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Labor Market Assessment

In Khyber Pakhtunkhwa

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Acronyms

ADB	Asian Development Bank
EU	European Union
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
HVAC	Heating, Ventilation and Air Conditioning
ILO	International Labour Organization
M&E	Monitoring and Evaluation
NAVTTC	National Vocational and Technical Training Commission
NSIS	National Skills Information System
OECD	Organisation for Economic Co-operation and Development
PBS	Pakistan Bureau of Statistics
PLC	Programmable Logic Controller
QAB	Qualifications Awarding Body
TVET SSP	TVET Sector Support Programme
TEVTA	Technical Education and Vocational Training Authority
TVET	Technical and Vocational Education and Training
UNESCO	United Nations Educational, Scientific and Cultural Organization
WBT	Work-Based Training

Executive Summary

As part of cooperation with the Government of Pakistan, this report is prepared for TVET Sector Support Programme to make recommendations on the potential, initial and key reforms needed including, but not limited to, demand driven courses, expansion of training programmes, and gender mainstreaming in TVET system across Khyber Pakhtunkhwa. The study shows that there is a strong job market for skilled workforce in the fields of manufacturing, construction, hospitality & tourism, textile garments, agriculture, livestock & fisheries, renewable energy, printing and packaging, and allied health.

An integrated intervention strategy is used that entails tools development and calibration, staff recruitment and training of surveyors, determination of parameters for field visits, definition of sampling parameters, and data collection and entry. Employers' sample for the study was systematically selected from the growth sectors within concentrated industrial districts to represent the broader population. The frameworks provided by Khyber Pakhtunkhwa (KP) Industries Departments were used while utilising an efficient sample size for reliable and valid results. Using acceptable estimates of over 95% confidence level and a margin of error smaller than the conventional 5% with a sample size of 1,189 results have been completed for a better understanding of the labour market along with their skills requirements.

Demand pressure in Khyber Pakhtunkhwa is mostly observed in construction related trades such as masonry, carpentry, plumbing, electrical, and renewable energy, as well as the hospitality industry. At the district level, it has been found that many cities including Peshawar, Swat, Charsadda, have a higher demand for electricians, plumbers, masons and solar panel technicians. The findings of the report shows a growing demand for green jobs because of the province's inclination towards less harmful sources of power. Another key driver is tourism with a high demand of waiters, cooks, housekeeping staff, chefs, etc. Swat has emerged as a tourism city. Moreover, nursing and paramedical professions have been found high in demand Swat and Nowshera districts calling for upscaling of training opportunities in these skills.

Some specific green skills identified include solar energy and green building codes. There is a need to increase hospitality management programmes in response to the growth of tourism industry. Special emphasis should be made on employment of the minorities, such as women, transgender community and persons with disability, which could be achieved through targeted training programmes addressing relevant employment barriers.

Key Recommendations

TVET institutes should capitalize on opportunities available in the tourism sector of Swat and Charsadda, and expand the training programmes to include hospitality and tourism. It is suggested that the programmes may include work-based training experiences involving local hotels and tour operators to impart desired skills in line with the region's tourism industry needs.

As employment opportunities for solar and other renewable energy technicians are on the rise in both Peshawar and Nowshera, TVET institutes need to offer specializations in installation of solar panels, and energy conservation, etc. Partnerships with global certification agencies will help maintain portable employment practices and facilitate Pakistan's green energy transition.

To meet the demand for skilled persons in the construction industry in Peshawar, Swat, and Haripur, TVET institutes need to increase their training options in masonry, carpentry, welding and safety procedures for infrastructure development.

For adapting to the current agricultural needs in Charsadda and Haripur, TVET institutes should revamp their curriculum for offering agritech, sustainable agriculture and business management courses to increase productivity through the modern methods of farming.

There is also a need to include specialized programmes in telemedicine, along with other innovative healthcare solutions, to prepare healthcare workers to meet the increasing demand in Swat and Nowshera and other parts of the province.

Peshawar has a higher demand for IT and administration skills for which TVET institutes may introduce programmes in business administration, IT, and accountancy. Training in digital literacy and soft skills will prepare graduates for the contemporary office environment, improving their chances for urban employment opportunities.

To promote diversity and women's employment, employers may devise and apply more gender-inclusive workplace policies such as flexible recruitment practices, work from home, flexi-hours, and improved accessibility. This would help break barriers for women inclusion in the job market.

To broaden employment horizon for women, NAVTTC may emphasis the development of programmes that can better prepare them for inclusion in sectors such as construction, IT and renewable energy. These programmes may include apprenticeship and internships to increase employability of women in these fields.

NAVTTC may redesign the curriculum to include office automation and graphic & web designing programmes that are increasing in demand in the province's labour market.

Owing to an increasing demand in renewable energy and sustainable practices, KP TEVTA should emphasize green skill training in trades such as Heating Ventilation and Air Conditioning (HVAC), solar energy technology, and energy efficient architecture, etc.

TVET institutes need to enhance their training programmes focusing on persons with disabilities and integrating green technologies in the curricula. The overall goal should be to make trainings more inclusive and aligned with 'Suitable' job opportunities.

TVET institutes may offer advance training in CNC machining, programming of PLC's and installation of solar systems and may engage employers for securing Work-Based Training (WBT) opportunities aligning skills development with regional and global job market requirements.

1. Introduction

This document presents the report “Labor Market Assessment in Khyber Pakhtunkhwa” conducted under the Team Europe funded TVET Sector Support Programme (SSP), which aims to introduce reforms like demand-driven courses, expand training programmes, and promote gender equality in collaboration with the National Vocational & Technical Training Commission (NAVTTC).

For this study, consultations with key stakeholders both in public and private sectors were held to achieve the study’s objectives. The findings and results of the report will help the policy makers and implementers in data-driven decision making for TVET programme designing and execution.

2. Background

TVET sector in Pakistan plays a crucial role in addressing the country's skilled workforce needs and fostering economic development. However, the sector faces several challenges that hinder its effectiveness and limit its potential impact. According to a report by UNESCO[1], Pakistan has one of the lowest enrollment rates in TVET programmes among developing countries, with only 5.5% of secondary-level students enrolled in such programmes.

One of the major challenges faced by the TVET sector in Pakistan is the lack of coordination and standardization among various governing bodies and institutions. The sector is governed by multiple authorities at federal[2] and provincial levels, leading to fragmentation and inconsistencies in policies, and quality assurance mechanisms. Additionally, the TVET sector suffers from inadequate funding, outdated curricula, and a shortage of qualified instructors, particularly in emerging technologies and industries[3].

Another significant challenge is the social stigma[4] associated with TVET education in Pakistan. Many perceive TVET programmes as inferior to traditional academic pathways, leading to a lack of interest and enrollment among students and their families. Furthermore, the TVET sector faces issues related to gender disparities[5] with lower participation rates among women due to socio-cultural norms and limited access to TVET institutions in certain regions.

Similarly, individuals with disabilities and transgender community have extremely limited access to vocational training. Only a small fraction of these marginalized groups has access, and even then, it is typically limited to traditional and outdated courses that have little demand in the market.

[1] http://uis.unesco.org/en/country/pk
[2] https://www.adb.org/publications/technical-vocational-education-training-pakistan
[3] https://www.pide.org.pk/research/technical-vocational-education-training-tvet-in-pakistan/
[4] https://www.worldbank.org/en/country/pakistan/publication/technical-vocational-education-training-pakistan
[5] https://www.undp.org/pakistan/publications/improving-technical-and-vocational-education-and-training-tvet-in-pakistan

In recent years, efforts have been made to address these challenges and improve the TVET sector in Pakistan. The government has introduced[6] various initiatives, such as the National Vocational and Technical Training Commission (NAVTTC) and the Prime Minister's Youth Skills Development Programme, aimed at promoting TVET education, standardizing curricula, and offering skills training opportunities.

The province of Khyber Pakhtunkhwa has taken steps to strengthen their TVET institutions and programmes. In Khyber Pakhtunkhwa[7], the government has set up in the Technical Education and Vocational Training Authority (TEVTA-KP) to oversee and regulate TVET programmes in the province. TEVTA-KP has introduced various initiatives, such as[8] establishment of new polytechnic institutes, curricula revisions, and promotion of industry-academia collaborations.

Despite these efforts, the TVET sector in Pakistan, including Khyber Pakhtunkhwa, continues to face challenges in terms of resource allocation, quality assurance, and stakeholder engagement. Ongoing efforts are needed to enhance the relevance, accessibility, and quality of TVET programmes to meet the evolving demands of the labour market and contribute to the country's socio-economic development.

3. Purpose and Scope

Purpose

The main purpose of this study is to present a comprehensive labour market assessment in the province of Khyber Pakhtunkhwa, Pakistan. It identifies skill gaps, shortages, and mismatches in sectors with higher growth potential, enabling TVET institutes to align their programmes and qualifications with the actual needs of the job market.

Scope of the Study

The scope of this study is a thorough examination of the current labour market conditions, employment trends, occupational demand and supply, skills gaps, and emerging industry needs.

The scope of the study covers the following key aspects:

Skills Demand Assessment

Engage with employers and industry representatives to understand their workforce needs, preferred qualifications, and desired skill sets. This information will help in aligning TVET qualifications and TVET programmes with the labour market demands.

[6]Prime Minister's Youth Skills Development Programme. http://navttc.gov.pk/pmysdp/
[7]https://tevtakp.gov.pk/annual-report/
[8]https://psdf.org.pk/annual-reports/

Employment Projections and Future Trends

Analyze technological advancements, and economic forecasts to project future employment landscapes. Identify emerging job roles and industries to help tailor TVET programmes accordingly.

District-Level Mapping

Conduct skilled workforce demand and supply mapping for each district of Khyber Pakhtunkhwa. Identify trades with shortage or surplus of skilled workforce and provide skill forecasts and projections for identified growth sectors.

Gender and Disadvantaged Groups

Suggest high-demand occupations for disadvantaged groups (women, transgender, minorities, etc.) that should be introduced in TVET institutes, promoting inclusivity and equal opportunities.

Recommendations

Provide practical and actionable recommendations for TVET policymakers and implementers based on the findings to help them address the identified challenges and align TVET programmes with labour market needs.

The study employed quantitative research methods, drawing representative samples, tools development for employer surveys, data analysis, and employment projections. This report is based on the outputs of the aforementioned methods and consolidates the same to give recommendations for enhancing the effectiveness of the TVET sector in meeting the skill demands of the labour market.

4. Methodological Framework

4.1. Data Collection and Analysis

For this research, both primary and secondary data were collected and analyzed. Primary data was collected through employer/enterprise surveys. While on the other hand, secondary data was gathered from provincial industry and commerce departments, Qualification Awarding Bodies (QABs) and National Skills Information System (NSIS). The secondary data helped in defining the sampling frame for primary data collection and calculation of weights for result extrapolation.

The survey tool was designed to address key issues related to the labor market, such as employment data, employee turnover, and the characteristics of businesses. Data was collected using the KOBO Collect application. Data quality was ensured through physical and digital monitoring.

Once the data collection was completed, data cleaning was carried out to correct any errors or inconsistencies and to check for any missing data. This process was crucial to ensure that the results were accurate, reliable, and reflective of the actual situation before moving on to the analysis phase.

The analysis was done based on the cleaned dataset to draw conclusions about the trends related to employers and their need for a skilled workforce.

4.2. Review of Literature

In the pursuit of a comprehensive understanding of the employment landscape, various methods have been employed to assess the status of employment details. These methods are crucial for examining employment densities, the demand and supply of specific jobs, the scarcity of skills, and the emergence of new-generation job markets. ILO (2017)[1] provided significant insights into the employment situation in Pakistan and underscored the urgent need for green skills. It was essential to recognize that the inclusion of green skills in the framework of an efficient green economy was vital, while also acknowledging the existing flaws within the current labour market, which aligned with the overarching purpose of this assessment.

Moreover, in ILO (2018)[2] a lot of discussion has been made on the possibility of creating new jobs through the transition towards green technologies. The implications for future employment and training workers for the available green jobs have also been observed. This perspective is useful for recognizing those sectors with the likelihood of creating many jobs in the future and establishing the applicability of current TVET programmes to meet emerging requirements.

[1]ILO (2017) Employment and Environmental Sustainability in Pakistan: a factsheet: available at: https://www.ilo.org/publications/employment-and-environmental-sustainability-pakistan-0

[2]ILO (2018). World Employment and Social Outlook 2018: Greening with Jobs, available at https://webapps.ilo.org/weso-greening/documents/WESO_Greening_EN_web2.pdf

ILO (2019)[3] is an interesting study, where it is possible to find out about important factors related to the greening of a workforce. There is an exploration of the necessary skills, which may be an important aspect of green jobs and how the scope of these skills can be implemented in the existing TVET programmes. This aligns with insights into the current and future skills sought by businesses and the growth of sectors. Therefore, it is also necessary to involve employers and other stakeholders in the workforce to understand their demands for workers, their preferences for an educated workforce, and their expectations for qualified personnel. It assists in linking TVET qualifications to the employment market.

According to ILO (2021a)[4], there is a need for lifelong learning to enable the advancement of economic growth and enhanced social cohesion in the face of an increasingly dynamic TVET labour market; with this perspective offering a guideline that allows for the incorporation of contemporary skills demands to the TVET education system. There is also the need to incorporate human capital development, especially through promoting lifelong learning in TVET so that workers produced remain relevant in the market (ILO, 2021b)[5]. Furthermore, ILO (2021c)[6] is targeted at the textile and garments sector where learners can learn the green skills and practices of the sectors. It is useful in tracking skills demand within certain sectors.

Analyzing demographic changes, technological advancements, and economic forecasts is essential for understanding future employment landscapes. The ILO (2022a[7],b)[8], in its policy brief on skill development for a just transition, and a practical guidance tool on greening TVET and skills development provides practical guidance on integrating green skills into TVET programmes, helping to tailor them to future job market needs. TVET institutions and organizations also use these reports to spot new professions and sectors, so their programmes are relevant for the future.

ADB (2023)[9] a global outlook for green skills and how they can be implemented in different sectors. These sources illustrate how demographic and technological factors change employment patterns and needed skills. Therefore, green skills are key in every industry as new forms of economic activities develop occupations requiring structural changes and worker transition. In the case of a switch to a low-carbon economy, the ability of the working population to retrain and move between industries appears critical. It highlights the critical role of skills and education policies in driving ecological modernization (OECD, 2014)[10].

[3]ILO (2019). Skills for a Greener Future: Challenges and Enabling Factors to Achieve a Just Transition, available at: https://www.ilo.org/publications/skills-greener-future-challenges-and-enabling-factors-achieve-just

[4]ILO (2021a). Shaping Skills and Lifelong Learning for the Future of Work, International Labor Conference, available at: https://www.ilo.org/sites/default/files/wcmsp5/groups/public/@ed_norm/@relconf/documents/meetingdocument/wcms_813696.pdf

[5]ILO (2021b). Resolution Concerning Skills and Lifelong Learning (ILC.109), available at: https://www.ilo.org/media/231121/download

[6]ILO (2021) Greener clothes? Environmental initiatives and tools in the garment sector in Asia, available at: https://www.ilo.org/publications/greener-clothes-environmental-initiatives-and-tools-garment-sector-asia

[7]ILO (2022a). Skill Development for a Just Transition, ILO Policy Brief (Oct. 2022), available at: https://www.ilo.org/publications/skills-development-just-transition

[8]ILO (2022b). Greening TVET and Skills Development: A Practical Guidance Tool, available at: https://www.ilo.org/publications/greening-tvet-and-skills-development-practical-guidance-tool

[9]ADB (2023). Preparing the Workforce for the Low-Carbon Economy: A Closer Look at Green Jobs and Green Skills, available at: https://www.adb.org/sites/default/files/publication/916561/adb-brief-262-workforce-low-carbon-economy.pdf

[10]OECD/Cedefop (2014), Greener Skills and Jobs, OECD Green Growth Studies, available at:https://www.oecd.org/content/dam/oecd/en/publications/reports/2014/02/greener-skills-and-jobs_g1g3e70b/9789264208704-en.pdf

For carrying out such determined trades' cross mapping, skilled workforce demand and supply for each division, district, and tehsil of Khyber Pakhtunkhwa is essential for recognizing trades where different skilled workforce elements are scarce or in surplus. Its work from this perspective includes comparative analysis to arrive at forecasts and projections of growth industries. When undertaking this mapping, the ILO's reports and other literature can be helpful in the task, particularly relating to a sector's required skills and employment outlooks.

Despite the extensive body of literature on green skills and their integration into diverse sectors, notable gaps exist regarding specific focuses on sectors such as manufacturing & industry, construction, hotels & tourism, textiles & apparel, agricultural & livestock & fisheries, renewable energy, printing & packaging, health & pharmaceutical, and sporting goods industries. While studies have addressed green skills in broader contexts, limited research explores the unique green skill requirements and the potential for job creation within these specific industries.

Moreover, although general concepts of green manufacturing and construction skills have been discussed, few studies have provided effective meaning. Current publications in this field are rich in descriptions of emerging sustainable practices and technologies for these industries but lack comprehensive guidelines for implementation. For instance, the hospitality and tourism sectors require specific green skills. As such, this has received insufficient attention, underscoring the need for a deeper identification of green skills in this area. The literature on specific green skills essential for enhancing environmental initiatives in the textile and garments sector is similarly scarce. This gap is critical for developing suitable TVET programmes.

Literature offers limited insights into the green skill requirements for agriculture, livestock, and fisheries, emphasizing the need for TVET programmes tailored to these sectors. While the renewable energy sector is well-documented regarding job creation, there remains a pressing need for a deeper exploration of the precise skills required for various technologies and roles. Moreover, research on green skills in the printing and packaging, allied health, and sports goods sectors is sparse. Understanding the unique skill requirements for these industries is crucial for effectively tailoring TVET programmes.

Addressing these gaps, the current labour market assessment focuses on tailoring TVET programmes to sector-specific green skills. By incorporating insights from the literature and conducting primary research, this study aims to enhance the relevance of TVET programs in promoting sustainable development and meeting the evolving demands of Pakistan's job market. This endeavour will ultimately support sustainable development and align with the evolving demands of the job market, ensuring that the workforce is adequately prepared for the future.

4.3 Sample

This survey is technically different from the household survey in certain aspects. For instance, household surveys normally capture vast and heterogeneous populations, and the proper sampling technique used is too intricate to capture the variability in the population factors. On the other hand, surveys applied to manufacturing firms are focused on relatively more limited populations. Hence, samples have to be specific and often, even comprehensive to have reliable and valid results. Households are located almost everywhere requiring regional analysis while manufacturing firms are mostly located in industrial areas. Data availability is also different; for households, the data is available with national databases while manufacturing firms may involve specific industrial databases. Population size and distribution skews strongly differentiate between the major types of survey and affect the design of each type of survey strongly.

An efficient sample size has been determined, using National Skills Information System (NSIS) datasets to have a representative sample of each adoption type. Moreover, to ensure impartiality and technical accuracy of the assessment, an expert in the field of TVET has been enlisted to conceptualize and conduct the survey. This will be followed by a targeted survey, providing insights into the labour market and the skill demands of the sampled industries.

Table 1 shows a district-wise breakdown of the sample size.

The sample size 'n' has been calculated using the following formula for finite populations:

$$n = \frac{N \times Z^2 \times p \times (1-p)}{\left(E^2 \times (N-1)\right) + (Z^2 \times p \times (1-p))}$$

- *N[1] represents the overall population of industrial units or entities for which the study will seek to provide the assessment. Due to the small population base in many cases, the formula derives such that the sample size is also sufficiently good.*
- *Z^2 corresponds to the confidence level of the study. For a 95% confidence level, a Z-score of 1.96 is used. Estimated Proportion (p) represents the proportion of the population expected to have the characteristic of interest (e.g., alignment between vocational training and industry demand). When this proportion is unknown, it is conservatively set at 0.5 to maximize the sample size, as this value assumes the highest variability.*
- *The Margin of Error (E)[3] is the acceptable amount of error that has to be considered while calculating the results of the completed sample space. Less percentage error means that the sample size has to be big; on the other hand, a high percentage error means that the sample size can be comparatively small. A 5% margin of error is tolerable in most of the research.*

Table 1: Sample size drawn from different districts of Khyber Pakhtunkhwa

District	Construction	Textile & Garments	Hospitality & Tourism	Renewable Energy- Alternative & Renewable Energy	Printing & Packaging	Agri, Livestock & Fisheries	Allied Health Services	Total
Peshawar	25	15	65	40	20	20	15	200
Nowshera	20	10	25	10	12	11	10	98
Haripur	12	5	23	13	10	21	22	106
Swat	10	16	100	16	15	15	8	180
Mardan	16	8	25	15	12	18	11	105
Abbottabad	15	0	90	14	7	0	10	136
D.I. Khan	10	10	15	18	5	16	15	89
Swabi	9	5	20	10	9	15	11	79
Charsada	10	0	25	12	7	10	12	76
Mohmand	20	0	0	15	5	0	10	50
Kurram	10	0	15	14	9	2	5	55
Grand Total	157	69	403	177	111	128	129	1.174

4.4. Sampling Technique

Official statistics were collected from national household surveys through enumeration blocks and sampling frames, which are refreshed periodically by the Pakistan Bureau of Statistics (PBS), however, for this study the NSIS database and data from the provincial industries departments were utilized. Therefore, the earlier recorded NSIS data shall be employed in sample making and generalization of findings.

After determining the overall sample size using the above formula, the sample was stratified by sector to ensure that each industry is proportionally represented. This stratified random sampling approach ensures that the study captures the specific demands and characteristics of different sectors, thereby enhancing the precision and relevance of the evaluation.

By employing this formula and carefully considering the factors influencing sample size, the study will achieve a balance between statistical accuracy and practical feasibility, leading to credible and actionable insights into the effectiveness of the government's technical and vocational training programmes.

RESULT AND FINDINGS

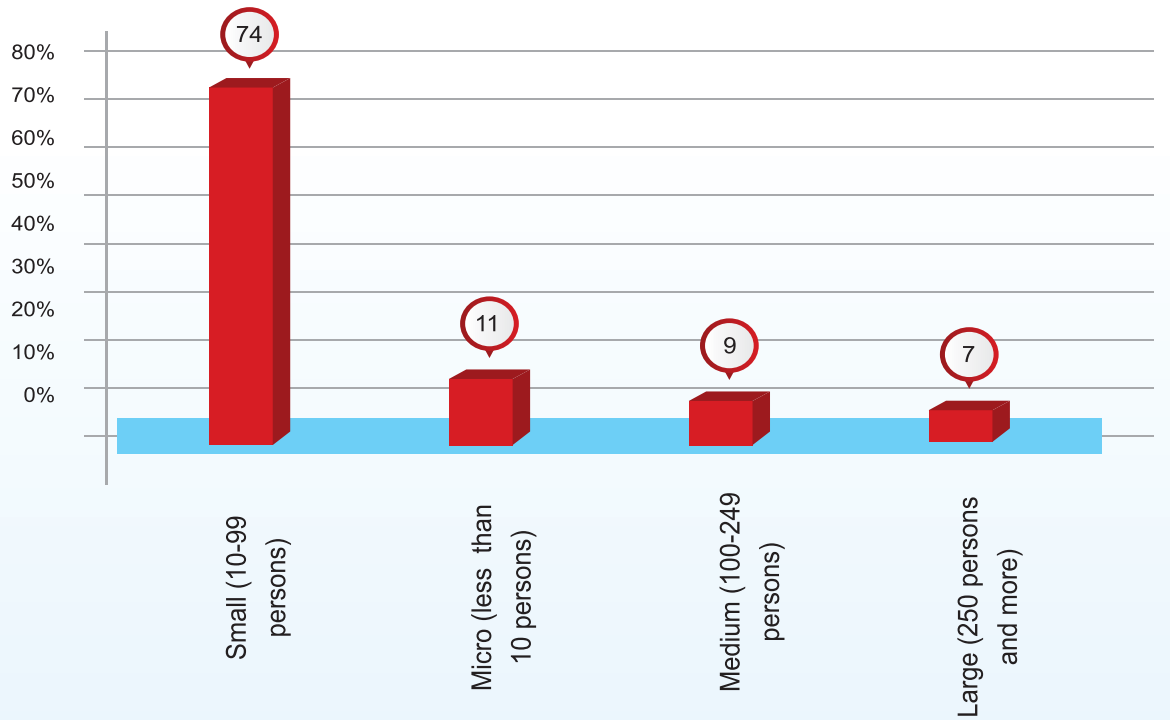
5. Distribution of Industries

Size-wise Distribution of Sample

Figure 1 classifies establishments based on their size across Khyber Pakhtunkhwa, revealing significant regional differences in business structures and workforce composition.

Khyber Pakhtunkhwa is heavily dominated by small establishments (10 to 99 employees), which constitute 74% (874) of the total establishments. The small business environment suggests relying on smaller-scale operations in sectors, such as hospitality, tourism, and agriculture. Micro establishments (less than 10 employees) also represent a notable 11% (129) of businesses, further emphasizing the region's reliance on small enterprises for economic activity. On the other hand, large and medium-sized enterprises are rare, making up only 7% (83) and 9% (103), respectively, of establishments in Khyber Pakhtunkhwa.

Figure 1: Establishments based on their size across Khyber Pakhtunkhwa (%)



6. Findings of Survey

6.1. Sector-wise Distribution of Industries

The available opportunities at the sectoral level are illustrated in Table 2 and reveal potential areas of focus for TVET initiatives. Hospitality and Tourism has emerged as the leading sector in KP, employing 34.2% of the surveyed workforce. This significant representation points to the critical role the service industry plays in the economy. The Renewable Energy sector accounts for 15.1% of the workforce, underlining the importance of renewable energy solutions. The shift towards sustainable energy sources necessitates TVET curricula updates to incorporate new technologies and sustainability practices.

The Construction sector, employing 13% of the workforce, continued to be a critical area for both infrastructure development and employment generation. At 10%, agriculture reflects the ongoing importance of this traditional sector. To sustain agricultural productivity, TVET programmes should focus on modern farming techniques, mechanization, and agribusiness skills. Allied Health and Manufacturing sectors, each representing 9.6% and 7.1% of the workforce, respectively, highlight the importance of technical skills in healthcare and industrial production.

Table 2: Sector-wise distribution of establishments

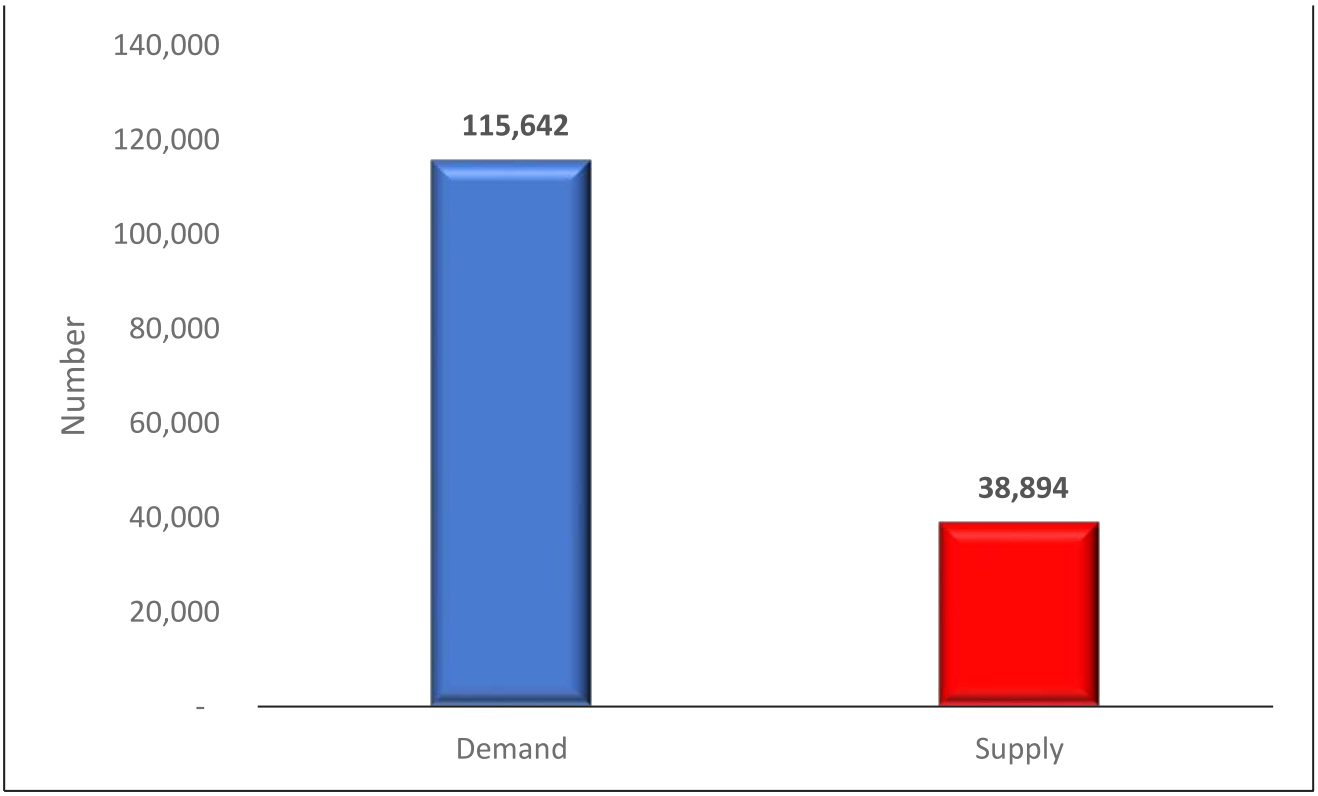
Sector	Frequency	Percent
Hospitality & Tourism	407	34.2
Renewable energy	179	15.1
Construction	155	13.0
Agricultural	119	10.0
Allied Health	114	9.6
Manufacturing	84	7.1
Printing and Packaging	84	7.1
Textile & Garments	18	1.5
Services	16	1.3
Professional, scientific and technical activities	13	1.1
Grand Total	1189	100

Printing and Packaging also represent 7.1% of the workforce, signaling a steady demand for specialized workers in this field. To support this, vocational training in packaging technologies and printing techniques should be given a priority. Given the rise of e-commerce, this sector is likely to experience continued growth, and TVET must prepare workers to adapt to evolving technological needs. Finally, the Textile and Garments and Services sectors are represented by 1.5% and 1.3% of the workforce, respectively, while Professional, Scientific, and Technical Activities account for 1.1%. In textiles, there is a need for training in garment production, quality control, and fashion design to rejuvenate this traditional sector. The services industry, on the other hand, demands a workforce skilled in customer service, IT support, and service management.

6.2. Annual Skilled Workforce Demand and Supply

It is critical to analyze the demand and supply of skilled workforce. Figure 2 highlights a significant gap between the demand (115,642) and supply (112,565) of skilled labor. This disparity, though not enormous, indicates a shortfall of approximately 3,077 workers to meet the labor market demands. Such gaps, while seemingly minor in percentage terms, can still have important implications for certain industries or regions, particularly those experiencing rapid growth or expansion. The demand-supply mismatch can strain businesses, especially in sectors where specialized skills are critical, such as manufacturing, construction, and renewable energy. This gap may also lead to delays in project completion, reduced productivity, and higher operational costs as businesses struggle to fill positions or are forced to hire less qualified workers.

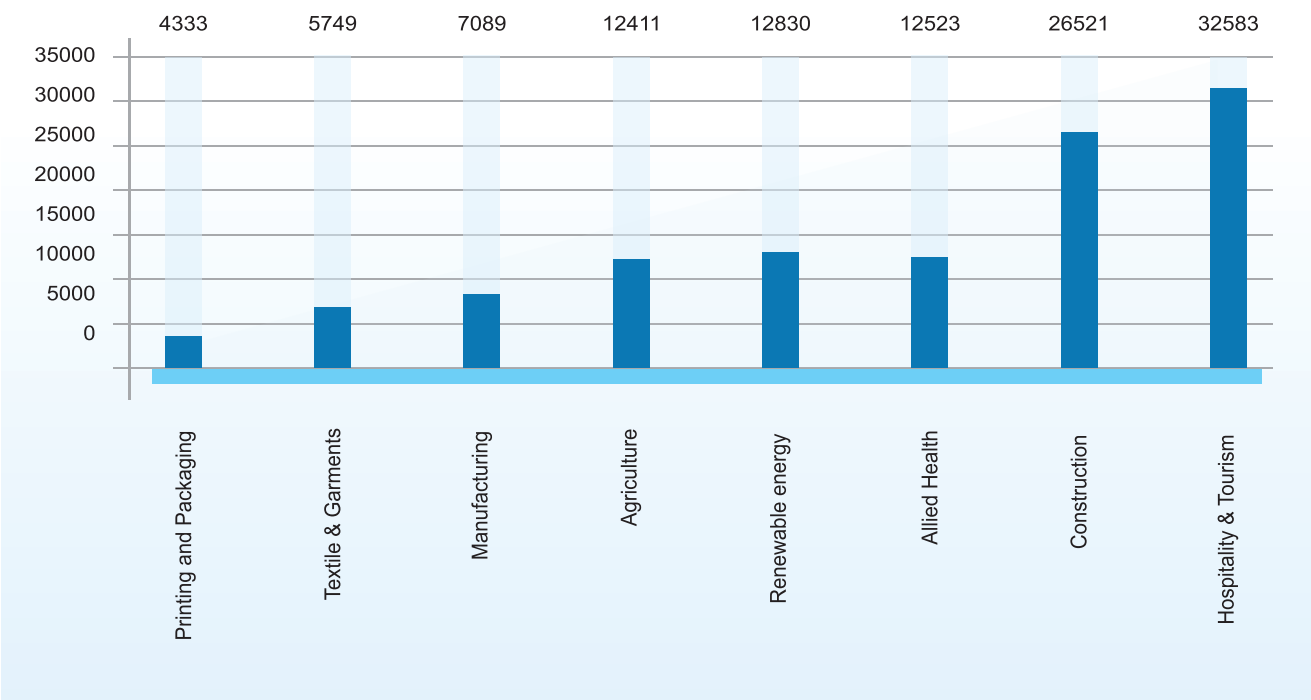
Figure 2: Annual skilled workforce demand and supply



6.3. Sector-wise Skilled Workforce Demand

The largest share of demand is in hospitality and tourism, which require 32,583 workers, representing 28.2% of the province's total workforce demand (Figure 3). The construction sector is another significant area, with 26,521 workers needed (22.9%), highlighting the province's infrastructure development efforts. The renewable energy sector also plays a key role, contributing to 11.1% (12,830 workers) of total demand, indicating efforts to expand clean energy projects. In contrast, manufacturing sector only accounts for 7,089 workers or 6.1% of demand, showing its smaller industrial base. Other sectors, such as allied health (12.8%), agriculture (10.9%), and textiles and garments (4.3%), are also prominent, reflecting the diversity of the local labor market.

Figure 3: Sector-wise skilled workforce demand

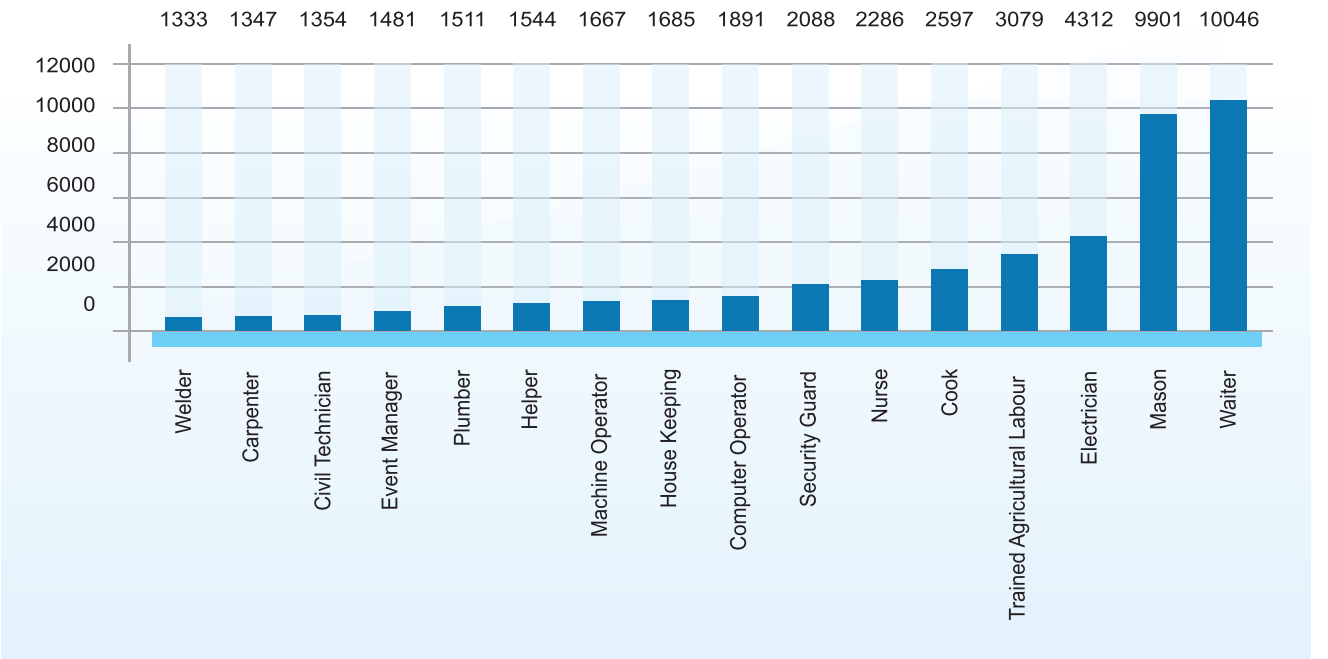


6.4. Trade-wise Skilled Workforce Demand

Demand for the workforce representative of various occupations is shown in Figure 4. The highest concentrations of workers are found in low-skill jobs, with Waiters (10,046) and Masons (9,901) making up the largest groups. This indicates a strong demand for labor in the hospitality and construction sectors. These roles are critical to the functioning of these industries, which are labor-intensive and require a large number of workers to meet demand. Additionally, electricians (4,312), while lower in number than waiters and masons, represent a significant portion of the workforce, suggesting the ongoing need for skilled labor in the construction and industrial sectors.

Mid-level professions, such as trained agricultural laborers (3,079), cooks (2,597), nurses (2,286), and security guards (2,088), show moderate representation in the workforce. These occupations generally require some level of training and skill, which aligns with the overall demand for semi-skilled workers in sectors like agriculture, healthcare, and security. The presence of skilled workers in moderate numbers indicates a steady but not overwhelming demand in these fields.

Figure 4: Workforce demand for various job roles across sectors

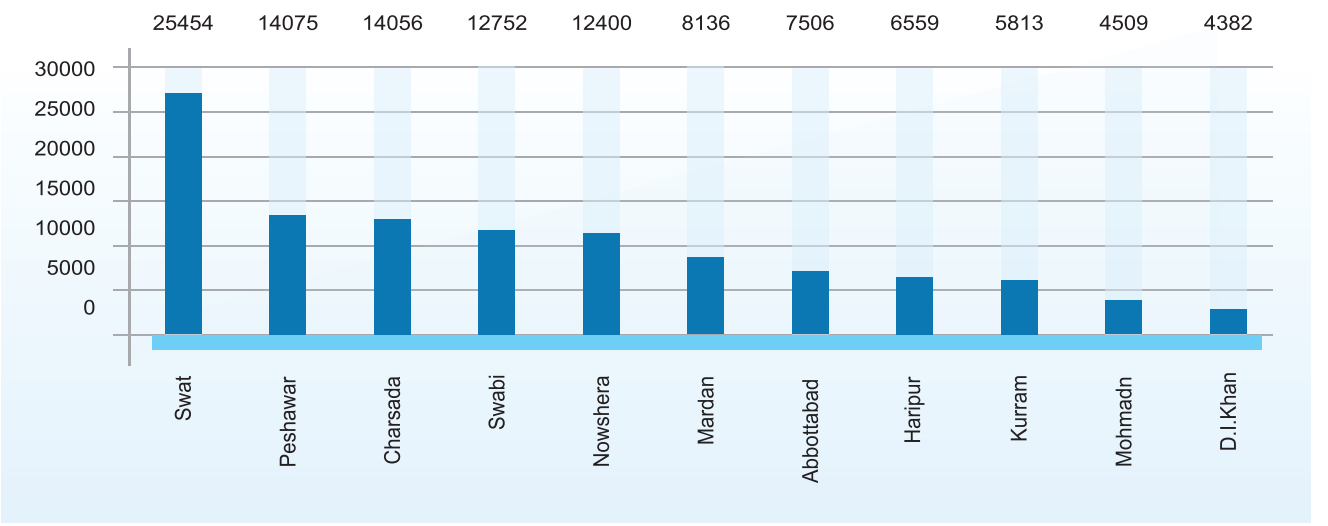


On the other end of the spectrum, skilled trades such as welders (1,333), carpenters (1,347), and civil technicians (1,354) show lower representation. These roles, which require specific technical training and certification, may be facing a shortage of qualified professionals. The low numbers suggest either limited demand or barriers to entry for potential workers, such as lack of access to vocational training or reduced interest in these trades. The data also reveals lower numbers for other roles, including event managers (1,481), plumbers (1,511), and housekeeping staff (1,685).

6.5. District-wise Skilled Workforce Demand

Swat stands out with a workforce demand of 25,454, reflecting its growing tourism and hospitality industry, which has been expanding due to its natural beauty and tourist attractions (Figure 5). Charsadda (14,056) and Peshawar (13,475) exhibit a demand centred on agriculture and small-scale manufacturing, consistent with the economic activities in these regions. Swabi (12,752) and Nowshera (12,400) show moderate workforce demand, reflecting a combination of agriculture and emerging small industries. Peshawar (13,475) has a diverse economic base, contributing to its workforce needs. Smaller districts like Mardan (8,370), Abbottabad (7,920), and Haripur (6,559) show localized labor demand, primarily in agriculture, services, and some light industrial activities. Towards the lower end, Kurram (4,509), Mohmand (4,382), and D.I. Khan (6,342) have minimal workforce demand, indicating less industrial and economic activity compared to other districts.

Figure 5: District-wise skilled workforce demand



6.6. Sector and Gender-wise Skilled Workforce Demand

This section provides data on gender-wise workforce demand across various sectors (Table 3). It reveals a significant disparity between employment opportunities. In sectors such as hospitality and tourism, there is a relatively higher demand for females (3,522 out of 32,583), reflecting the industry's openness to hiring women in roles related to customer service, management, and hospitality. However, male demand is still high.

Construction and renewable energy exhibit extreme gender imbalances, with nearly all demand skewed towards males. In construction, the demand for males (26,492) vastly overshadows the female demand (29). Similarly, the renewable energy sector has a workforce demand of 12,801 males and only 29 females. These numbers highlight the persistent barriers women face in technical and labor-intensive fields, likely stemming from cultural norms, a lack of targeted training, and limited awareness of opportunities for women in these sectors. In Allied Health sector, there is a more balanced gender representation, with 40% of the total demand (5,875 out of 14,783) being for females. This is likely because health-related fields are more historically and culturally acceptable for women due to relevant societal expectations.

Table 3: Sector and gender-wise workforce demand

Sector	Male	Female	Total
Hospitality & Tourism	29,061	3,522	32,583
Construction	26,492	29	26,521
Allied Health	8,908	5,875	14,783
Renewable energy	12,801	29	12,830
Agriculture	12,567	7	12,574
Manufacturing	5,959	1,130	7,089
Textiles & Garments	4,797	178	4,975
Printing and Packaging	4,278	9	4,287
Grand Total	104,863	10,779	115,642

The agriculture sector remains overwhelmingly male-dominated, with 12,567 males and only 7 females in demand. Women's roles in this sector may be informal or unrecognized, leading to underreporting. In contrast, sectors such as manufacturing and textiles & garments show modest female participation, though they still remain male-dominated. The manufacturing sector has 16% female demand (1,130 out of 7,089), while textiles and garments, expected to employ more women, reveal a surprisingly low female demand (178 out of 4,975), suggesting possible shifts in employment patterns or under reporting of female roles. Finally, printing and packaging follow a similar pattern of male dominance, with 4,278 males and only 9 females in demand, indicating a need for significant efforts to make related technical competencies more accessible to women.

6.7. Skill Level and Gender-wise Workforce Demand

The gender-wise workforce demand across different skill levels shows a consistent trend of male-dominated employment across all levels, with female representation increasing at higher levels but lagging behind by and large. At Level 1, which likely includes entry-level and unskilled roles, the total demand is 15,110, of which only 213 positions are for females (Table 4). This reflects limited female participation in lower-skilled labor markets, potentially due to societal norms and limited opportunities in traditionally male-dominated fields. At Level 2, the demand increases to 31,402, with females accounting for 3,174 of these positions, marking a moderate but still limited improvement in female participation. The demand at this level suggests that slightly higher number of women are being integrated into semi-skilled or skilled roles, likely in sectors where female employment is more culturally acceptable, such as Allied Health and Hospitality.

Table 4: Skill level and gender-wise workforce demand

Level	Male	Female	Total
Level 1	14,897	213	15,110
Level 2	28,228	3,174	31,402
Lecel-3	32,626	4,251	36,877
Level 4	19,779	1,972	21,751
Level 5	9,089	1,413	10,502
Total	104,619	11,023	115,642

The most significant female representation is seen at Level 3, where 4,251 female positions make up 11.5% of the total demand (36,877), which is indicative of higher-skilled roles. This suggests that with appropriate training and education, female participation can be increased. Level 4 and 5 occupations represent highly specialized or managerial roles and follow a similar trend. At Level 4, there is a demand for 1,972 female workers out of 21,751, while at Level 5, the female demand stands at 1,413 out of 10,502. Despite being more in number at the upper end of the skill spectrum, women are still underrepresented, indicating barriers such as limited access to advanced training and persistent gender biases in high-level professional environments.

6.8. Sector-wise Leading Trades

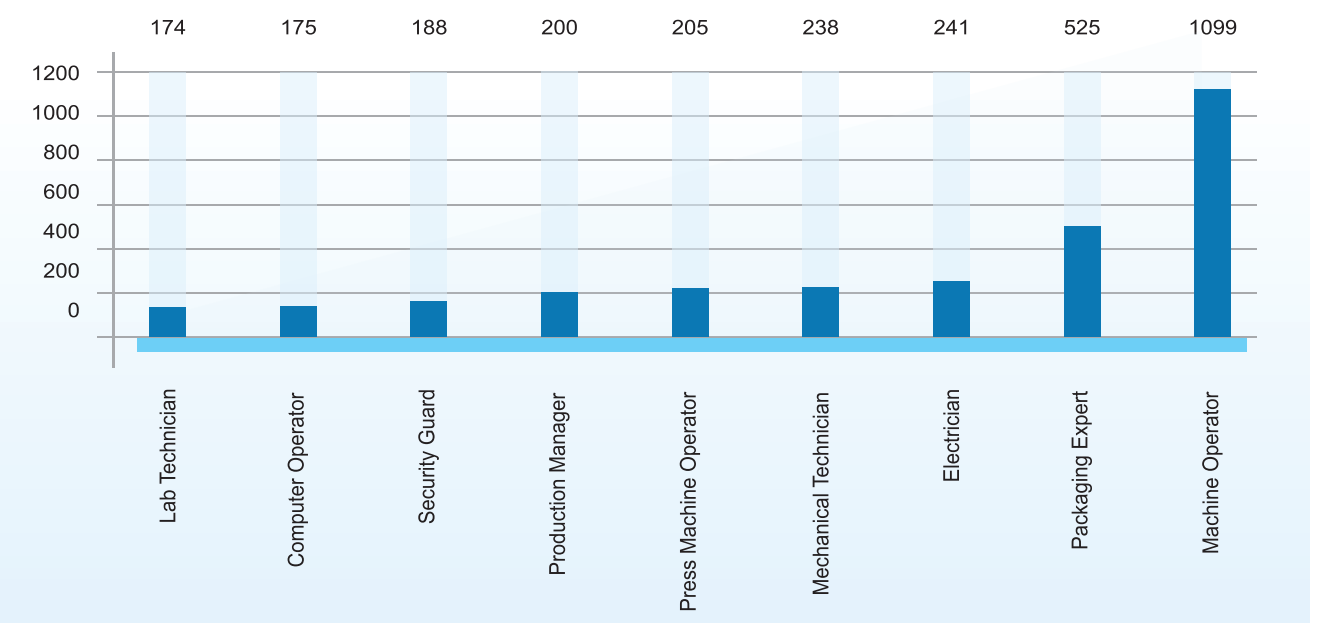
This section highlights the importance of different sectors of the economy, with each requiring a skilled workforce to maintain growth.

6.8.1. Manufacturing Sector

The workforce demand across different positions in the manufacturing sector reveals a clear concentration of demand in technical and machine-oriented roles. Figure 6 highlights that the highest demand is for Machine Operators, with 1,099 positions representing the core operational need in the manufacturing industry. Following machine operators, there is a noticeable demand for Packaging Experts, with 525 positions. This reflects the importance of post-production processes in the manufacturing sector, where packaging is a key step before products are ready for distribution. Other technical roles such as Electricians (241 positions), Mechanical Technicians (238 positions), and Press Machine Operators (205 positions) show moderate demand, underscoring the need for specialized technical skills in maintaining and operating machinery.

Roles such as Production Managers (200 positions), Security Guards (188 positions), and Computer Operators (175 positions) reflect the diverse nature of workforce requirements, ranging from supervisory positions to support roles that ensure the smooth functioning of production environments. The relatively lower demand for roles like Lab Technicians (174 positions) might indicate that the manufacturing sector is more focused on operational roles rather than research or quality control, or it could imply that these roles are concentrated in specific types of manufacturing industries.

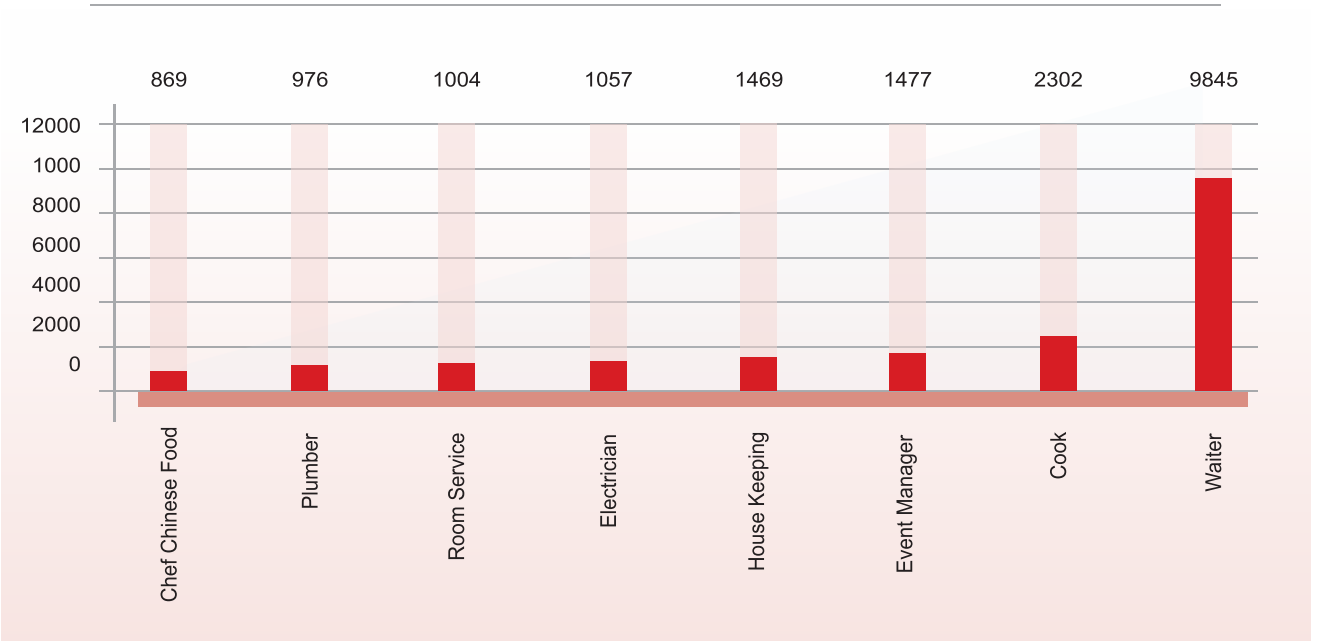
Figure 6: Workforce demand in the manufacturing sector



6.8.2. Hospitality & Tourism Sector

The workforce distribution in the Hospitality and Tourism sector demonstrates a significant demand for service-oriented roles. In Figure 7, the highest demand is seen for Waiters, with 9,845 positions, reflecting the labor-intensive nature of this sector, where direct customer service is critical. Following this, there is a notable demand for Cooks, with 2,302 positions. Moreover, the demand for Event Managers (1,477 positions) and Housekeeping staff (1,469 positions) suggests that the hospitality sector is not only focused on food services but also on providing a well-rounded guest experience, including event coordination and cleanliness, which are vital for maintaining high service standards.

Figure 7: Workforce demand in hospitality and tourism sector



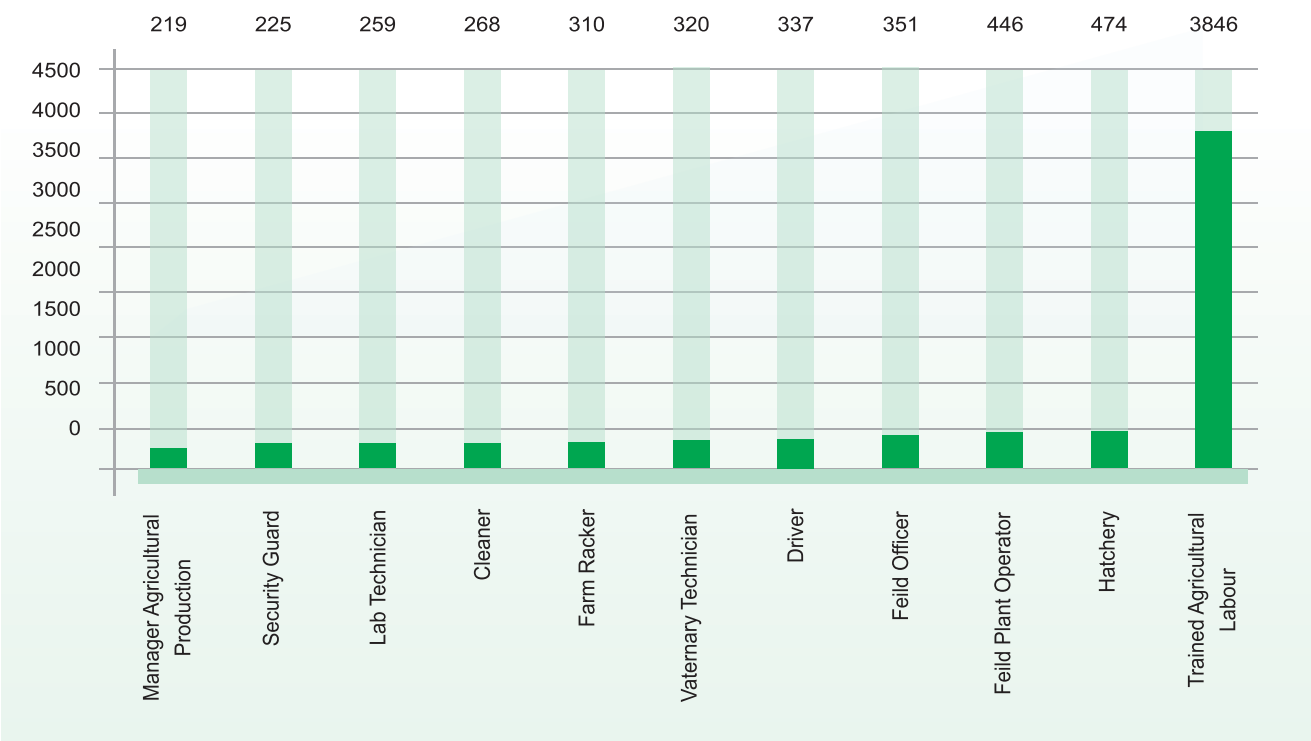
Trades such as Electricians (1,057 positions), Plumbers (976 positions), and Room Service Staff (1,004 positions) indicate the need for support staff that ensures the operational efficiency of hospitality establishments. These roles ensure that facilities run smoothly, reinforcing the importance of infrastructure and support services in the hospitality industry. Lower demand is seen for specialized roles like Chefs (Chinese food), with 869 positions. This may reflect a more niche demand in specialized culinary skills but also indicates the growing trend of diverse cuisine offerings in the hospitality industry.

6.8.3. Agriculture Sector

Figure 8 reveals that the majority of the workforce is concentrated in general agriculture labor, with trained agriculture labor accounting for a significant portion with 3,846 individuals. This large supply of general labor highlights a strong focus on unskilled or semi-skilled workers within the agriculture sector, likely reflecting the demand for manual labor in traditional farming practices. However, the dominance of this category suggests a potential higher supply in this area than more specialized roles. In contrast, the other positions, particularly specialized roles like Manager Agriculture Production (219), Veterinary Technician (320), and Lab Technician (259), display much smaller workforces. This imbalance indicates a shortage of workers with technical and managerial expertise, which is critical for improving efficiency, adopting modern farming techniques, and boosting productivity in agriculture. The relatively low numbers in these roles may reflect gaps in vocational training that targets advanced skills and the need for KP TEVTA to expand its training programmes to meet this demand.

The findings also show that intermediate roles such as Feed Plant Operator (446) and Hatchery (474) have a somewhat larger representation compared to managerial and technical positions, though still significantly less than general labor. These occupations, essential for the mechanization and modernization of agriculture, point to the growing need for mid-level technical skills. However, the lower supply in these areas compared to the labor pool suggests that the current focus is still heavily on manual labor, which may not align with the demands of an evolving agriculture industry increasingly reliant on technology and mechanization.

Figure 8: Workforce demand in the agriculture sector

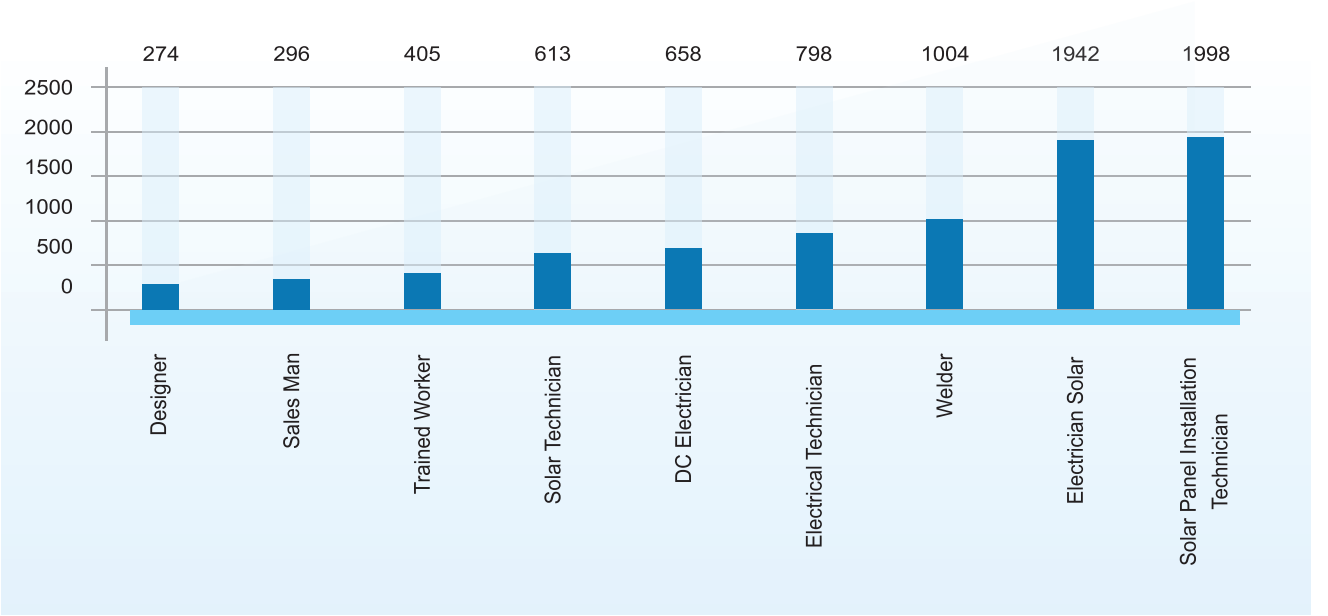


6.8.4. Renewable Energy Sector

The workforce distribution in the renewable energy sector, as depicted in Figure 9, highlights several key roles that support the sector's growth, particularly in solar energy. The largest demand is for Solar Panel Installation Technician, with 1,998 positions, these technicians are essential for setting up solar panels, ensuring proper functionality, and optimizing energy capture. This role is critical for the installation, maintenance, and operation of solar power systems. Following closely is the electrician solar with 1,942 positions, reflecting the need for skilled labor to construct and maintain the structural components of renewable energy equipment, particularly solar panels.

In this regard, the demand for welders is also significant, with 1,004 positions, which emphasizes the increasing reliance on solar energy infrastructure. Similarly, demand for Electrical Technicians (798 positions) and DC Electricians (658 positions) further highlight the need for skilled professionals to manage and troubleshoot solar energy systems. Other key roles, such as Solar Technician (613 positions), trained workers (405 positions), and Designer (274 positions), point to the technical expertise required to manage the electrical aspects of renewable energy projects. Sales roles, including Salesmen (296 positions), show the commercial side of renewable energy, indicating the importance of promoting solar solutions to both businesses and households.

Figure 9: Workforce demand in the renewable energy sector

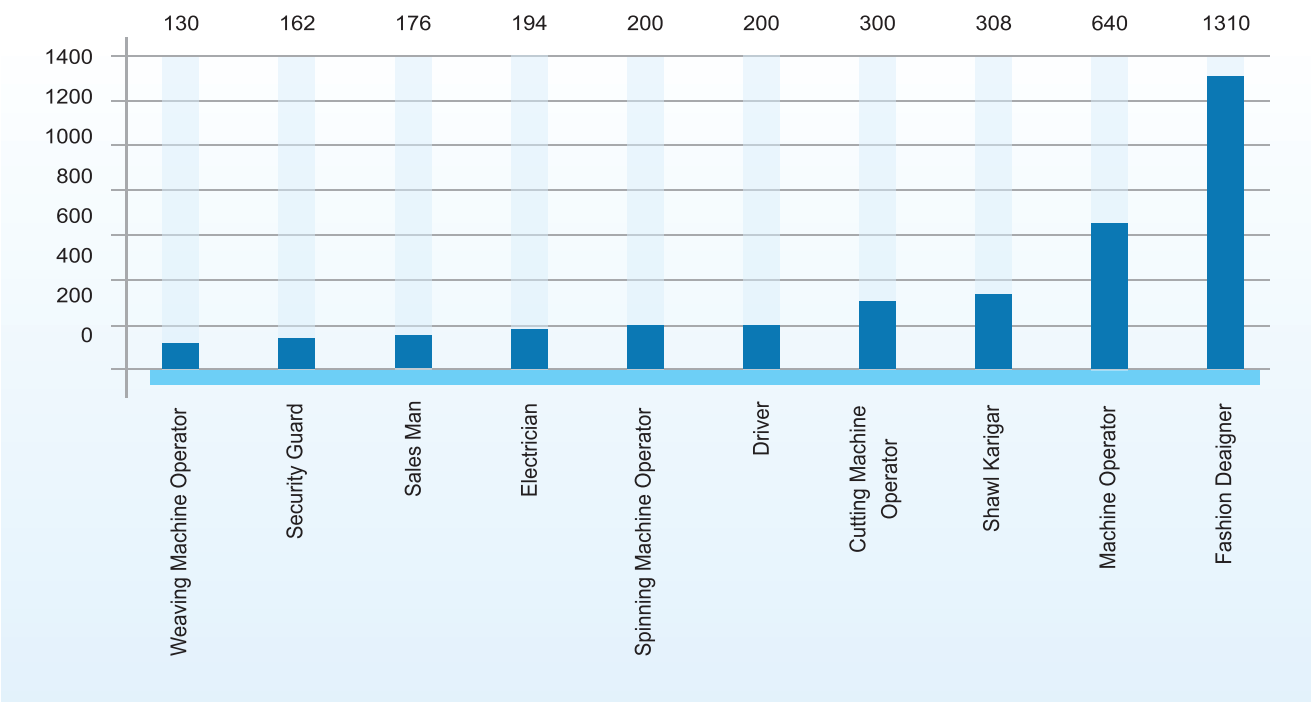


6.8.5. Textiles & Garments Sector

The workforce distribution in the Textiles & Garments sector, as illustrated in Figure 10, highlights critical roles that reflect the industry's labor demand. The highest demand is for Fashion Designers, with 1,310 positions, highlighting the importance of creative professionals who can innovate and bring fresh designs to Pakistan's textiles and garments industry, which remains a major contributor to exports and employment. Next in demand are Machine Operators with 640 positions, signifying the need for skilled labor to manage various machines used in textile production. Additionally, the number of Shawl Karigars (308 positions) and Cutting Machine Operators (300 positions) show the need for specialized artisans and operators to support both traditional and modern garment production processes.

Trades such as Spinning Machine Operators (200 positions) and Weaving Machine Operators (130 positions) reflect the mechanized aspect of textile manufacturing, which is essential for maintaining the efficiency and output of Pakistan's textiles mills. Additionally, skilled Electricians (194 positions) are necessary to ensure the smooth functioning of electrical machinery in textiles plants. The demand of Security Guards (162 positions) and Salesmen (176 positions) suggests that textiles operations not only rely on production but also on associated roles to manage operations and sales.

Figure 10: Workforce demand in the textiles & garments sector

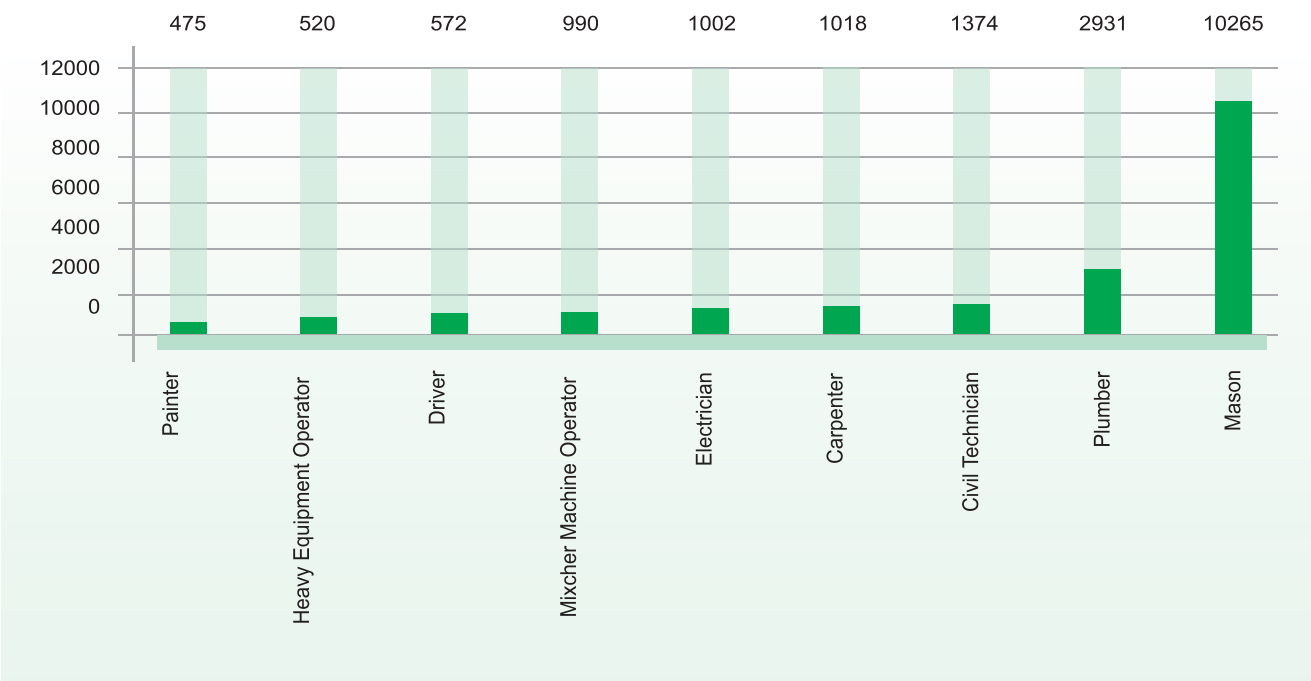


6.8.6. Construction Sector

Figure 11 illustrates the workforce demand across different positions in the construction sector, showing a clear variance in the number of workers assigned to each role. The most striking feature is the overwhelming demand of 10,265 masons. This number is significantly higher than that of any other job category, suggesting that masonry is a highly demanded skill within the construction sector. The second-largest group consists of plumbers (2,931 workers) and Civil Technicians demand is 1,374. These workers provide essential technical expertise, reflecting the importance of qualified civil engineers in ensuring the structural integrity and design of construction projects.

Other positions with a considerably high demand include Carpenters (1,018 workers), Electricians (1,002 workers), and Mixer Machine Operators (990 workers). These roles are all essential for specialized tasks within the construction process. This highlights the importance of skilled trades in construction, each contributing to various aspects of building projects, from electrical wiring to plumbing and carpentry.

Figure 11: Workforce demand in the construction sector

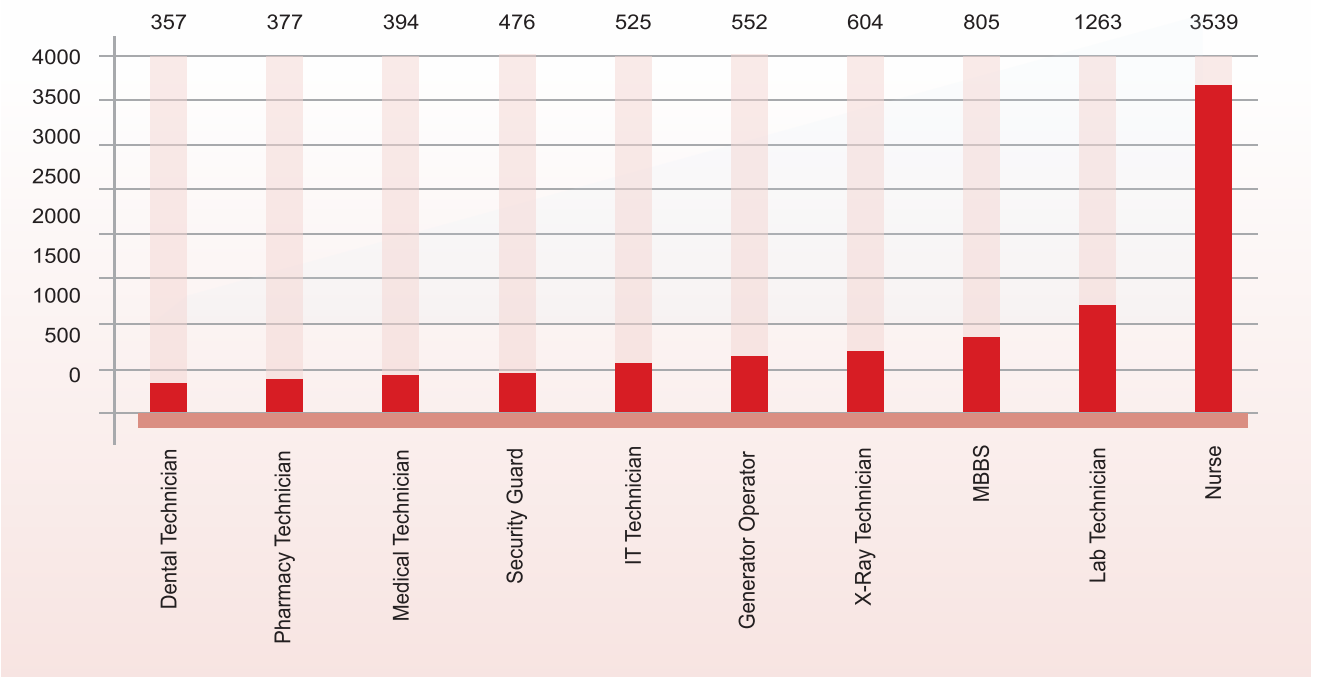


The lower spectrum of the workforce demand includes Drivers (572 workers), Heavy Equipment Operators (520 workers), and Painters (475 workers). These positions, while necessary, seem to require fewer personnel in comparison to the other trades. Drivers and heavy equipment operators, for instance, may be utilized intermittently during certain phases of construction, such as transporting materials or operating machinery at specific points in the project. Painters, although essential in the finishing stages of construction, represent the smallest workforce group, likely due to the fact that painting work occurs towards the end of a project and requires fewer personnel than needed at the initial stages of building and assembly.

6.8.7. Allied Health Sector

Figure 12 reveals significant differences in the number of workers employed in each role, reflecting the varying demands for specific skills within healthcare. Nurses constitute the largest group in the workforce demand in this sector, 3,539. This high number underscores the essential role nurses play in healthcare, providing direct patient-care, monitoring patient health, and supporting doctors. The second largest group comprises lab technicians, totaling 1,263 workers. Their sizeable demand indicates a need for diagnostic services in healthcare settings, emphasizing the importance of lab work in patient-care. Doctors (MBBS) represent the next substantial group, with 805 individuals. X-ray technicians are in high demand (604), which highlights the role of imaging technology in modern healthcare.

Figure 12: Workforce demand in Allied Health Sector



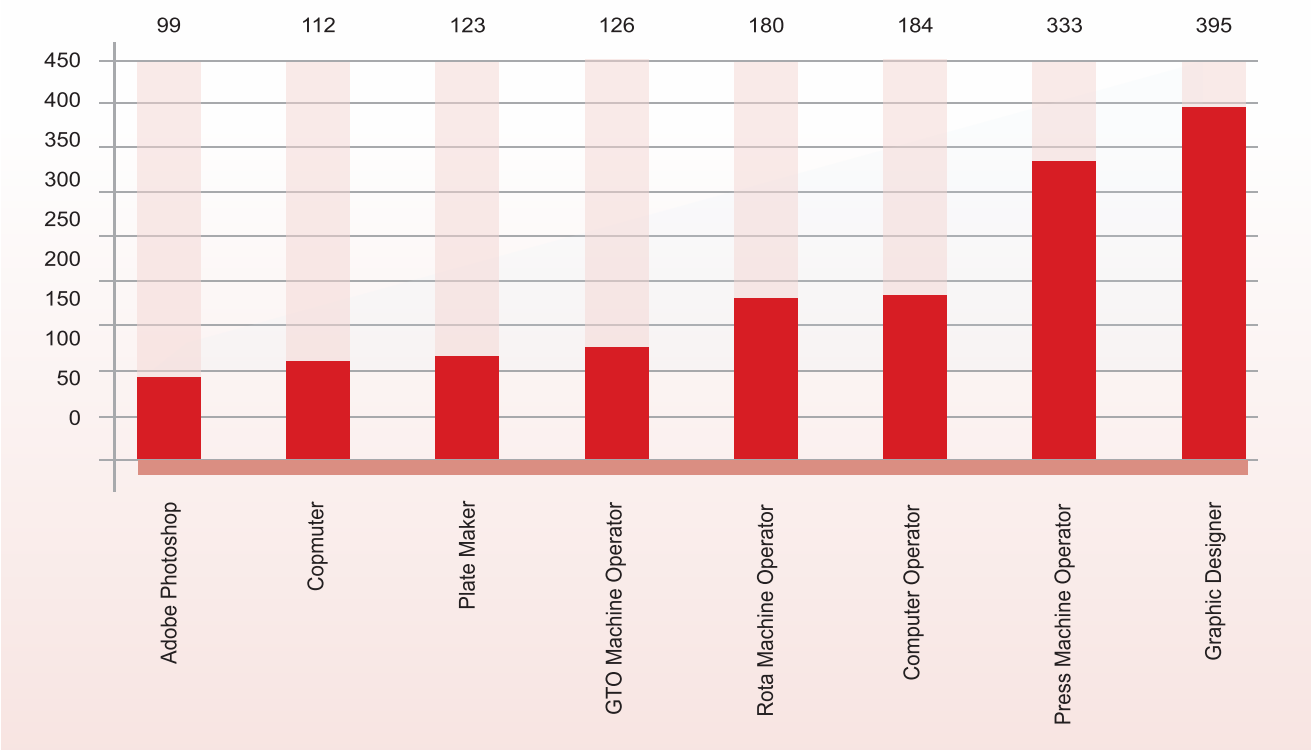
The demand of Generator Operators (552) reflects the need for reliable power sources, particularly in hospitals and clinics that require continuous operation of medical equipment. The roles of IT technicians (525 workers) and Security Guards (476 workers) are also important within Allied Health services. Other positions include Medical Technicians (394 workers), Pharmacy Technicians (377 workers), and Dental Technicians (357 workers). Although these roles have relatively smaller workforce, they remain integral to specialized areas of healthcare.

6.8.8. Printing and Packaging Sector

Figure 13 indicates that Graphic Designers dominate the demand spectrum in printing and packaging sector with 395 employment opportunities. This suggests that graphic designing skills are in high demand within the industry, reflecting the importance of digital creativity and design work in packaging and printing. Press Machine Operators follow closely behind with 333 opportunities, showcasing the significant need for technical machine operation skills in the sector. The operation of press machines, critical for large-scale printing tasks, highlights the role of mechanization in maintaining production efficiency in the industry.

Other technical roles such as Computer Operators (184), Rota Machine Operators (180), and GTO Machine Operators (126) further highlight the sector's reliance on machine handling and the smooth running of complex printing equipment. These roles are essential in maintaining the flow of operations and ensuring high-quality printing outputs. At the lower end of the spectrum, positions such as Plate Maker (123), Composer (112), and Adobe Photoshop Expert (99) are lower in demand but still critical in supporting various pre-production and design tasks. Adobe Photoshop expertise is particularly important in the digital design phase, highlighting the shift toward modern digital tools.

Figure 13: Workforce demand in the printing and packaging sector

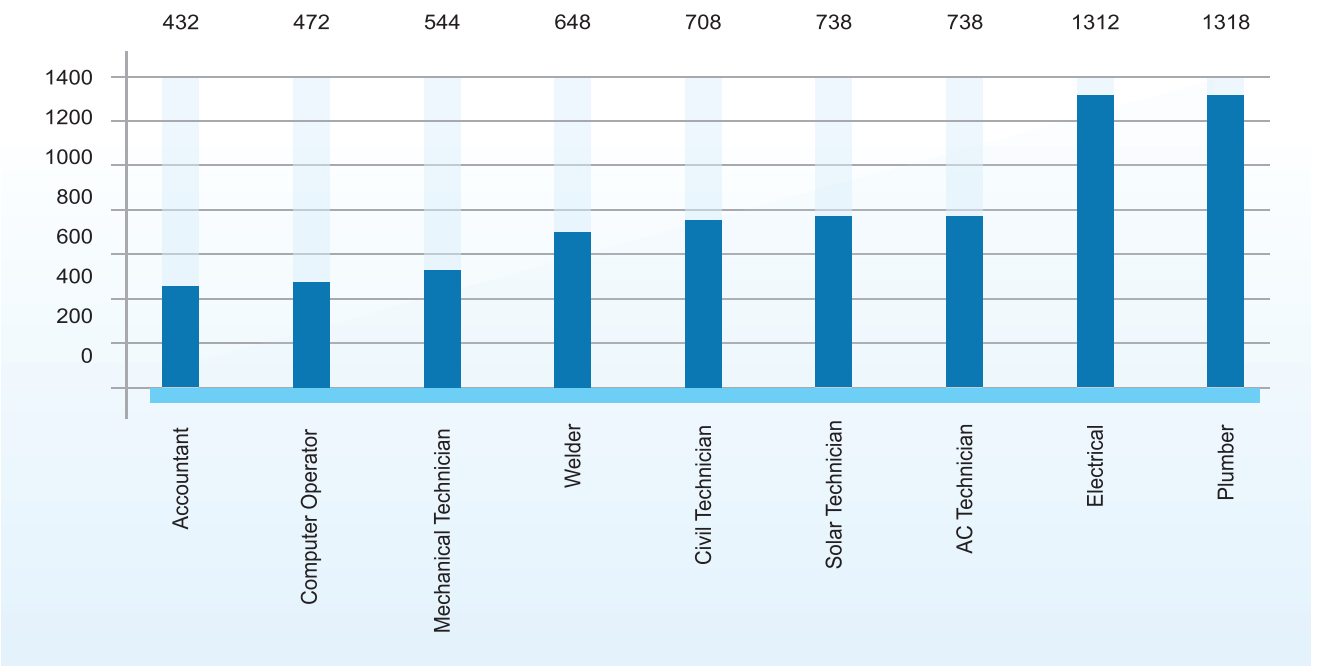


6.9. District Level Insights

6.9.1. Peshawar

Figure 14 illustrates the demand for various skilled occupations in Peshawar. Electricians and Plumbers dominate the demand landscape with 1,312 and 1,318, respectively. This aligns with the growing need for infrastructure development and maintenance in urban centers where construction activities are on the rise. Other highly demanded occupations include AC technicians (738), Welders (648), and Civil (708), Mechanical (544), and Solar (738) Technicians.

Figure 14: Skilled workforce demand in Peshawar



The demand of 432 Accountants and 472 Computer Operators highlights the emerging need for office-based roles that support the administrative and financial functions of businesses. This data indicates a clear preference for technical and vocational skills that align with Peshawar's industrial needs, particularly in construction, infrastructure maintenance, and technology-driven occupations. KP TEVTA plays a critical role in addressing this demand through its vocational training programmes. It can further enhance its capacity by expanding training facilities, increasing outreach, and ensuring the quality of education matches the needs of employers.

6.9.2. Swat

Figure 15 represents workforce demand in Swat. There is a substantial demand for masons, 5,555, which vastly outnumbers other occupations. This high demand aligns with the needs of the ongoing construction and infrastructure development in Swat, a region known for its scenic beauty and a booming tourism and hospitality industry. The second-highest demand is for waiters (2,541), followed by cooks (1,166), which reinforces the importance of the hospitality and service sectors in the region.

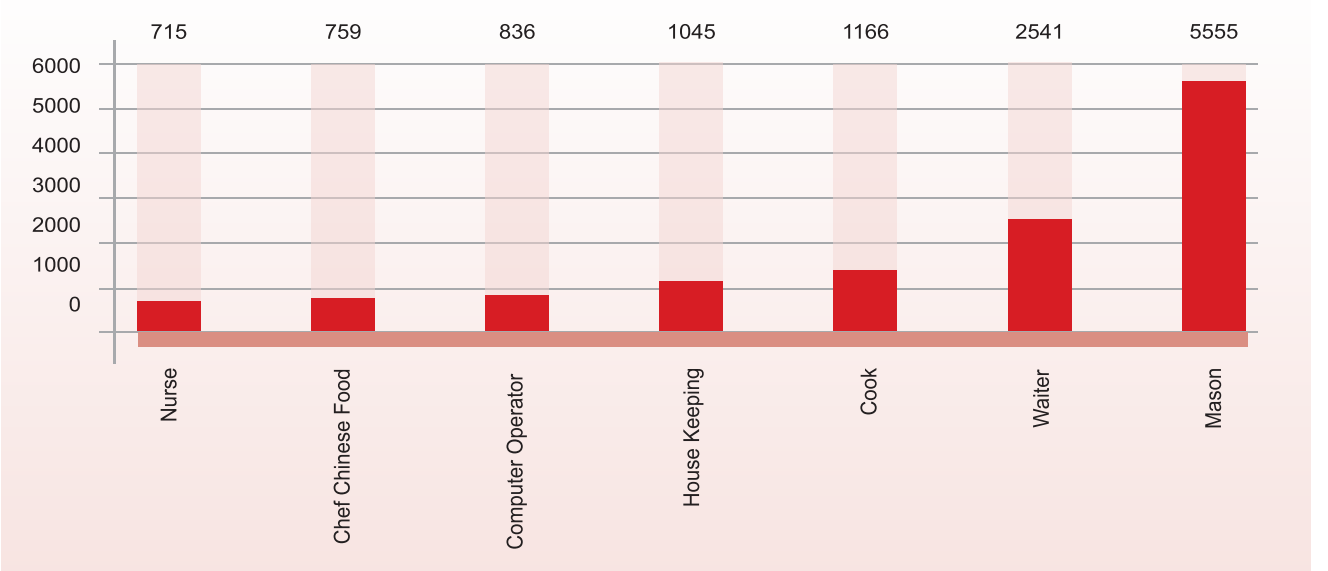
Other roles in demand include housekeeping staff (1,045), computer operators (836), and chefs specializing in Chinese food (759). This data reflects the growing influence of tourism in Swat, as businesses look to cater to a diverse and increasing number of visitors. There is a moderate demand of Nurses (715) suggesting that the healthcare sector is developing, but is not yet a dominant employer in comparison to construction and hospitality.

KP TEVTA has a critical role in meeting the vocational needs of Swat by providing relevant training programmes that align with the regional demand for skills in hospitality, construction, and healthcare. However, the immense demand for masons and waiters suggests that current efforts may not fully meet the market requirements. As such, KP TEVTA should expand its focus on these high-demand areas to ensure that sufficient workforce is adequately trained to fill the gap.

Combined with the need for basic infrastructure development, Swat's potential as a tourism hotspot provides an opportunity for KP TEVTA to innovate its training offerings and build capacity in these essential sectors.

The demand for a diverse range of skills from hospitality to construction reflects the multifaceted economic needs of the region, which can be supported by more targeted vocational education programmes.

Figure 15: Skilled workforce demand in Swat



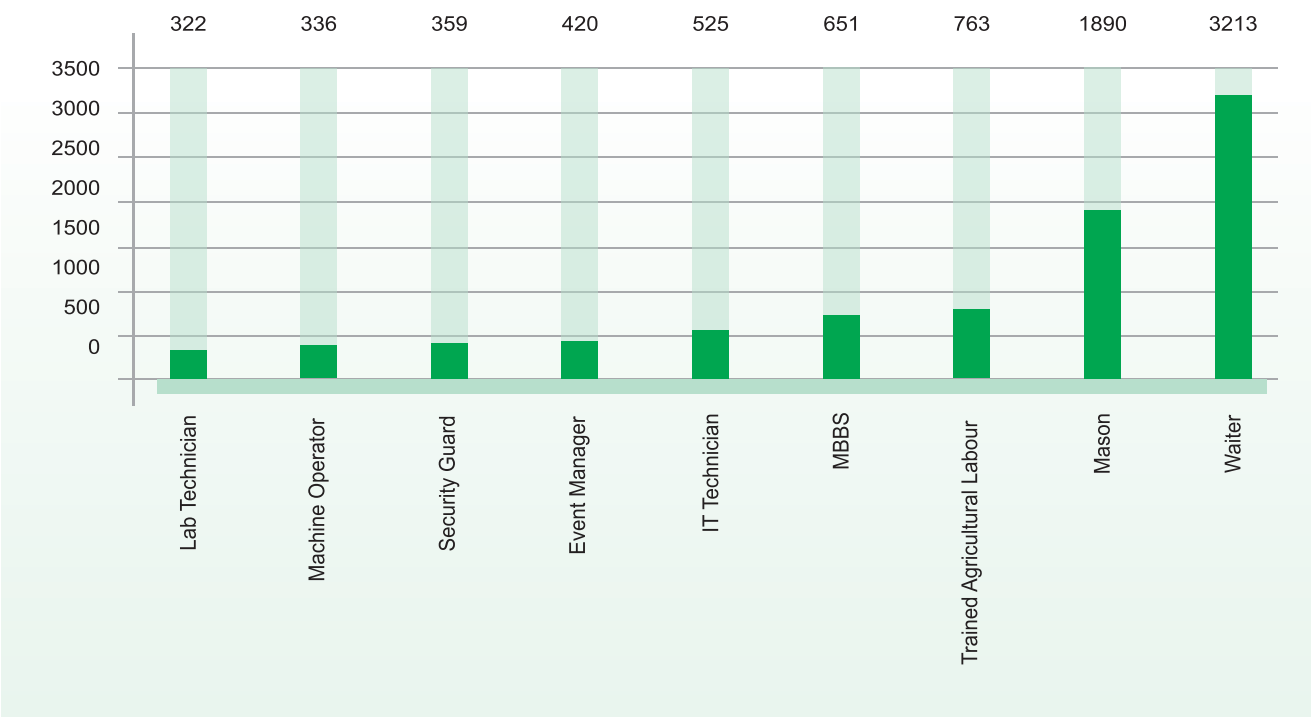
6.9.3. Charsadda

The workforce distribution in Charsadda shown in Figure 16 reflects a similar pattern seen in other regions, with a substantial demand for waiters (3,213) and masons (1,890). This indicates the prominence of both the service and construction sectors in Charsadda suggesting that the district's economic activities are largely concentrated in hospitality and infrastructure development. Beyond these, there is a considerable demand for trained agricultural labor (763), which also corresponds with Charsadda's agricultural base. The suggested agricultural training need indicates that the local economy still depends significantly on farming and related activities. Other occupations needed, such as MBBS doctors (651) and IT technicians (525), reflect a growing demand in healthcare and digital skills, showing Charsadda's shift towards more diversified economic activities.

Roles such as event managers (420), security guards (359), machine operators (336), and lab technicians (322) show moderate demand, representing a need for general vocational skills that can support the region's evolving economic landscape.

KP TEVTA's involvement is crucial for meeting the Charsadda's vocational training needs in both traditional sectors, such as agriculture and construction, and emerging areas like healthcare and IT. The significant demand for agricultural labor underscores the importance of continuing and expanding agricultural training programmes, ensuring that labor in this sector is skilled and is able to support more advanced and sustainable agricultural practices. Similarly, construction and hospitality training programmes will be essential to meet the substantial local demand for masons and waiters.

Figure 16: Skilled workforce demand in Charsadda



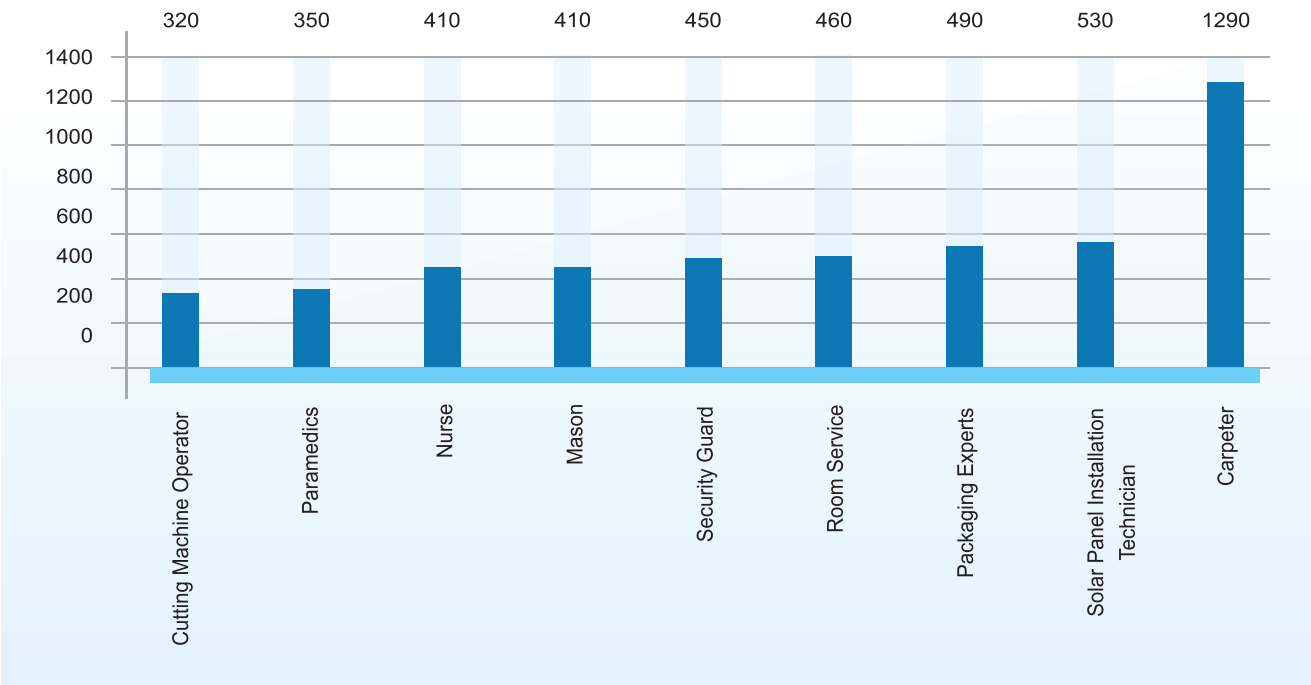
6.9.4. Nowshera

Figure 17 shows the demand for various technical and vocational roles in Nowshera, highlighting the need for skilled labour in specific sectors. Carpentry has the highest demand with 1,290 individuals sought, reflecting a strong need for trained workers in the construction and manufacturing industries. Other skilled occupations with high demand include Solar Panel Installation Technicians (530 positions), Packaging Experts (490 positions), and Room Service (460 positions). These numbers suggest a growing focus on renewable energy, hospitality, and packaging sectors.

The demand for Security Guards (450), Nurses (410), and Paramedics (350) indicates the growing needs of healthcare and security services in Nowshera. Additionally, demand under roles such as Mason (410) and Cutting Machine Operators (320) reflect ongoing infrastructure development in the district requiring skilled labor in construction and manufacturing.

With an increasing focus on enhancing employability through market-driven skills, KP TEVTA has introduced various training programmes aimed at meeting the evolving needs of Industry. For example, courses have been initiated for renewable energy sector, including solar panel installation to capitalize on the rising demand for clean energy technologies. Similarly, TEVTA provides training for healthcare roles such as nurses and paramedics, aligning with the demands of the healthcare sector in Nowshera. However, there is still a gap between the demand for skilled labor and the supply of adequately trained workers. Also, there is a need for more comprehensive programmes that cater specifically to high-demand trades like construction, carpentry, packaging, and security services.

Figure 17: Skilled workforce demand in Nowshera

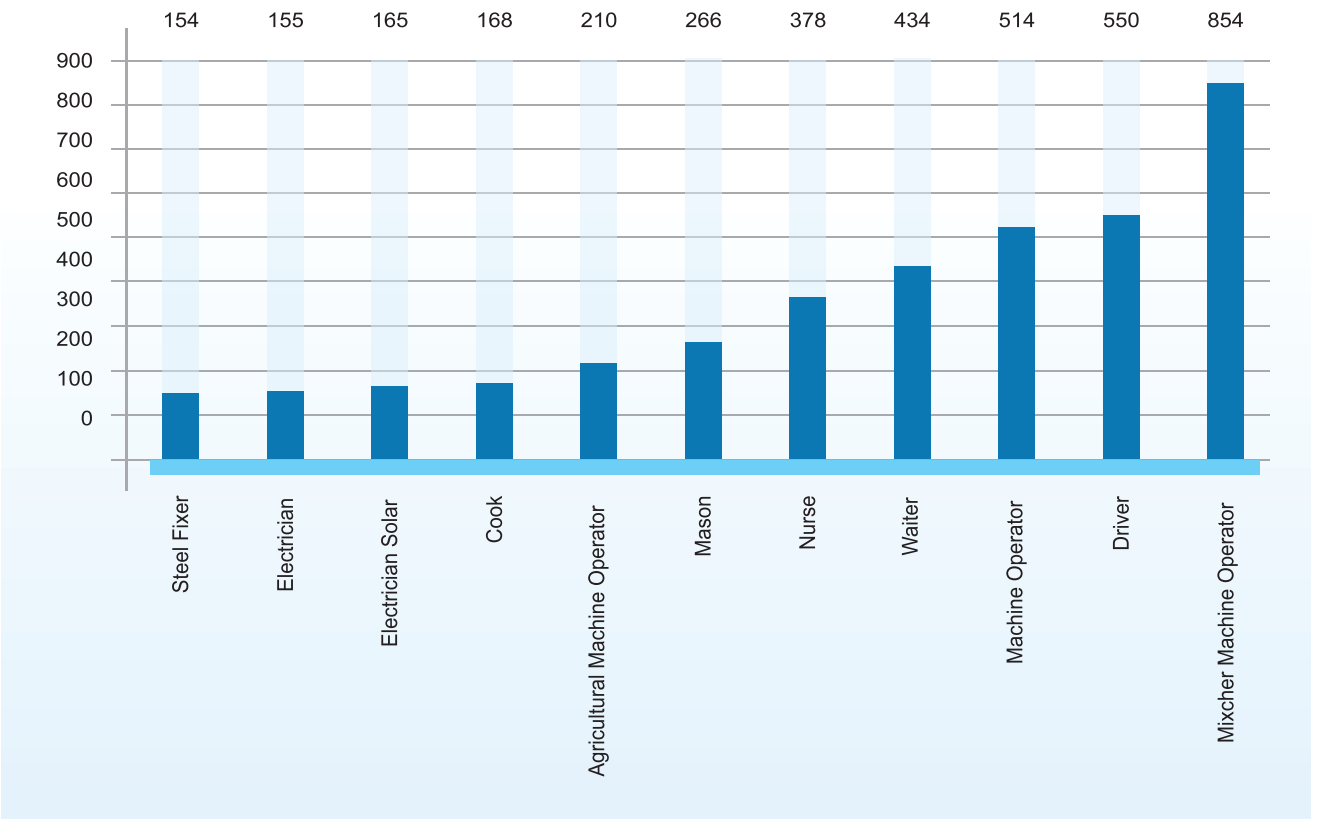


6.9.5. Haripur

Figure 18 reveals a significant demand for various skilled roles in Haripur with Mixer Machine Operators leading at 854 positions, which points to the expanding industrial and manufacturing sectors in the district. Moreover, there is also considerable demand for drivers (550) and Machine Operators (514), highlighting the need for trained labor in logistics and manufacturing industries. The demand for Waiters (434) suggests growth in the hospitality sector, while the requirement for Nurses (378) is indicative of the growing needs of the healthcare sector. Furthermore, there is a notable demand for Masons (266 positions), Agricultural Machinery Operators (210 positions), and skilled workers such as Solar Electricians (165 positions) and Cooks (168 positions).

The demand trends in Haripur reflect broader national patterns. Pakistan's industrial growth, especially in machinery operation and logistics, mirrors global trends where the manufacturing and logistics sectors are critical drivers of economic growth. Literature suggests that vocational education plays a pivotal role in supporting such growth, especially when programmes are tailored to meet regional demands. Studies also emphasize that regions like Haripur benefit from targeted vocational training programmes, which can help alleviate unemployment and improve economic productivity.

Figure 18: Skilled workforce demand in Haripur



6.10. Demand and Supply Gaps in Khyber Pakhtunkhwa

The analysis on the demand-supply gap in Khyber Pakhtunkhwa (Annex C: Table 9) provides a clear picture of the severe labor market gaps across various trades, indicating both shortages and surpluses in key areas (Appendix C). Notably in the Cook trade, the demand far exceeds supply by an overwhelming 3,444 positions. This gap signifies a pressing need for training programmes to address the high demand for hospitality and food services, an industry that is growing in the province.

In the rapidly expanding renewable energy sector, the need for Solar Inverter Technicians is another area with a massive gap of 3,236, reflecting the province's shift towards sustainable energy solutions. There is also a significant shortfall in trades such as Security Guards, with a gap of 1,950, and Drivers (LTV), which has a shortage of 1,865. Other critical gaps include positions like Pharmacy Technicians (816) and Industrial Lab Technicians (723). Similarly, the gap for Electronic Technicians (293) and Generator Mechanics (346) suggests a growing demand for technical expertise in maintaining and repairing essential equipment in the region's industries.

In construction sector, the gap for Carpenters (G-II) (300) and Shuttering Carpenters (86) reveal the high demand for skilled tradesmen to support ongoing development projects. The need for Heavy Machinery Operators (770) highlights the importance of infrastructure projects that rely on trained labor to operate specialized equipment like dozers, graders, and other heavy machinery. This gap highlights the need for increased training in this high-demand trade.

Another notable area is the demand for Graphic Designers, with a gap of 919, and Receptionists, shown a deficit of 936. These gaps reflect not only the need for creative and technical skills in media and communication but also for support roles in administration and business services, which are essential for day-to-day operations in both public and private sectors. Interestingly, certain trades display an oversupply, such as Civil Drafting with Auto CAD (-119) and Civil Draftsman (-50), indicating that there are more trained individuals than the available job opportunities in these fields. This oversupply may lead to underemployment or a need for re-skilling to meet the demand in other high-growth areas.

In Architecture Drafting, there is a moderate gap of 48 workers, while in banking, the demand exceeds supply by 127 employment opportunities. The trades that involve manual labor, such as Carpentry, display significant disparities. For general carpenters, there is a shortage of 138 skilled workers, while for Carpenter G-II, the gap widens to 300. In transportation sector, the shortages are more pronounced, with the number of Heavy Transport Vehicle (HTV) drivers falling short by 175, and Light Transport Vehicle (LTV) drivers by a considerable 1,865 opportunities. The most glaring shortages are seen in the hospitality industry, where there is a demand for 3,444 Cooks, far receding the supply of 212. This mismatch extends to other technical fields as well, such as Electronic Technicians (293 gap) and Generator Mechanics (346 gap).

There are also smaller but still significant deficits in trades like DAE Electrical (37), Jewellery CAD-CAM (-13), and DAE Mining (-13), which reflect niche yet important areas where targeted interventions could fill gaps in highly specialized fields. Additionally, trades such as Plumbers (321), Welder (491), and Motor Winding (-50) represent crucial sectors where skilled labor is in demand to support industrial maintenance and installation work.

The trades showing zero supply from KP TEVTA present critical shortages, suggesting a need for immediate interventions in skill development and vocational training to address these gaps. For technical trades, the gap is particularly pronounced in fields like AC & DC Electric Technicians (1,158), Solar Panel Installation Technicians (1,117), and Electrical Technicians (475). These trades are vital for supporting the energy sector, infrastructure development, and general technical maintenance. Healthcare related professions also face acute shortages, with zero supply for roles like Anesthesia Technicians (121), Dialysis Technicians (14), and Nurses (3,665). Given the growing population and the increasing demand for healthcare services, these gaps are alarming. The shortages in Specialist Doctors (70) and Surgeons (175) further exacerbate the situation.

In agricultural sector, gaps are seen in essential trades such as Agriculture Experts (174), Agricultural Machinery Operators (41), and Trained Agriculture Labor (3,079). Addressing these gaps through targeted training in modern agriculture techniques, machinery operation, and crop management will be crucial for sustaining agricultural growth and meeting food security goals. Hospitality and service sectors also face sever shortages, particularly in trades like Waiters (9,955), Cleaners (814), and Housekeeping Staff (1,887). With the province's growing tourism industry, the demand for skilled workers in these areas is high. The lack of trained personnel poses a significant challenge to the hospitality industry, as poor service quality could affect the sector's ability to attract and retain tourists.

6.11. Employment Opportunities for Disadvantaged Groups

Table 5 provides insights on inclusion and representation for various disadvantaged groups in employment and public service opportunities. The largest proportion of employment opportunities for disadvantaged groups, 67.8% (2,177 seats), is allocated to religious minorities, which indicates a significant commitment to ensuring representation for individuals belonging to minority faiths. Following religious minorities, the elderly are allocated 16.3% (525 seats) of the total reserved seats. This is a positive step towards promoting employment and participation among older individuals, addressing age-based barriers that can limit their economic and social involvement. Furthermore, transgenders receive 7.4% (238) of the reserved seats. Although small, this representation is a promising step towards fostering inclusion and reducing the stigma associated with transgenders.

About 6.1% (196 seats) are reserved for persons with disabilities. As such, provision of employment initiatives for persons with disabilities is critical for fostering an inclusive workforce. Women are allocated only 2.2% (70 seats), which is significantly lower than expected, especially considering the larger societal push for gender equality. This disparity suggests the need for more robust interventions to improve women's access to employment and reserved opportunities. The smallest allocation, 0.2% (7 seats), is for ethnic minorities, signaling a very limited focus on ethnic inclusivity in the workforce. This group is under-represented, which may reflect either a lack of political attention to ethnic issues or a failure to recognize the employment barriers they face.

Table 5: Employment opportunities for disadvantaged groups

Special Group	Number	Percent
Religious minority	2,177	67.8
Elderly	525	16.3
Transgender	238	7.4
Person with disability	196	6.1
Women	70	2.2
Ethnic Minority	7	0.2
Grand Total	3,213	100

6.12. Skills for Disadvantaged Groups

The analysis of the data reveals a focused allocation toward lower-skilled labor, aimed at creating employment opportunities for disadvantaged segments of society. A total of 3,213 seats have been designated across a variety of occupations, with the largest share of seats allocated for Sweepers (1,750 seats), making up more than half of the total (Annex-B: Table 8).

Other significant allocations include Packing Workers (315 seats), Security Guards (273 seats), and Office Boys (245 seats). These roles typically require minimal technical training and provide essential services in both urban and rural areas. Employment opportunities for skilled workers such as Lab Technicians (56 seats) and Nurses (35 seats) are comparatively low. This indicates a potential gap in advanced employment opportunities for disadvantaged groups, limiting upward mobility in more specialized sectors. Additionally, the low number of opportunities for Computer Operators (14 seats) and Computer Aided Designing (CAD) Operators (07 seats) suggests a missed opportunity in terms of equipping disadvantaged groups with technical skills that may lead to more sustainable employment.

The presence of more traditional occupations like Farm Labor, Washing and Cleaning, and General Workers further illustrates the concentration on low-skill, labor-intensive jobs. However, the limited number of seats for administrative roles like Clerks, Telephone Operators, and Data Entry Operators highlights the restricted access to clerical and office-based employment for disadvantaged groups.

The data suggests that while efforts are being made to provide jobs for disadvantaged groups, the focus is primarily on low-skilled, manual labor roles. There is a need for targeted initiatives to increase the number of seats in higher-skilled, technical, and administrative occupations to foster greater economic mobility and long-term career development for these groups.

6.13. Employers' Satisfaction with TVET Graduates

The data in Table 6 presents insights into the level of satisfaction with TVET across different sectors. The analysis helps identify the performance of TVET sector in meeting sectoral expectations and highlights potential areas for improvement. The agriculture sector shows an alarming trend, as 100% of respondents reported their lack of awareness or engagement with TVET programmes, signalling a significant gap between training providers and stakeholders in agriculture sector.

Allied Health sector exhibits a very high satisfaction level, with 85% of respondents expressing satisfaction and none reporting dissatisfaction. Only 15% admitted completed lack of awareness, suggesting that this sector is generally well-served by TVET sector, and the courses offered align well with the labor market needs in the health industry. In Manufacturing, 76% of respondents are satisfied, while 3% are not satisfied, and 20% are unsure. Although satisfaction is high, the percentage of those who are uncertain indicates a need for improved outreach of TVET programmes.

The reported satisfaction and dissatisfaction levels in the printing and packaging sector is 74% and 4%, respectively. A relatively higher proportion, 21%, reported ignorance about the impact of TVET training within this industry. The Renewable energy sector displays a more divided opinion, with only 50% satisfied, 31% not satisfied, and 19% uncertain. This significant dissatisfaction highlights a need for TVET institutions to review the curriculum for better alignment with the evolving technological demand of the sector.

Professional, scientific, and technical activities exhibit low satisfaction levels, with only 48% expressing satisfaction and a notable 44% admitting ignorance. This suggests that there may be a disconnect between the specialized needs of this sector and the skills being developed through TVET programmes. The employers in services sector reported 74% satisfaction and 15% dissatisfaction, with a relatively small percentage (11%) uncertain. This indicates a general alignment of TVET with service sector needs with room for improvement to address dissatisfaction. Textiles & garments sector showed 82% satisfaction, 2% dissatisfaction, and 16% uncertainty. These results suggest that TVET programmes are serving well the needs of the sector.

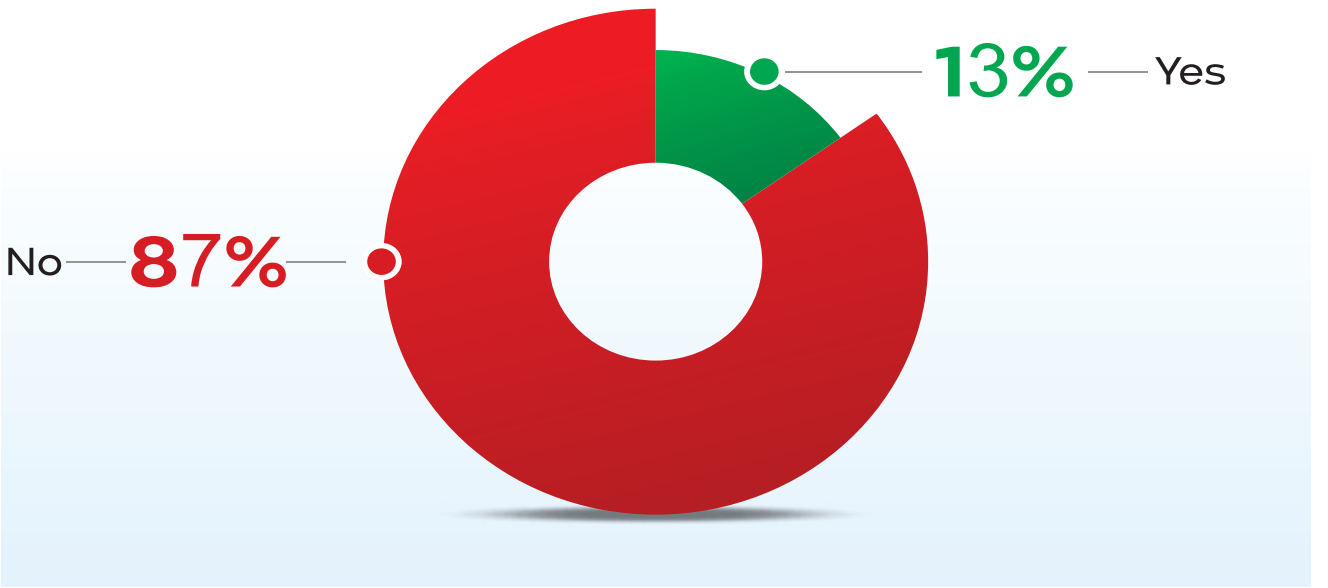
Table 6: Employer's satisfaction with technical and vocational education and training

Sector	Safisfied	Not Safisfied	Don't Know
Agricultural	0	0	100
Allied Health	85	0	15
Manufacturing	76	3	20
Printing and Packaging	74	4	21
Renewable energy	50	31	19
Professional, scientific and technical activities	48	7	44
Services	74	15	11
Textile & Garments	82	2	16
Average	76	3	20

6.14. Industry-Led Training Opportunities

Figure 19 shows the industry-led training opportunities within companies. The data shows that 87% of the employers surveyed do not have such opportunities. In contrast, only 13% of the employers offer industry-led training opportunities.

Figure 19: Industry-led training opportunities

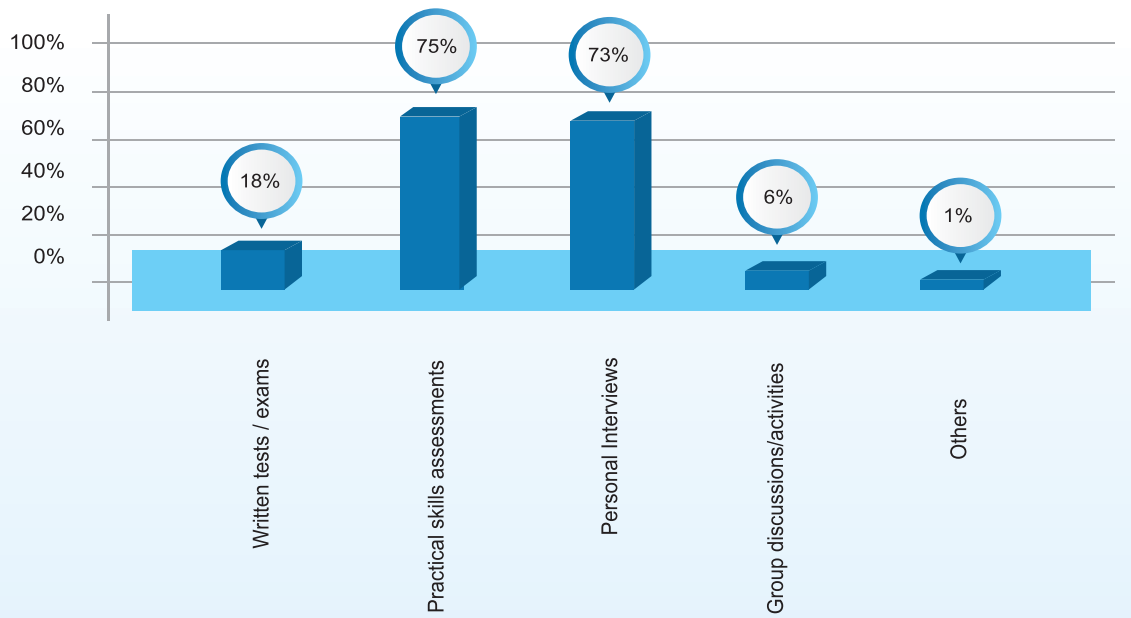


The absence of such initiatives could hinder both organizational growth and individual career progression, particularly in sectors where continuous skill enhancement is critical to maintaining productivity and competitiveness. On the other hand, a small percentage of companies providing in-house job training could be early adopters of more progressive human resource practices, recognizing the value of internal training in enhancing workforce capabilities. Lack of industry-led training programmes highlights a potential gap in workforce development strategies, which could be filled through partnerships with technical and vocational training institutes.

6.15. Skills Assessment in Recruitment

Personal interviews are the most common assessment method (72.9%) reported by the employers. Seventy-five percent of employers use practical skills assessment showing their preference for hands-on competency assessment. Whereas 73% also use personal interviews. About 18% use written text, indicating that formal tests make for a good assessment of candidates' declarative knowledge, or procedural skills. The use of group discussions/activities has been reported by 6% of employers. Finally, any other forms of assessment are used infrequently, at 1%. This indicates that human capital selection in most organizations in Khyber Pakhtukhwa is conducted predominantly through more conventional and formal processes.

Figure 20: Methods of skills and competencies assessment



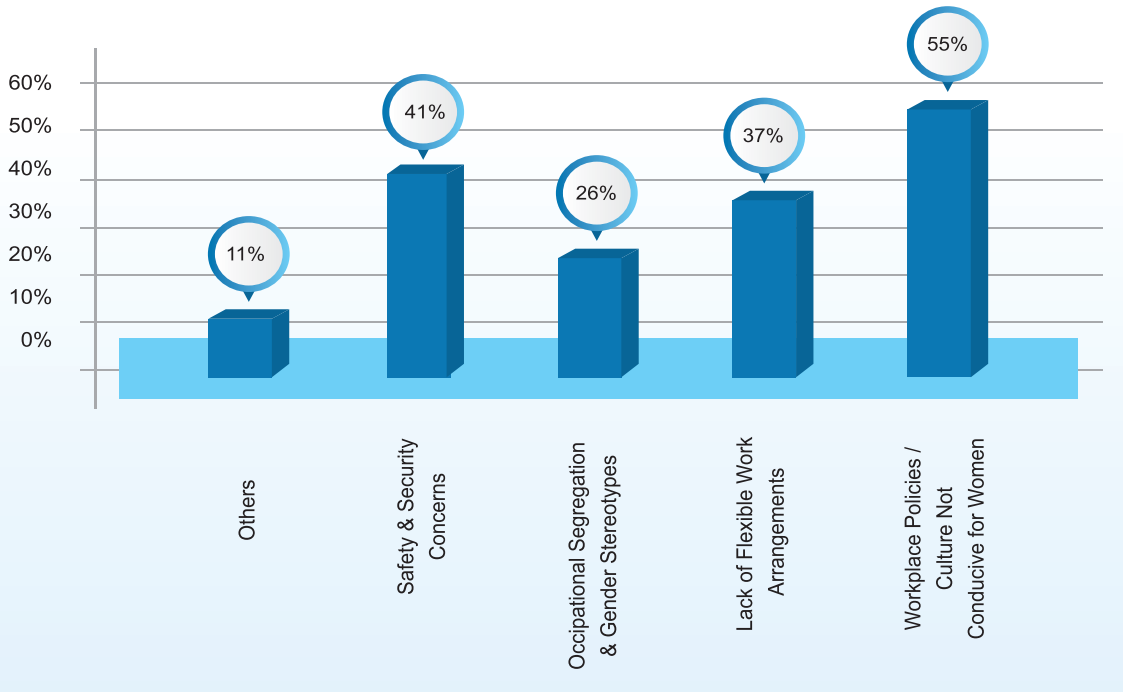
6.16. Challenges in Hiring or Retaining Employees

6.16.1. Female Employees

Figure 21 gives a glimpse of prevalent issues relating to the hiring or retention of female employees in workplaces. The most cited problem is the lack of women-friendly workplace policies and culture selected by 55% of the respondents. The issue that was found to be second most frequent is the absence of flexible work arrangements (37%).

With 26% responses, gender stereotypes and occupational segregation were also reported as important barriers. Furthermore, 41% of participants identified safety and security as a significant challenge. Lastly, 'other' challenges were mentioned by 11 % of respondents, out of which 5% cited the commuting distance from industries and 6% highlighted accommodation as challenges they faced.

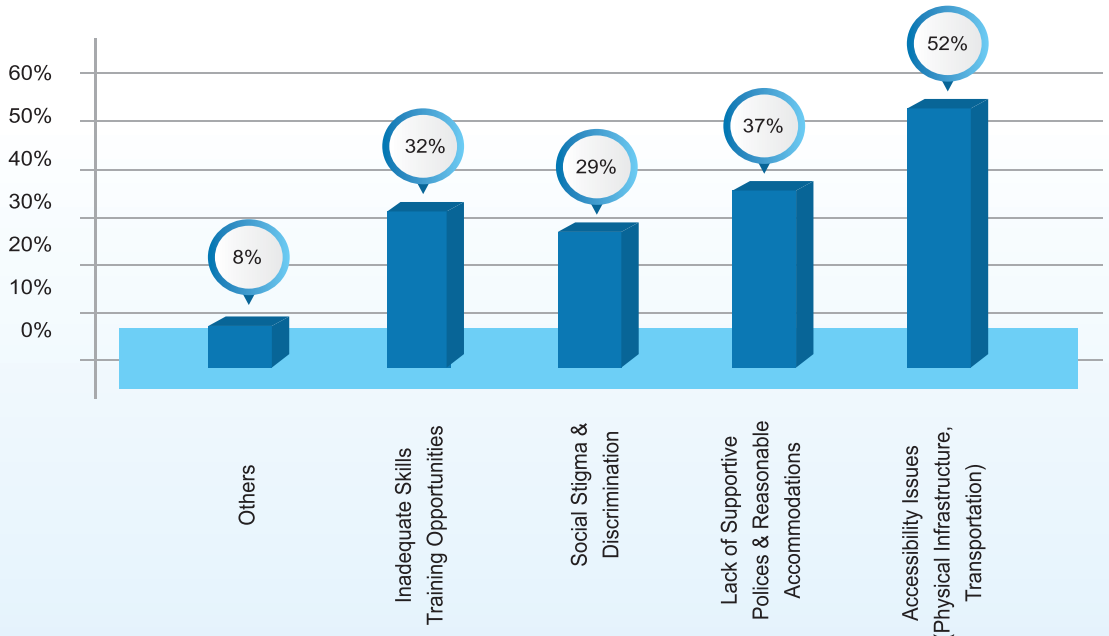
Figure 21: Challenges in hiring or retaining female employees



6.16.2. Disadvantaged Groups

Figure 22 shows the key barriers encountered by disadvantaged groups in recruitment. The most quoted problem (52%) was accessibility of the health facilities translating into poor physical access and transportation options. Another problem area is the absence of supportive policies and reasonable accommodation, selected by 37% of the respondents. Moreover, 16% of the respondents expressed social discrimination as a big challenge. Lack of skills training was identified as a challenge by 32% of the respondents, calling for refinement of the existing training interventions to also include programmes that may help persons from disadvantaged groups in making successful transitions in the labor market. Lastly, 'other' factors were reported by only 8% of respondents. Five percent of them cited a perceived lack of arrangements for disabled groups, while 3% doubted thier ability to deliver.

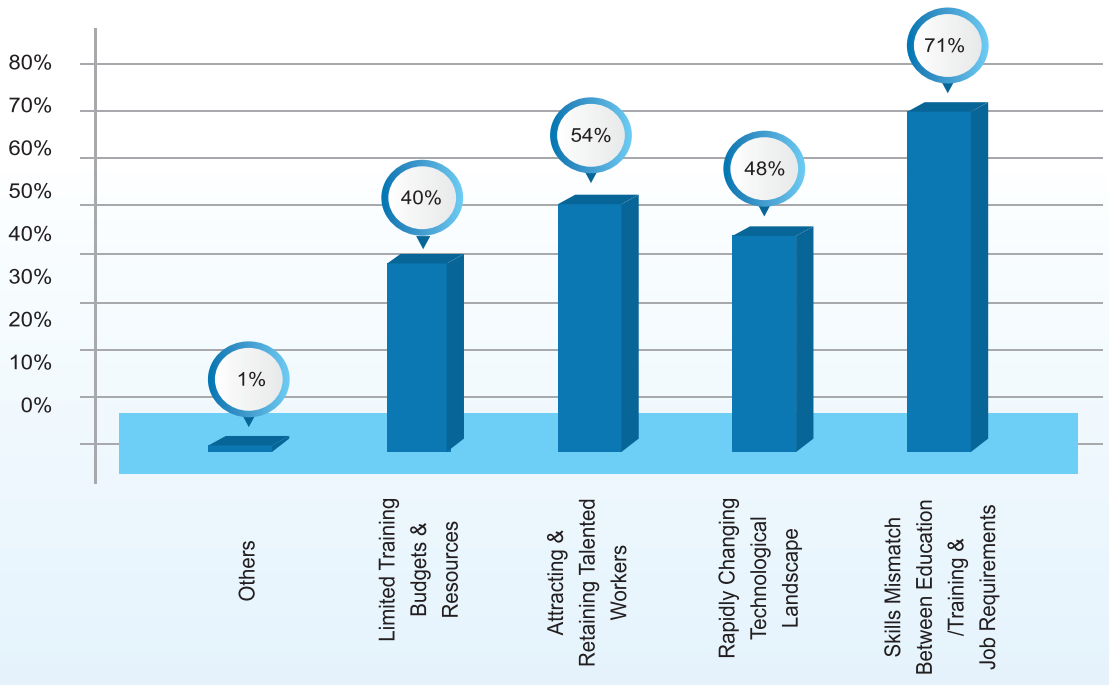
Figure 22: Challenges in hiring or retaining employees from disadvantaged groups



6.16.3. Workforce Development and Skill Acquisition

Skills mismatch between education/training and job requirements is the most cited challenge (71%) followed by attracting and retaining talented workers (54%). Furthermore, the rapidly changing technological landscape (48%) and limited training budgets and resources (40%) are also critical issues in workforce development. Reported by only 1% of the respondents, 'other' issues suggest that other barriers exist but not frequently reported.

Figure 23: Key issues in workforce development and skill acquisition



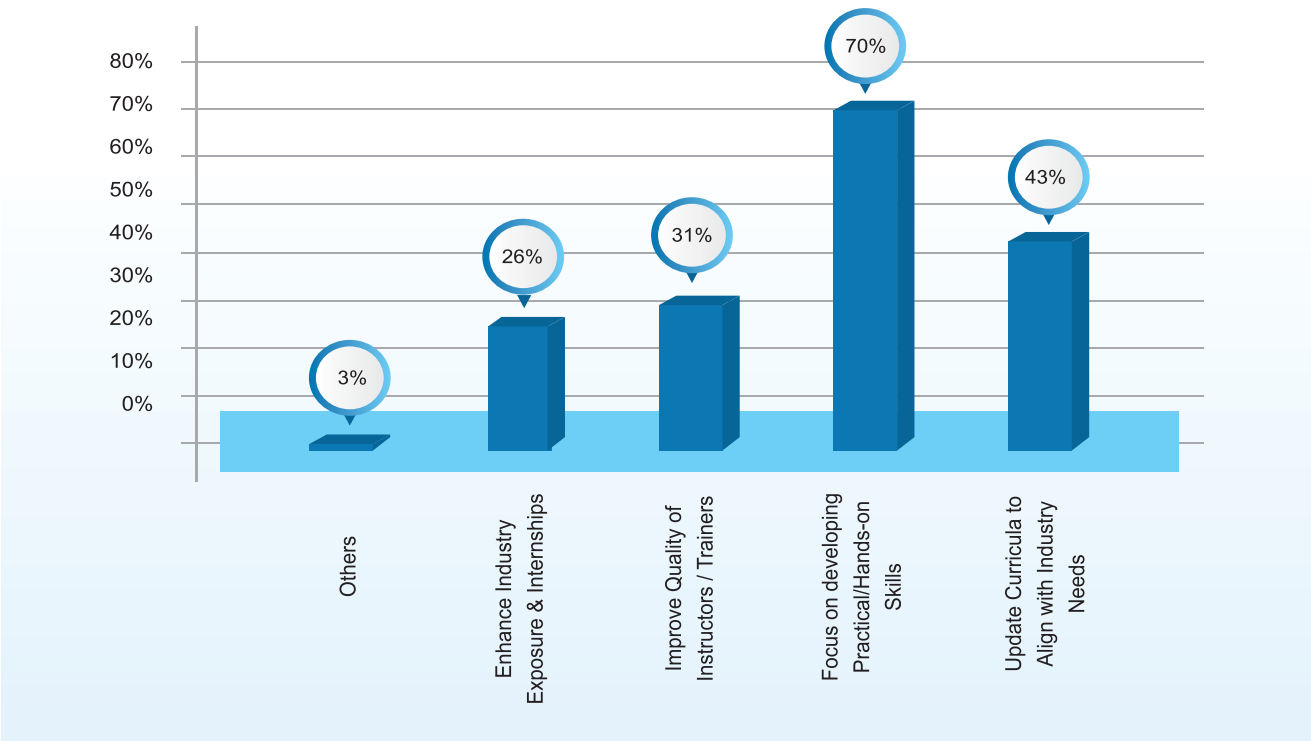
6.17. Suggestions for Improvement

6.17.1. Quality and Relevance of TVET Programmes

Figure 24 highlights the need to concentrate on the development of practical/hands-on skills as the most important advice to be given to both provinces. Seventy percent of the respondents stress this aspect. As agreed by 43% of respondents, there is a need to change curricula according to the requirements of the industry.

The need to improve the quality of instructors/trainers is endorsed by 31% respondents. Also, enhancing industry exposure and internships was critical for 26% respondents. Three percent of the respondents suggested alternative solutions.

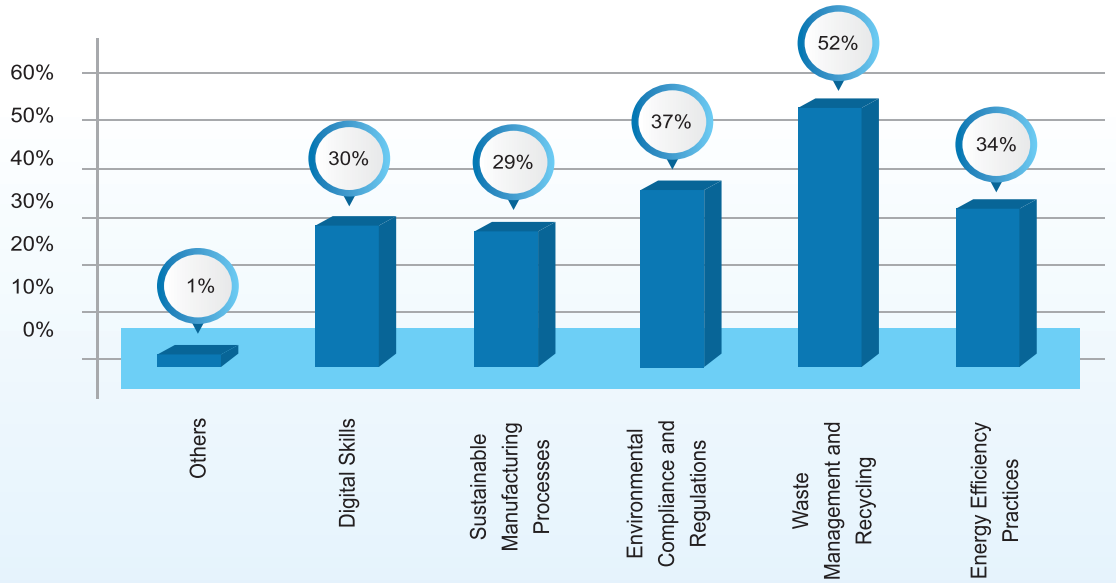
Figure 24: Suggestions for improving the quality and relevance of TVET programmes



6.17.2. Green Skills

Energy efficiency practices top the list of responses with regard to Green skills, with 34%. Selected by 52% of respondents, waste management and recycling has a relatively high recognition for green skills. Environmental compliance or regulations are perceived as important by 37% of respondents. For digital skills, there is a huge gap as 30% of respondents agreed on their importance in this sector. Moderate attention was paid to sustainable manufacturing practices in the survey (29%).

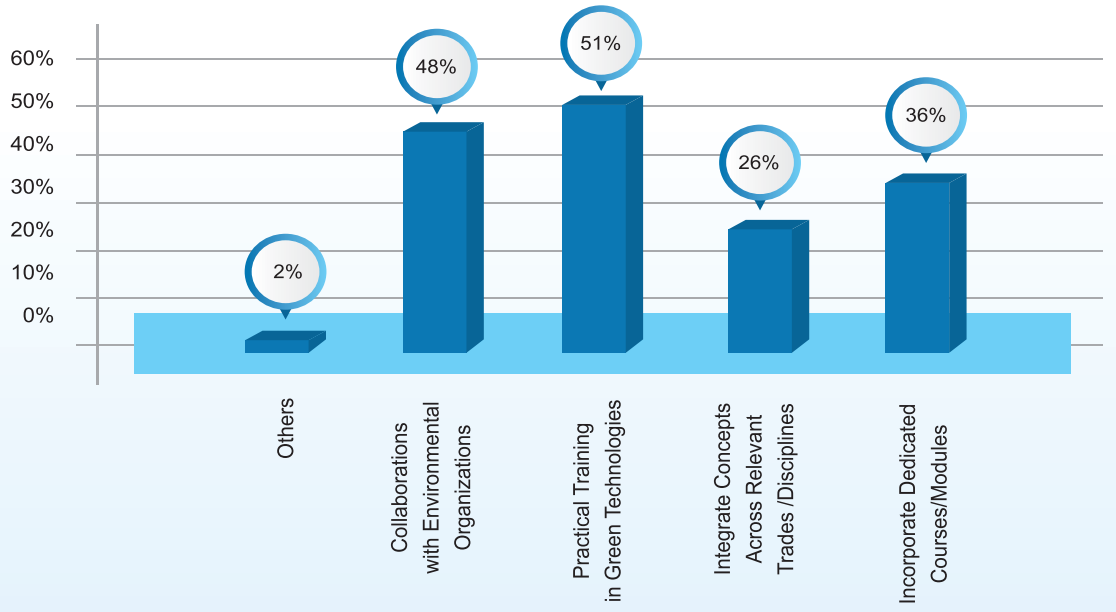
Figure 25: Green skills across industries



6.17.3. Introducing Green Skills in TVET Programmes

Fieldwork experience in green technologies was the most preferred idea, supported by 51% of the respondents (Figure 26). Partnerships with environmental organizations are also valued with their importance noted by 48% respondents. Thirty six percent respondents favored Integration of unique green skills courses or modules. Twenty six percent respondents suggested embedding green ideas within relevant trades and disciplines.

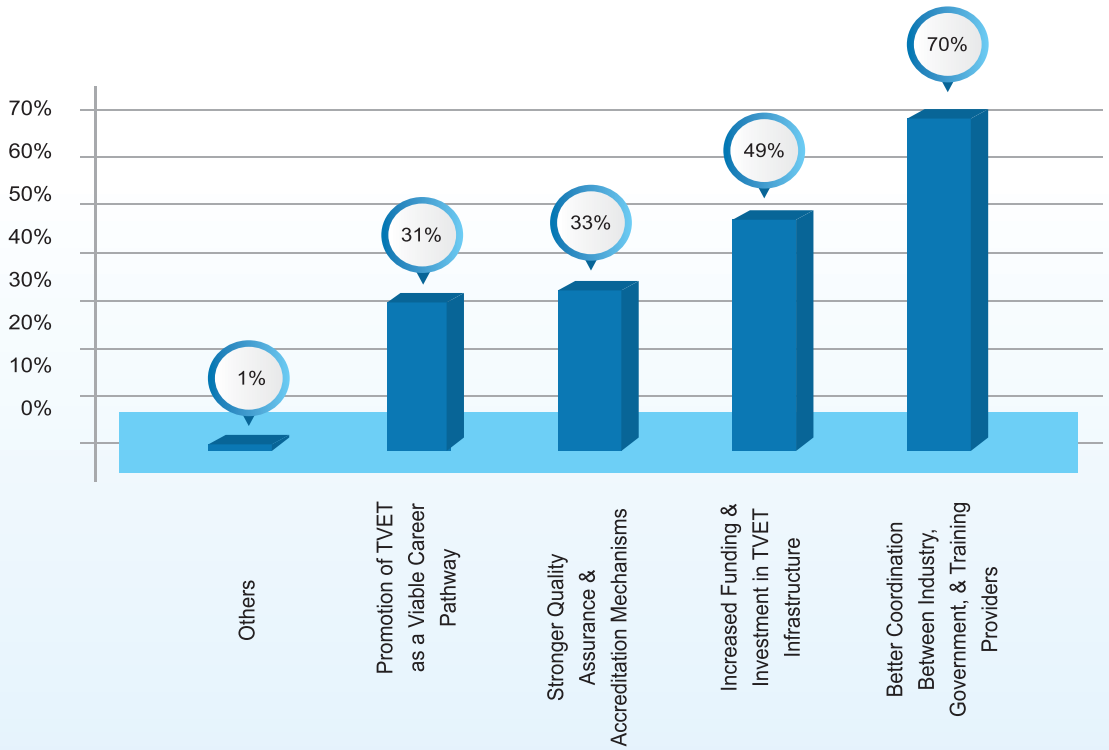
Figure 26: Suggestions on green skills in TVET Programmes



6.17.4. Improving Overall TVET System

An important suggestion for improving TVET system is to facilitate more internship and apprenticeship opportunities (60%) (Figure 27). Fifty eight percent responses point to the need for curriculum development and curriculum review to include industry input. About 38% of respondents have suggested the formation of formal industry advisory boards/committees. Finally, 27% of the respondents suggested encouraging industry contributions, such as equipment, instructors, and funding support.

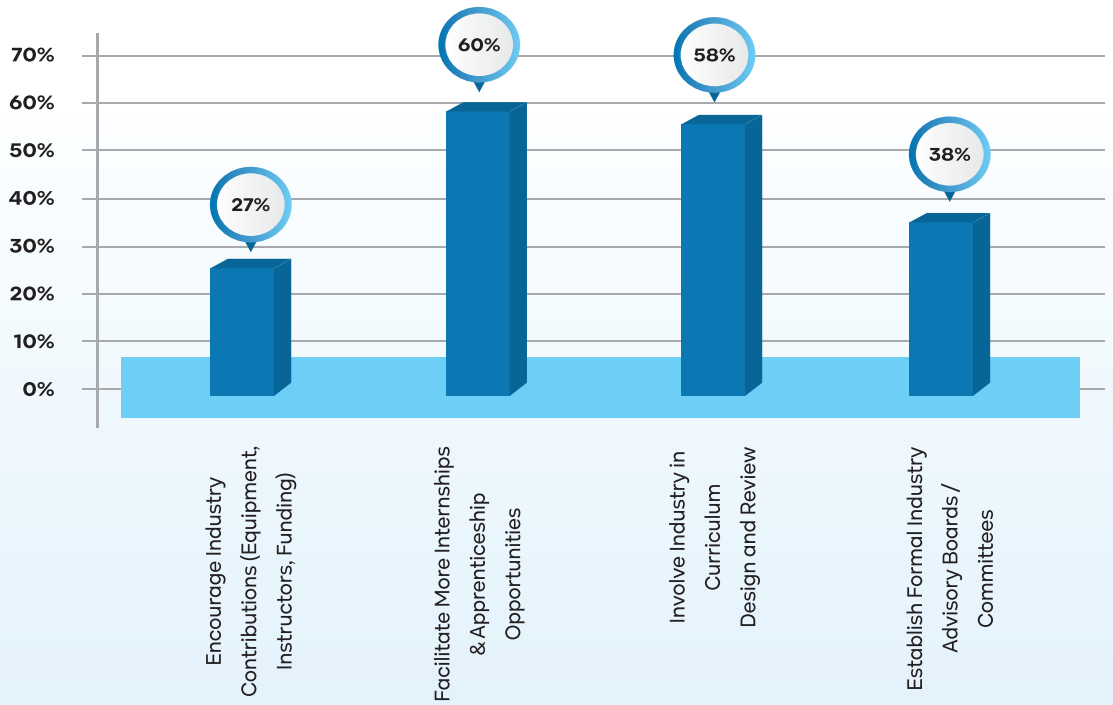
Figure 27: Suggestions for improving TVET system



6.17.5. Promoting Industry-TVET Collaboration

About 60% of respondents emphasized the need to facilitate more internship and apprenticeship opportunities, highlighting that practical, hands-on experience is a critical component of vocational training (Figure 28). Another significant suggestion, supported by 58% of the respondents, is to involve industry in curriculum design and review. This reflects a recognition of the importance of aligning TVET curricula with the latest industry standards, ensuring that graduates are equipped with relevant skills. A lower, but still relevant, 38% of respondents recommended establishing formal industry advisory boards or committees. Finally, 27% of respondents suggested encouraging industry contributions in terms of equipment, instructors, and funding. This highlights the resource gap in many TVET institutions that can be filled through greater industry investment, helping improve the quality of training.

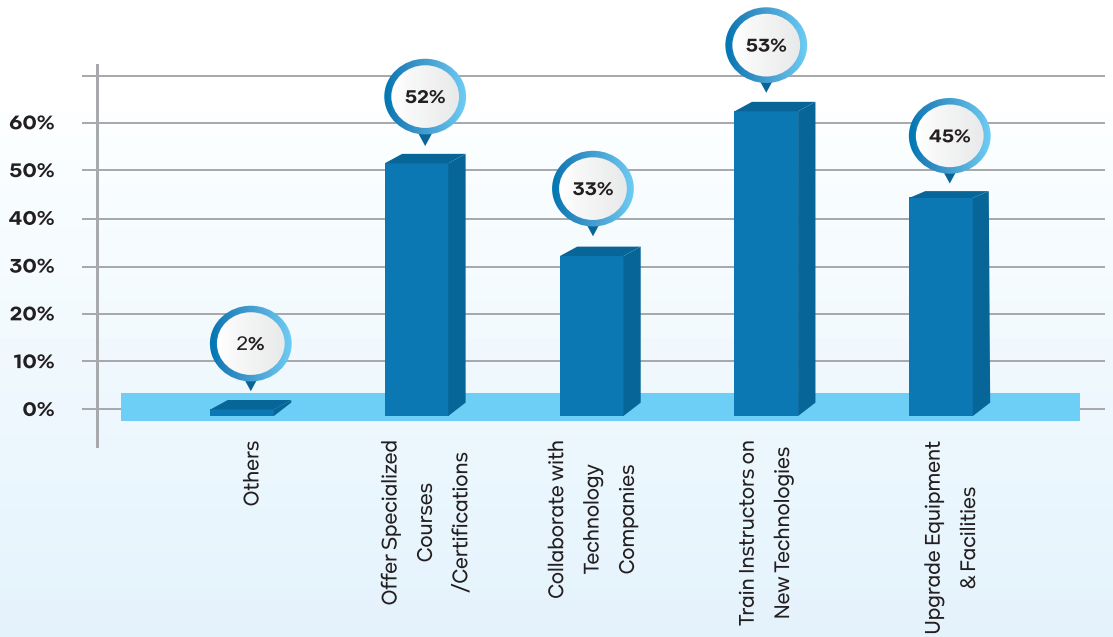
Figure 28: Suggestions for promoting industry-TVET collaboration



6.17.6. TVET Programmes and Industry Collaboration

About 33% employers from KP favored working with technology companies so that the governance of TVET programmes reflects today's technological advancements (Figure 29). 53% of the respondents emphasized the need for training of new technologies to the TVET instructors. Another key recommendation was upgrading equipment and facilities supported by 45% respondents. The idea of offering special courses and certifications to meet industry needs was approved by 52% of respondents.

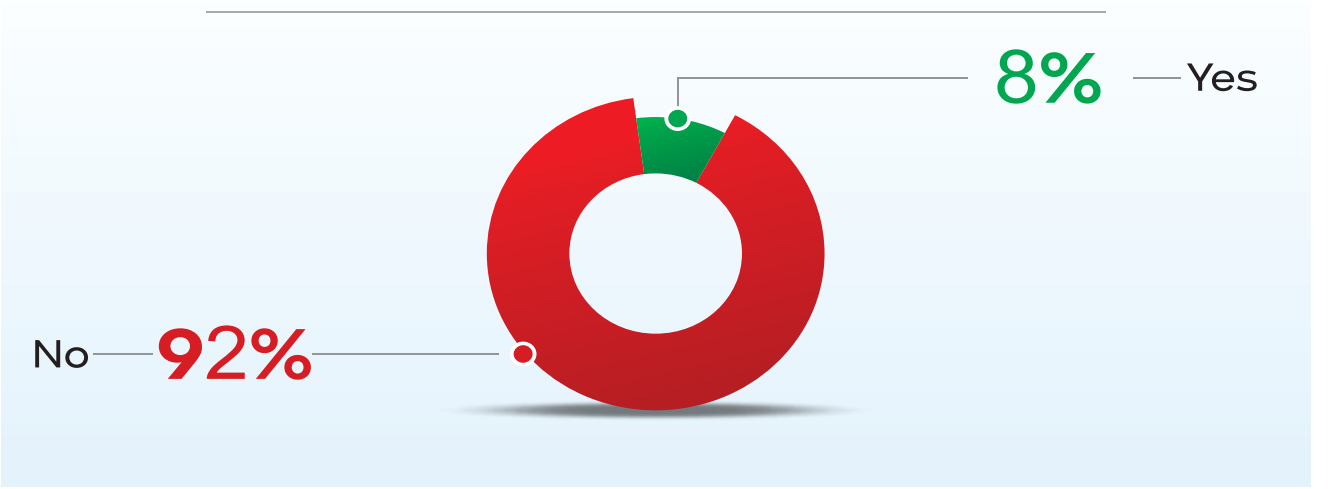
Figure 29: Suggestions for TVET programmes and industry collaboration



6.17.7. Enterprises having Dedicated Training/Learning and Development Department

It was found that only 8% of the organizations have a Learning and Development department, pointing to a critical need for workforce development (Figure 30).

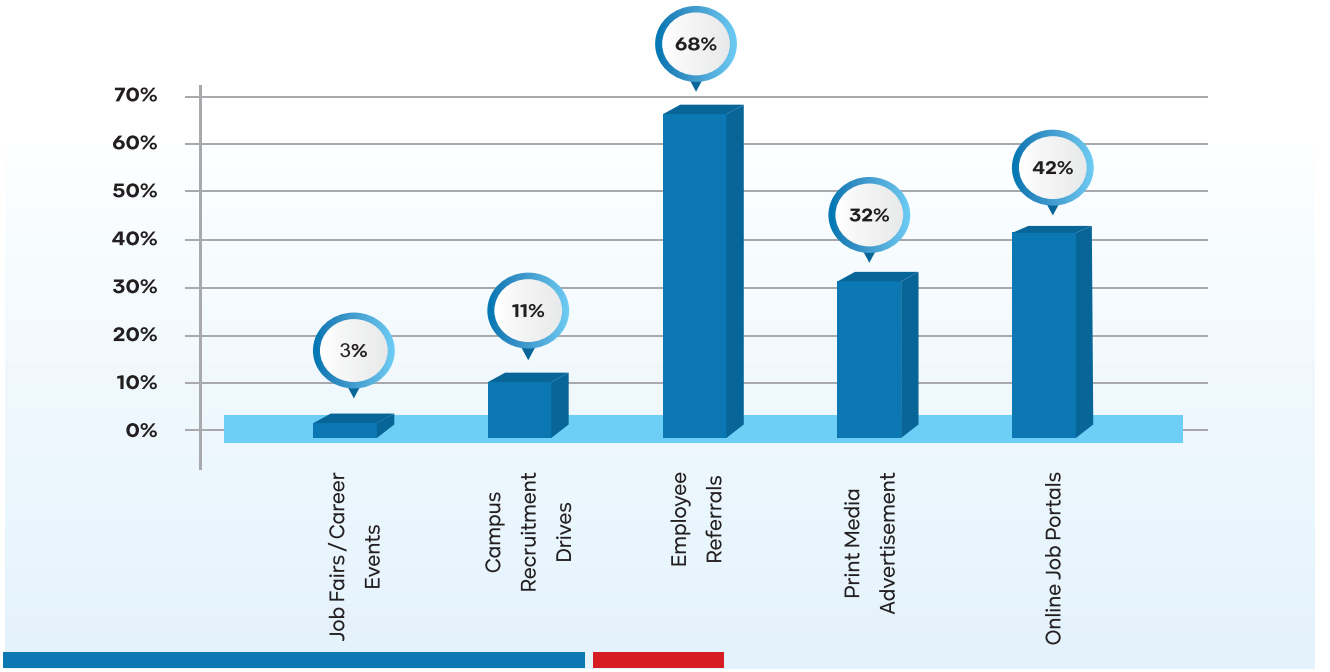
Figure 30: Availability of dedicated training learning and development department at enterprise level



6.17.8. Identifying and Sourcing Potential Job Candidates

Employee referrals are highly valued as 68% of the organizations practice them. Practicing formal methods of sourcing candidates using online job portals has been reported by 42% of the organizations. Another important one is print media advertisements used by 32% of the organizations. Campus recruitment drives, 11% and job fairs/career events (3%) are even less common means explored by employers (Figure 31).

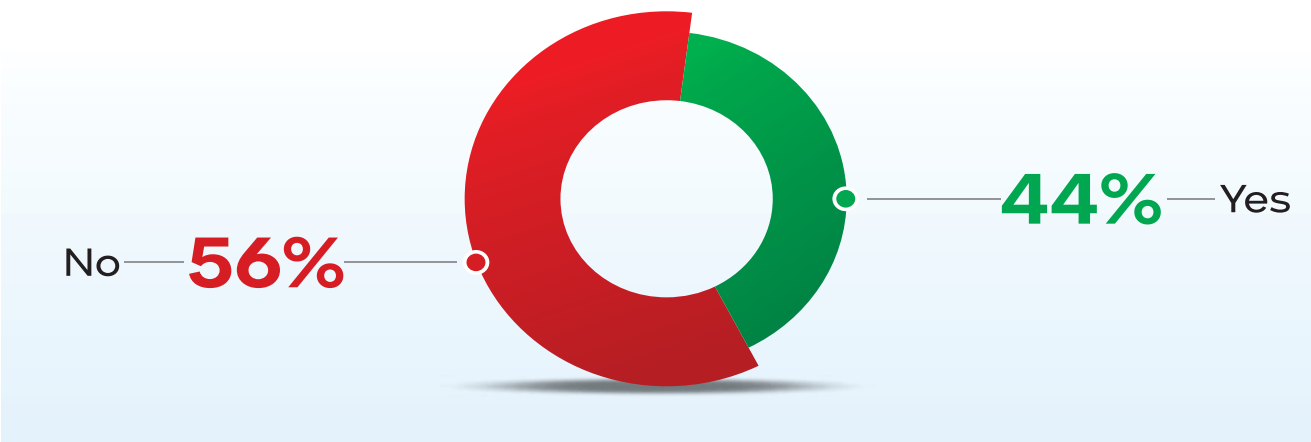
Figure 31: Preferred methods for identifying and sourcing potential job candidates



6.17.9. Competency Standards/Curricula

The level of interest in review of competency standards and curricula is somewhat lower, with 44% of the organizations willing to participate in this process (Figure 32). A larger proportion, 56%, are not interested in taking part in development or review of curricula, which suggests a relatively lower level of engagement with the educational and training sector in this respect.

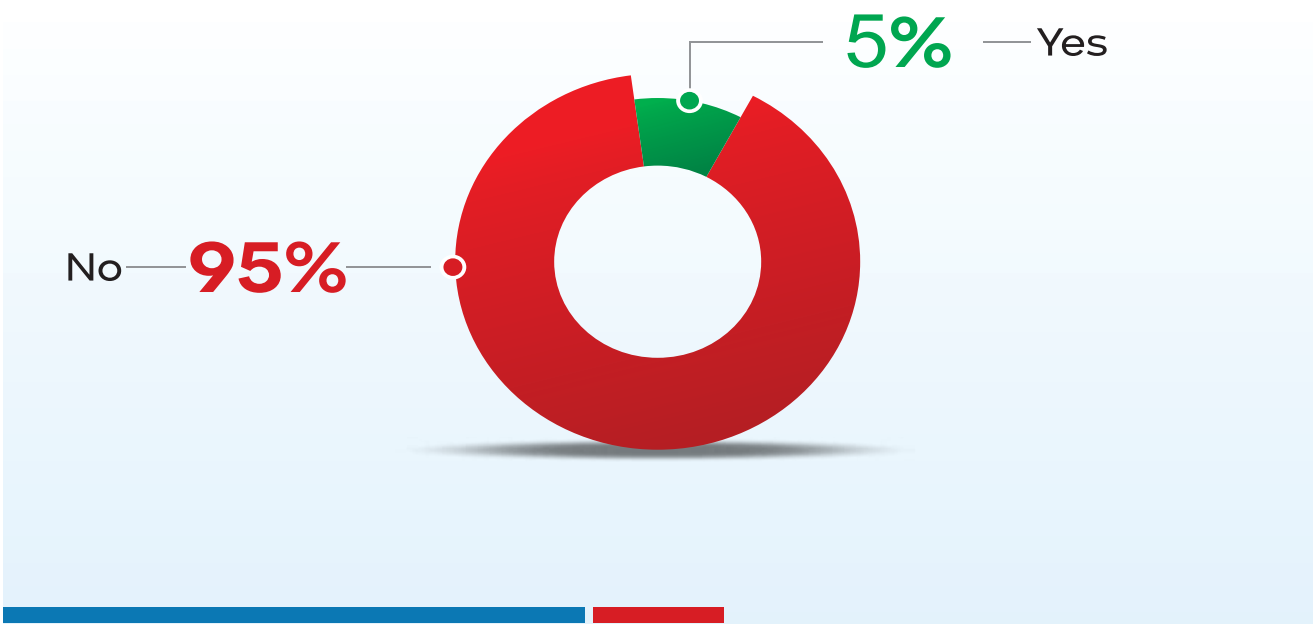
Figure 32: Interest in participating in the development or review of competency standards and curricula



6.17.10. Employee Retention and Turnover

Just 5% of the organizations experience difficulties with retention, while a notable 95% do not perceive it as a significant problem (Figure 33).

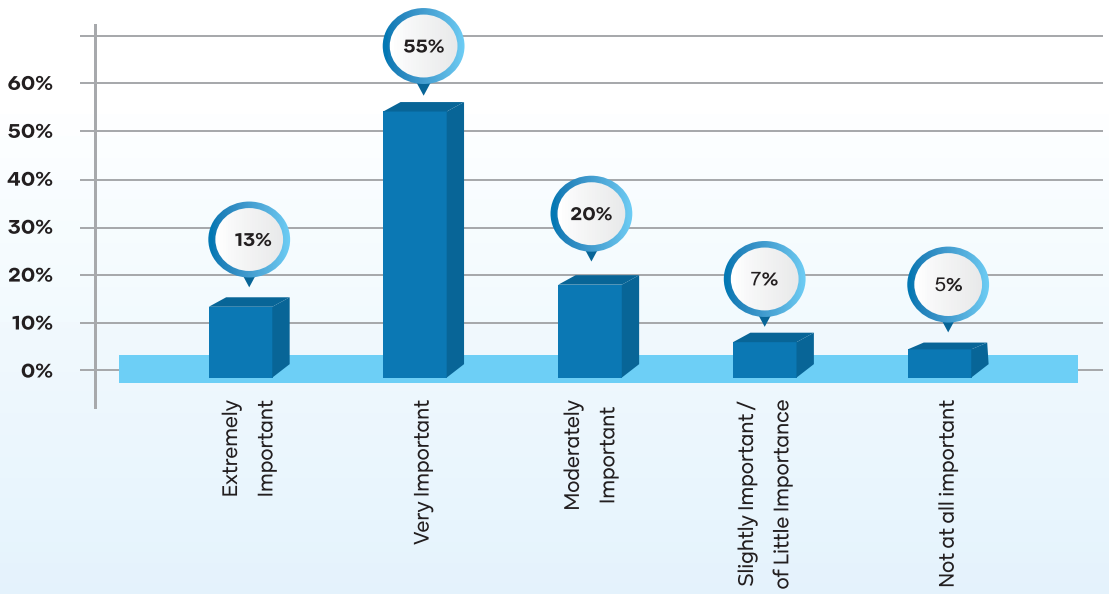
Figure 33: Challenges related to employee retention and turnover



6.17.11. Digital/ICT Skills Workforce Demand

The emphasis on digital skills is quite pronounced with 55% of the organizations viewing them as very important and 13% considering them extremely important (Figure 34). A further 20% classify them as moderately important, while only 7% and 5% consider them to be slightly important or not at all important.

Figure 34: Importance of digital and ICT in the workforce



6.17.12. Digital/ICT Skills in TVET Programmes

Responses from 29% of the organizations suggested their interest in having more Digital Skills in TVET. Most organizations (71%) did not offer suggestions, reflecting limited involvement on the matter.

Figure 35: Digital/ICT skills in TVET programmes

6.17.13. Demand for Future Digital Skills

A look at the demand for niche and emerging areas (Table 7) shows that Computer Operators top the list with a demand of 62, reflecting the province's need for basic IT literacy to support day-to-day operations in various sectors. Additionally, accounting software expertise is in demand with 24 professionals needed, signaling the province's growing interest in digitizing business processes.

The province also has a strong demand for Digital Corporate System Developers (50) and Digital Marketing experts (55), albeit in smaller numbers. This indicates that while the province is embracing digital solutions, the focus remains more on core, foundational skills necessary for supporting broader digitization efforts. Although the demand for advanced digital skills like AI (16) and Cybersecurity (11) exists, the numbers are relatively modest. Similarly, the demand for Software Developers (30) and IT Experts (37) highlights the need for technology professionals to support growing industries.

Table 7: Demand in niche and emerging areas

Occupation	Professionals Needed
Computer Operator	62
Digital Marketing	55
Digital Corporate system Developers	50
IT Expert	37
Renewable energy	32
Software Developer	30
AutoCAD	27
Data Analysis	24
Accounting software	24
AC & DC electrician	23
Social media developer	18
Web Designing & Development	18
Artificial intelligence	16
E Commerce	15
Laser printing	14
Corel Draw	14
Coding and Programming	13
Designer	13
Graphic designer	12
Cyber Security	11
Telehealth	9
ERP System	9

Occupation	Professionals Needed
Renewable energy Engineering	8
Machine Learning	7
Mobile app development	6
Research and development	5
CCTV Technician	5
CNC programing	4
Composing	4
Develop software's for health care	4
Eye laser	3
Robotic machinery	3
Cloud computing	3
Amazon expert	3
Building information modeling	3
Video editing	2
Digital marketing	2
3D printing	2
Business analytics	2
CCNA	2
Renewable energy	1
Automation and robotics	1
Apps development	1
Advanced diagnostic x ray	1
C.T Scanner machine operator	1
CAD design And Simulation	1
4D design for building	1
CT Scan	1
MRI technician	1
X ray with low radiation exposure	1
Grand Total	604

At the moment, the most popular courses are purely basic computer courses, including Computer Operation (62) and Accounting Software (24), which indicates that, although the province is implementing digital solutions, it has not yet entered a more advanced stage of this process. Thus, it is seen that while some positions such as Graphic Designer (27) and Front-End Developer (45) remain unique to the internet, demand for Software Developers (30) and Digital Marketing Experts (55) shows that industries themselves are gradually adopting more specific digital positions as well. The trends are consistent with the sub-fields of interest that are more niche, such as renewable energy (32) and AutoCAD (27), however, these numbers are lower and represent the shift of the province towards incorporating technology into more traditional industries. Accordingly, requirements for digital competencies are characterized by an emerging but more fundamental demand for rudimentary computer literacy together with digital marketing.

7. Conclusion

The findings of the labour market assessment in Khyber Pakhtunkhwa highlights the province's unique economic structures and growth trajectories. It exhibits a more diversified demand across tourism, construction, and allied health sectors. It further reinforces the fact that workforce development programmes must be tailored to address the specific needs of each district's business environment.

In KP, workforce demand is spread across multiple sectors, with tourism and hospitality on top which require 32,583 skilled workers. Construction is another key sector, with 26,521 workers needed, reflecting the province's focus on infrastructure development. Requiring 12,523 workers, allied health is also significant, highlighting the growing importance of healthcare services. Given the smaller size of businesses, workforce development programmes should focus on capacity building for small and micro enterprises. Training in entrepreneurial skills, business management, and basic technical skills can help enhance productivity and stimulate growth in key sectors like tourism and renewable energy.

The findings also suggest that upskilling and reskilling efforts will be critical in addressing workforce shortages, particularly in high-demand sectors like hospitality, construction, and renewable energy. In Khyber Pakhtunkhwa, for example, the tourism sector requires a large number of waiters (9,845) and cooks (2,302) that are essential for supporting the growing tourism industry. To meet this demand, vocational training programmes must cater to customer service and hospitality management skills. Similarly, the construction sector requires skilled masons and electricians, where technical training is essential for ensuring quality and safety in infrastructure projects.

The gender disparity in workforce demand is another key challenge highlighted in the data. Women are underrepresented in higher-ranking positions and skilled professions. There are fewer opportunities for women to advance into technical or managerial roles in many of the available positions in sectors like manufacturing, construction, and renewable energy. This could be due to limited access to education and training, as well as societal and cultural barriers that their hinder career progression.

Addressing this gender disparity will require targeted interventions fostering practices on equal opportunities for women so that they may pursue careers at all levels, particularly in senior positions. This may involve initiatives like women mentorship programmes, leadership training, and scholarships aimed at promoting women's career mobility. Additionally, policies that enable women to balance work and family responsibilities, such as flexible working arrangements and childcare support, are essential for ensuring their continued participation and advancement in the labour market.

The digitalization of the economy is another important trend reflected in the workforce demand data. KP shows a growing need for computer operators, electronic technicians, and IT-related jobs. For instance, demand for computer operators (1,891 positions) and electronic technicians (412 positions) underscores the increasing importance of digital literacy in modern industries. Vocational training programmes therefore, should include digital skills training to prepare workers for roles in an increasingly automated and technology-driven workforce.

8. Recommendations

To strengthen the governance of institutions and align TVET programmes with industry needs, a robust interaction mechanism should be established between industry/employers (demand-side) and TVET institutions (supply-side). This can be achieved through the formation of Sectoral Working Groups and Institute Management Committees (IMCs) having representation from relevant industries.

These fora should aim to estimate, evaluate, and align training programmes with government-defined priority sectors like renewable energy, information technology, manufacturing, construction, and others.

Implementation Steps

Establish Institute Management Committees (IMCs)

Form IMCs at institute level comprising representatives from industry, government, and TVET providers to identify skill gaps, develop training plans, and monitor programmes effectiveness.

Conduct Regular Industry-Academia Dialogues

Organize quarterly seminars to discuss the prevailing labor market trends, identify skill shortages, and align training programmes with national and provincial development priorities.

Implement a Regular Feedback Mechanism

Establish a regular feedback mechanism between employers and TVET institutions to incorporate market demands into curricula.

Develop Sector-Specific Training Plans

TVET institutions should develop training plans for priority sectors, such as renewable energy, IT, and advanced manufacturing, addressing specific skill needs within each specialization.

Conduct Periodic Market Studies

Conduct annual market studies to assess emerging industry trends, identify skill demands, and evaluate the relevance of existing TVET programs. Based on these studies, introduce new programs in growing sectors and phase out those that no longer align with market needs or show declining demand.

Monitor and Review Training Programmes

A bi-annual review system may be devised to assess the performance of training programmes against market trends and make necessary adjustments accordingly.

1. To address the growing demand for human resources in hospitality and tourism, TEVTA may expand its training programmes in Swat and Charsadda.

With significant opportunities in roles such as waiters, cooks, housekeeping staff, and tour guides, these districts offer vast potential for employment growth in the tourism sector. Collaborating with local hotels and tour operators will allow for work-based trainings and employment opportunities. As Swat is becoming a tourism hotspot, TEVTA should focus on building capacity in hospitality management, thereby aligning with the government's goal of promoting tourism-driven economic growth.

2. There is a rising demand for skills in renewable energy in Peshawar and Nowshera particularly for solar panel installation technicians and electrical experts for renewable systems.

With hundreds of job openings in these roles, TEVTA should introduce specialized courses in solar and wind energy technologies, as well as energy efficiency management. By partnering with international agencies for certifications, TEVTA can ensure that its graduates are equipped with globally recognized skills, thus boosting their employability and supporting Pakistan's transition to renewable energy.

3. The construction sector is another critical area for skill development, especially in Peshawar, Swat, and Haripur, where masons, carpenters, machine operators, and welders are in high demand.

TEVTA should continue offering training in modern construction techniques, safety standards, and project management to help address labor shortages. Apprenticeship programmes with construction companies will ensure that trainees gain hands-on experience, particularly in districts experiencing infrastructure development booms.

4. In the agriculture sector of Charsadda and Haripur, there is a high demand for skilled workers and machinery operators to support local farming.

TEVTA should modernize its agricultural training by integrating agri-tech, sustainable farming practices, and agri-business management skills. This will not only meet local demand but also improve productivity through the adoption of advanced farming techniques, helping to strengthen the region's agricultural base.

5. Healthcare training should be expanded in Swat and Nowshera, where the demand for nurses and paramedics is growing.

Training institutions should introduce specialized programmes in fields like telemedicine and geriatric care to meet both local and national healthcare needs. By doing so, training providers can ensure that its healthcare graduates are prepared for the demands of modern medical care, supporting clinics and hospitals.

6. In Peshawar, there is an increasing demand for administrative roles such as accountants and computer operators.

Training providers may capitalize on this by introducing training programmes in business administration, IT, and accounting. By integrating digital literacy and soft skills into these courses, they can prepare graduates to meet the evolving needs of urban employers in Peshawar, equipping them with a diverse skill set for office-based jobs.

7. TVET programs should enhance the inclusion of persons with disabilities by providing accessible training facilities and adaptive technologies tailored to their needs.

Policymakers should focus on equipping individuals with skills relevant to high-demand green jobs, such as solar panel installation, energy efficiency practices, and waste management. These fields may also provide opportunities for persons with disabilities to participate in Pakistan's transition toward a green economy thus contributing to both social inclusion and economic development.

8. TEVTA should integrate green skills into traditional training programmes.

In Swat, Charsadda, and Haripur, where there is a significant focus on construction and agriculture, TEVTA may integrate green skills into traditional training programmes. For instance, construction training for masons in Swat (5,555 positions) and agricultural machinery operators in Charsadda (763 positions) should incorporate sustainable practices such as energy-efficient building techniques and solar-powered irrigation systems. By embedding green skills into these high-demand fields, TEVTA can support the development of a more sustainable workforce that aligns with the region's environmental goals and growing demand for eco-friendly solutions.

9. Given the stark gender disparities in sectors like construction (26,492 males vs. 29 females) and renewable energy (12,801 males vs. 29 females).

TEVTA should design and promote targeted training programmes aimed at women in these fields. By providing specialized training in areas such as construction techniques, renewable energy technologies, and technical skills, TEVTA can empower women to enter these traditionally male-dominated industries. Collaborating with local businesses to create internship opportunities can facilitate hands-on experience, making these roles more accessible to women.

10. To combat gender stereotypes and the occupational segregation reported by 26% of respondents.

The provincial government may launch initiatives that challenge traditional perceptions of gender roles in various industries. This can involve community outreach programmes in schools that encourage girls to explore careers in sectors like construction, manufacturing, and technology. Government may also partner with local NGOs and community organizations to raise awareness about the importance of women in diverse roles, promoting a culture of inclusivity and breaking down barriers to entry.

11. With 41% of participants indicating safety as a significant concern, Labour Department must advocate for improved safety protocols in workplaces.

This includes offering training on workplace safety and creating environments that protect employees from harassment and violence. KP Labour Department may work with industry leaders to ensure that safety standards are not only established but actively monitored and enforced.

12. TEVTA may prioritize addressing the significant demand-supply gap in foundational digital skills in Khyber Pakhtunkhwa.

For example, there is a notable shortage of computer operators (gap of 2,410) and basic IT literacy programmes such as Office Automation (gap of 131). These are critical skills for various industries looking to digitize their operations and enhance efficiency. TEVTA may revise its curriculum to offer comprehensive training in computer operations, office software, and data entry. Furthermore, the demand for specialized roles such as Graphic Designers (gap of 919) and Web Designers (gap of 20) suggests the need to introduce targeted digital skill programmes. Expanding these offers will equip the workforce with the essential digital competencies required for both foundational tasks and more specialized roles in the province's growing digital economy.

13. Stark gender disparities exist in sectors like construction (26,492 males vs. 29 females) and renewable energy (12,801 males vs. 29 females.

Significant gaps exist in key technical areas, such as CNC Machine Operators (gap of 89), Programmable Logical Controllers (PLC) specialists (gap of 95), and Solar Inverter Technicians (gap of 3,236), reflecting the province's growing needs in manufacturing and renewable energy sectors. By introducing or enhancing training in these specialized fields, KP TEVTA can help bridge the current skill shortages and better prepare the workforce to support critical sectors like renewable energy and advanced manufacturing. Additionally, collaborating with industry stakeholders for practical experience and certification will ensure that graduates are adequately skilled to meet both local and international standards.

14. TEVTA must urgently introduce specialized training programmes to address critical demand-supply gaps in high-demand occupations with zero supply across Khyber Pakhtunkhwa.

Occupations such as AC & DC Electric Technicians (gap of 1,158), Solar Panel Installation Technicians (gap of 1,117), and Agricultural Machinery Operators (gap of 41) are essential to both traditional and emerging sectors in the province. The renewable energy sector, in particular, presents significant employment opportunities, and TEVTA should prioritize training for solar energy jobs to support Pakistan's transition to cleaner energy sources. Similarly, skilled labor in agriculture and industrial fields — Agricultural Experts (gap of 174), CNC Machine Operators (gap of 89), and Electrical Technicians (gap of 475) — are vital for modernizing industries and enhancing productivity. By addressing these gaps, KP TEVTA can contribute significantly to reduce unemployment while supporting the province's economic development through focused vocational training programmes that match industry needs.

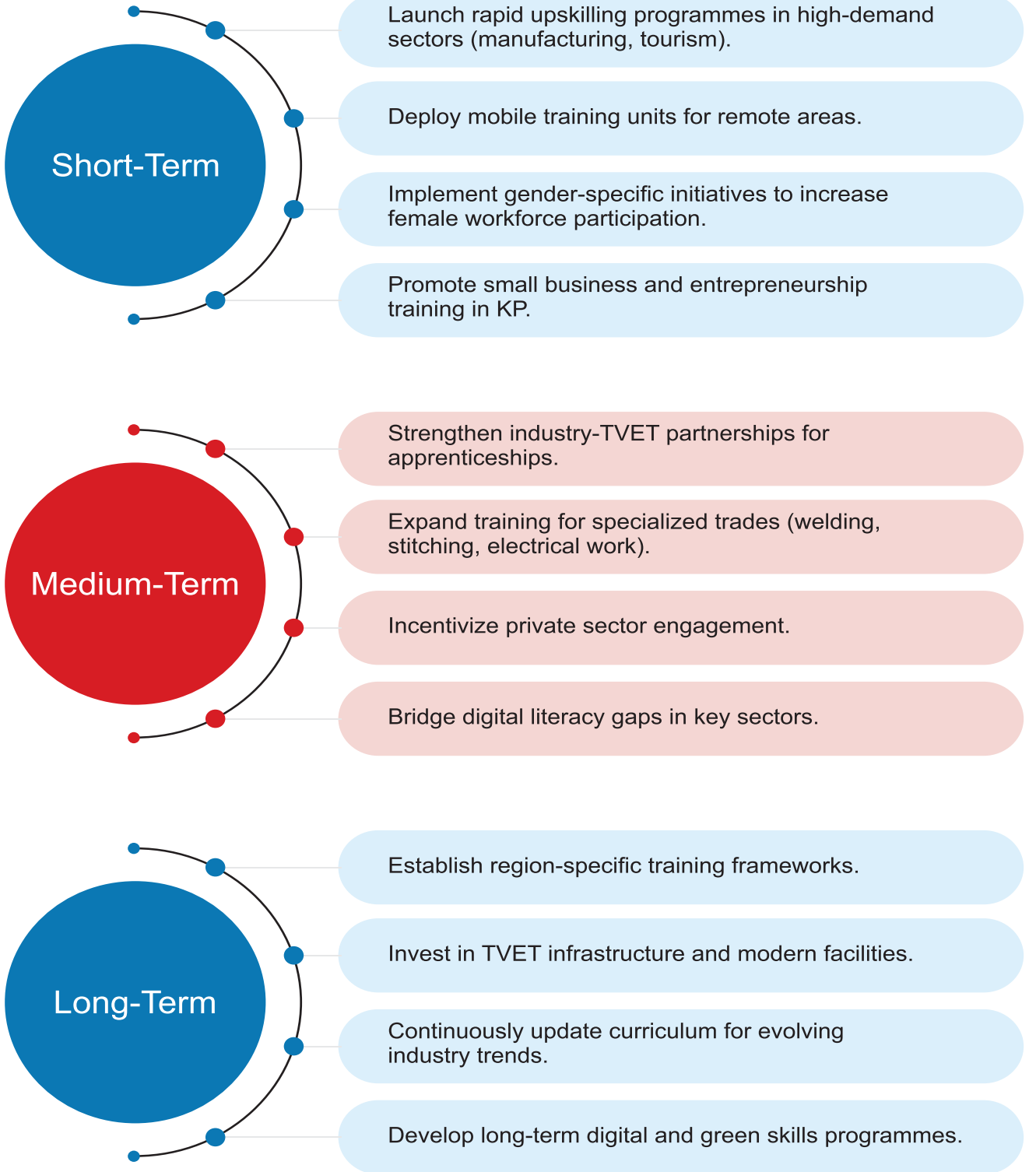
15. There is a need to introduce green skills training, especially in sectors with significant demand and zero supply, such as solar energy, energy efficiency, and sustainable manufacturing.

With a substantial gap in Solar Inverter Technicians (gap: 3,236), Building Electricians specializing in Solar PV systems (gap: 73), and Solar, Wind, & UPS System Assemblers (gap: 402), TEVTA should prioritize green energy-focused vocational programmes. These initiatives will help meet the rising demand for renewable energy technicians and support Pakistan's transition towards sustainable energy. Additionally, HVAC and refrigeration technicians (gap: 392) also present opportunities for TEVTA to incorporate energy-efficient practices within traditional trades. Collaborating with industry and environmental organizations for hands-on training and certifications will ensure that graduates are equipped with necessary skills to succeed in a growing green job market.

16. TEVTA should prioritize the introduction and expansion of training programmes in solar energy technologies across districts such as Peshawar, Nowshera, and Haripur.

The demand for solar panel installation technicians (530 in Nowshera, 165 in Haripur, and 708 in Peshawar) is growing significantly. These districts are experiencing a shift toward renewable energy solutions to meet infrastructure and energy demands. KP TEVTA should develop specialized training modules focused on solar inverter technicians, solar PV systems, and solar electricians to support green energy initiatives. Expanding these programmes will also address the demand for skilled labor in the installation and maintenance of solar technologies, supporting Pakistan's broader transition to renewable energy.

Proposed Action Plan



Annexures

Annex-A

Demand Side Questionnaires

The information given through format will be kept strictly confidential and will be used for research & Planning of National Skills Information System, NAVTTC, Government of Pakistan

Assalam-o-Alaikum,

My name is [Your Name], and I am representing TVET Sector Support Programme which is implemented by GIZ in close coordination with NAVTTC and TEVTAs in Khyber Pakhtunkhwa. The aim of this survey is to bring improvement in Technical and Vocational Education and Training (TVET) programs through identifying skills gaps in various sectors, weaknesses in the current offerings and growth sectors. As part of this endeavor, we are conducting this survey to gain a deeper understanding of the current state of the labor market, skills demand, and the effectiveness of the current TVET initiatives both in the public and private sectors. Your participation in this interview is crucial in helping us gather accurate and relevant information to guide policy planning and program implementation efforts. We greatly appreciate your time, your views and expertise in contributing to this important study."
Your participation in this survey is completely voluntary and there is no payment for your participation. Your answers will be completely confidential and anonymous, meaning that we will not be sharing your answers with others. The answers and views of the survey respondents will be used, analyzed, and reported in an aggregated manner without specifying the names and identities of the respondents.

Please ask if you would like more clarification about the study. You may also like approach the research coordinator of the survey if you have any questions or concerns.

His name is Mr. Himat Ullah. His phone number is 0334-5259088.

Do I have your consent/permission to continue with the interview:

☐ Yes ☐ No

End Interview

Section A
1.0: Basic Information

Name of organization:					
Dated:		Province:		District:	
Email:					
Address of the establishment:					

A 1.1:	Size of the enterprise (establishment) (Select only one answer):
1	Large (250 persons and more)
2	Medium (100–249 persons)
3	Small (10–99 persons)
4	Micro (less than 10 persons)

A 1.2:	Enterprise ownership (Select only one answer):
1	Public
2	Private

A 1.3:	**Legal form of the enterprise** (Select only one answer):
1	Limited liability company
2	Joint-stock company
3	Cooperative
4	Private enterprise
5	Public
6	Another form (write) _____

A1.4:	**In which economic activity does the enterprise operate?**	
A	Agriculture, forestry and fishing	1
C	Textile & Garments	2
D	Hospitality & Tourism	3
F	Construction	4
C	Printing and Packaging	5
J	Information and communication	6
L	Real estate activities	7
M, N	Professional, scientific, technical, administration and support services	8
O, P, Q	Renewable energy	9
R, S, T, U	Other services	10

A 1.5: How many people are currently employed in your establishment (full-time and part-time)?

		Full-time	Part-time
1	Currently (as …., 2023)		
2	Last year (as …., 2024)		

B 2.1. Future Skilled workforce Demand

S.N	Occupation	Levels																				Number/Annum	
		Male										Female											
		1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	Male	Female
1																							
2																							
3																							
4																							
5																							
6																							
7																							
8																							
9																							
10																							
11																							
12																							

B 2.2:	**Does your organization have a quota/reserved seats for disadvantage groups?**

Yes = 1, No = 2

B 2.3:	**If "Yes", please give details in the following table.**

S.N	Occupation	Disadvantage group (minorities/transgender/ elderly)	No. of Seats
1			
2			
3			
4			
5			

Section-B

1	What is your level of satisfaction from the TVET graduate?	3.1: 1= Satisfied, 2= Not Satisfied, 3=Don't Know
2	Does your organization provide any in-house or on-the-job training programs?	1-Yes 2-No
3	If yes, what types of training programs do you offer?	
4	How do you currently assess the skills and competencies of job candidates during the hiring process?	1. Written tests/exams 2. Practical skills assessments 3. Personal interviews 4. Group discussions/activities 5. Other (please specify)
5	Do you have any specific suggestions for improving the quality and relevance of TVET programs?	1. Update curricula to align with industry needs 2. Focus on developing practical/hands-on skills 3. Improve quality of instructors/trainers 4. Enhance industry exposure and internships 5. Other (please specify)
6	If yes, please specify the green skills or environmentally friendly skills relevant to your industry.	1. Energy efficiency practices 2. Waste management and recycling 3. Environmental compliance and regulations 4. Sustainable manufacturing processes 5. digital skills 6. Other (please specify)
7	Do you have any specific suggestions for introducing green skills or environmental skills in TVET programs?	1. Incorporate dedicated courses/modules 2. Integrate concepts across relevant trades/disciplines 3. Practical training in green technologies 4. Collaborations with environmental organizations 5. Other (please specify)

8	If yes, what are the major challenges in hiring or retaining female employees?	1. Workplace policies/culture not conducive for women 2. Lack of flexible work arrangements 3. Occupational segregation and gender stereotypes 4. Safety and security concerns 5. Other (please specify)
9	If yes, what are the major challenges in hiring or retaining employees from disadvantaged groups?	1. Accessibility issues (physical infrastructure, transportation) 2. Lack of supportive policies and reasonable accommodations 3. Social stigma and discrimination 4. Inadequate skills training opportunities 5. Other (please specify)
10	What are the top 3 challenges you face in terms of workforce development and skill acquisition?	1. Skills mismatch between education/training and job requirements 2. Rapidly changing technological landscape 3. Attracting and retaining talented workers 4. Limited training budgets and resources 5. Other (please specify)
11	Do you have any suggestions for improving the overall TVET system in your region?	1. Better coordination between industry, government, and training providers 2. Increased funding and investment in TVET infrastructure 3. Stronger quality assurance and accreditation mechanisms 4. Promotion of TVET as a viable career pathway 5. Other (please specify)

11	Do you have any specific suggestions for promoting greater industry-TVET collaboration?	1. Establish formal industry advisory boards/committees 2. Involve industry in curriculum design and review 3. Facilitate more internship and apprenticeship opportunities 4. Encourage industry contributions (equipment, instructors, funding) 5. Other (please specify)
12	Do you have any specific suggestions for introducing new or emerging technologies in TVET programs?	1. Upgrade equipment and facilities 2. Train instructors on new technologies 3. Collaborate with technology companies 4. Offer specialized courses/certifications 5. Other (please specify)
13	Is there anything else you would like to add or suggest regarding TVET programs and industry collaboration?	1. Yes (please specify) 2. No
14	Does your organization/enterprise have a dedicated training/learning and development department or team?	1. Yes (please specify) 2. No
15	What is your preferred method for identifying and sourcing potential job candidates?	1. Online job portals 2. Print media advertisement 3. Employee referrals 4. Campus recruitment drives 5. Job fairs/career events 6. Other (please specify)
16	Would you be interested in participating in the development or review of competency standards/curricula for relevant trades/occupations?	1. Yes (please specify) 2. No
17	Does your organization/enterprise face any challenges in terms of employee retention and turnover?	1-Yes, if yes, please specify the major reasons_____ 2-No

18	How important are digital/ICT skills for the current and future workforce needs of your organization?	1. Not at all important 2. Slightly important/Of little importance 3. Moderately important 4. Very important 5. Extremely important
19	Do you have any suggestions for enhancing the development of digital/ICT skills in TVET programs?	1. Yes 2. No
20	What are the 3 digital skills you think will be in demand in future	1_____ _ 2_____

Annex-B

Table 8: Occupation-wise seats for disadvantaged group

Occupation	Khyber Pakhtunkhwa
Sweeper	1,750
Packing worker	315
Security guard	273
Office boy	245
General Worker	196
Cook	63
Lab Technician	56
Form labor	49
Washing and cleaning	42
Nurse	35
Receptionist	28
Storekeeper	21
Stitcher	21
Waiter	21
Clerk	21
Telephone operator	21
Computer oprator	14
Record keeper	14
Data entry operator	14
House Keeping	7
Assistant manager logistics	7
CAD operator	7
Medical technician	7
Orthodontic Assistant	7
Attendant	0
Room Services Staff	0
Machine operator	0
Sales man	0
Accountant	0
Helper	0
Skilled Labor	0

Occupation	Khyber Pakhtunkhwa
Cushion Taller	0
Polisher	0
Designer	0
Driver	0
Human Resource	0
Malli (gardeners)	0
Carpenters	0
Cashier	0
Feeders	0
Floor Manager	0
Furniture Polisher	0
Aya	0
Booking counter	0
Grand Total	**3212**

Annex-C
Demand Supply Gap

Table 9: Occupations with excess demand

Occupation	Supply	Demand	Gaps
Architecture Drafting (Manual and Computerized)	14	62	48
Banking	44	171	127
Carpenter	1167	1305	138
Carpenter (G-II)	215	515	300
Civil Surveyor	44	301	257
Cook	212	3656	3,444
DAE Chemical	40	77	37
Driver HTV	50	225	175
Driver LTV	50	1915	1,865
Electronic Technician	119	412	293
Generator Mechanic	293	639	346
Graphic Designer	109	1028	919
Heavy Machinery (Dozier, Shawal, Grader etc.) Operator	398	1168	770
Lab Technician (Industrial)	19	742	723
Machinist (TSC)	13	90	77
Pharmacy Technician	21	837	816
Plumber	1817	2138	321
Receptionist	138	1074	936
Security Guard	144	2094	1,950
Shuttering Carpenter	64	150	86
Solar Inverter Technicians	451	3687	3,236
Web Designing and Development	13	33	20
Welder	885	1376	491
X-Ray Technician	17	695	678

Occupation	Supply	Demand	Gaps
Accountant	3942	1127	(2,815)
Aluminum & Steel Fabricator	70	0	(70)
Arts (Dress Making)	1778	77	(1,701)
Auto CAD	2904	147	(2,757)
Auto Electrician	97	0	(97)
Auto Machanic	2889	72	(2,817)
Basic Computer	2410	0	(2,410)
Beautician	1282	33	(1,249)
Beautician, Skin Care, Hair Styling and Cutting	3164	0	(3,164)
Building Electrician	78	0	(78)
Building electrician-solar PV system	73	0	(73)
Chef	140	0	(140)
Civil Drafting with Auto CAD	119	0	(119)
Civil Draftsman	50	0	(50)
CNC Machine Operator	197	108	(89)
Computer Operator	2560	1891	(669)
Cooking	123	0	(123)
Architecture Technician	43	0	(43)
Auto & Diesel Technician	100	0	(100)
Auto Farm Technician	4	0	(4)
Bio Medical Technician	44	0	(44)
Civil Technician	3293	1429	(1,864)
Computer Hardware Technician	165	0	(165)
Electrical Technician	4687	547	(4,140)
Electronics Technician	281	38	(243)
Food Processing & Preservation Technician	16	0	(16)
Mechanical Technician	1113	602	(511)
Mining Technician	13	0	(13)
Petro Chemical Technician	103	0	(103)
RAC Technician	74	0	(74)
Telecomm Technician	110	0	(110)
Dental Technician	38	0	(38)
Diploma in Business Administration	415	0	(415)
DIT	40521	0	(40,521)

Occupation	Supply	Demand	Gaps
Draftsman Mechanical	25	0	(25)
Drawing & Designing	30	0	(30)
Dress Making & Fashion Designing	340	44	(296)
E-Commerce	1	0	(1)
Electrical Machine Winding Technician	37	0	(37)
Electrical Supervisor	55	0	(55)
Electrician general	2920	2594	(326)
Fashion Design & Dress Making/ Tailoring	1563	1320	(243)
Fashion Jewellery Maker (Beads and Wires)	24	0	(24)
Gemology	31	0	(31)
Gems and Jewellery Sector - Gemstone Carving	74	0	(74)
Gemstones Cutting and Polishing	84	0	(84)
General Mechanic	280	0	(280)
Hand & Machine Embroidery	235	0	(235)
Hand Embroidery	2134	0	(2,134)
Hardware & Network Technician (Networking)	50	0	(50)
Home Appliance Repair & Maintenance	93	0	(93)
HVAC Technician	560	168	(392)
HVCR	281	0	(281)
Industrial Electrician	1862	0	(1,862)
Jewellery CAD-CAM	13	0	(13)
Knitting Machine Operator	22	0	(22)
Leather Garments Pattern Maker	25	0	(25)
Leather Work	2716	0	(2,716)
Machine Embroidery	2364	0	(2,364)
Machinist (G-II)	468	0	(468)
Marble Cutting & Polishing	2234	79	(2,155)
Mason & Tile fixer, Plaster	237	0	(237)
Mechanic Motorcycle	20	0	(20)
Mechanical Technology (Machinist-Turner)	104	0	(104)
Mechanical Technology HVACR	377	0	(377)
Micro Hydal Project Machine Operator	50	0	(50)
Mobile Repair	113	0	(113)
Motor Winding	50	0	(50)

Occupation	Supply	Demand	Gaps
Motorcycle Mechanic	36	0	(36)
Office Automation	131	0	(131)
Office Secretarial Practice	519	31	(488)
P.S.V (LTV)	47	0	(47)
Pipefitter	33	0	(33)
Plumbing cum solar water heating	889	0	(889)
Post Matric	329	0	(329)
Product Designing & CAM Operator	45	0	(45)
Programmable Logical Controller (PLC)	95	0	(95)
Quantity Surveyor	76	47	(29)
Refrigeration & Air Conditioning	787	0	(787)
Revit & Sketchup	14	0	(14)
Rural Poultry	3544	0	(3,544)
Safety Officer	41	11	(30)
Senior Beautician (Women-Men)	462	0	(462)
Solar, Wind & UPS System Assembly	402	0	(402)
Steel Fabricator	2	0	(2)
Surveyor Civil	432	0	(432)
Tailoring	5097	0	(5,097)
Tailoring & Hand embroidery	582	0	(582)
Tailoring & Machine embroidery	44	0	(44)
Tailoring & Machine Knitting	31	0	(31)
Tractor Driver & Mechanic	49	0	(49)
Wood Carving	50	0	(50)
Wood Works	46	0	(46)