These findings are consistent with Hashimi and Safi (2025), who found that TVET provides individuals with the skills required to enter the labor market and produce goods for local markets, thereby contributing to economic empowerment and improved household living standards. Similarly, Chang (2021) reported that TVET increases employability and income growth and emphasized the importance of aligning training skills with labor-market requirements. From this perspective, the significant effect of TVET on employment in the present study (β = 0.67) suggests that when training is aligned with available economic opportunities, the likelihood of converting acquired skills into economic activities and income increases.

The present finding concerning the relationship between training and the labor market is also consistent with the findings of Ansari et al. (2020) and Naderi et al. (2022), who emphasized the importance of aligning TVET programs with labor-market needs in increasing employment and income opportunities. In contrast, Khademi Kalelo et al. (2023) reported a mismatch between TVET and employment in some economic sectors. This difference suggests that the effectiveness of TVET is not uniform across different contexts and depends on factors such as training quality, the alignment of training fields with market demand, and opportunities to apply acquired skills in practice.

The positive effect of TVET on skills and abilities (β = 0.71) is also consistent with the findings of Bairagya (2021), Okafor (2011), and Ali et al. (2017). These studies emphasized the role of vocational training in enhancing professional competencies, employability, and income. Accordingly, acquired skills can generate economic outcomes when individuals are able to apply them in actual economic activities. In the present study, the significant effect of TVET on skills and abilities indicates that training programs have provided the necessary foundation for strengthening participants' professional capacities and creating opportunities for employment and income generation.

One of the important findings of the present study is that the strongest effect of TVET was observed on occupational attitudes (β = 0.88). This result indicates that, beyond transferring technical skills, TVET can strengthen individuals' motivation, self-confidence, and readiness to participate in economic activities. This finding is consistent with Azami et al. (2022) and Badi Farashtah et al. (2021), who emphasized the role of TVET in enhancing self-confidence, self-belief, skills, and readiness for economic participation. Furthermore, the relationship between psychological capital, person–career fit, and employability reported by Sulistiobudi and Kadiyono (2023) highlights the importance of attitudinal and psychological factors in translating training into employability.the significant effect of TVET on understanding career goals (β = 0.67) further indicates that vocational training can help individuals identify appropriate career paths and select occupations that correspond to their abilities and available opportunities. This finding can be compared with the studies of Umar and Manabete (2018) and, to some extent, Hoidn and Šťastný (2023). However, the latter study showed that labor-market outcomes of TVET are not uniform across different educational systems and may depend on the structure of the training system, work experience, and contextual conditions.

Furthermore, the findings of the present study are consistent with Yousaf and Bhatti (2022), Bairagya and Thomas (2025), and Chakravarty et al. (2019), who associated TVET with poverty reduction, increased employment, and improved income. Overall, the

evidence suggests that TVET can contribute to household income and livelihoods through a chain of processes involving the development of skills and occupational attitudes, increased employability and career orientation, and ultimately the creation of income-generating opportunities. However, the magnitude of these effects depends on training quality, practical experience, available equipment, economic support, and, most importantly, the alignment of training skills with actual labor-market needs.

Conclusion

The present study aimed to examine the extent to which technical and vocational education and training (TVET) affects household income in Pul-e Khumri District, Baghlan Province, Afghanistan. The study was applied in terms of its purpose and employed a quantitative approach using structural equation modeling (SEM). The statistical population comprised 980 individuals who had completed formal, informal, or non-formal TVET programs in Pul-e Khumri District and were actively engaged in the occupations for which they had been trained. Based on the Morgan table, a sample of 280 participants was selected using convenience sampling. Data were collected through a researcher-developed questionnaire. The instrument demonstrated good reliability, with a Cronbach's alpha coefficient of 0.882, while its validity was confirmed based on the expert opinions of three experienced PhD holders. The KMO measure of sampling adequacy was 0.870, and Bartlett's test of sphericity was statistically significant ($p < 0.010$), confirming the suitability of the data for factor analysis. Data were analyzed using SPSS 27 and AMOS 24 through confirmatory factor analysis (CFA) and structural equation modeling. Descriptive findings showed that 72% of trained participants entered the labor market after completing TVET programs, indicating a substantial increase in employment following training. This finding suggests that TVET has contributed to reducing the skills gap between the local workforce and labor-market requirements. The diversity of training fields, including tailoring, mobile phone repair, plastering, metalwork, solar installation, and carpentry, further indicates that the programs were largely oriented toward market-based occupations compatible with local economic conditions, thereby enhancing employability and income-generating opportunities. The first-stage confirmatory factor analysis showed that the TVET construct had satisfactory validity and reliability and consisted of four main dimensions: employment, skills and abilities, occupational attitudes, and understanding of career goals. The measurement model demonstrated

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Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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