

Skills Mismatch and Graduate Unemployment: Aligning Higher Education with CPEC/SEZ-Driven Economic Opportunities in Khyber Pakhtunkhwa



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Abstract: *Khyber Pakhtunkhwa (KP) is facing an economic dilemma as the province has the highest provincial unemployment rate in the latest Labour Force Survey in Pakistan, but has the Rashakai Special Economic Zone (SEZ) as the flagship China-Pakistan Economic Corridor (CPEC) industrial project in the province. This article explores and analyzes the existing gap between the higher education output of KP and the labour needs of the SEZs connected to CPEC, based on the data provided by the Pakistan Bureau of Statistics, with the help of institutional data on SEZs related to CPEC. The findings reveal that although KP has a higher unemployment rate of 9.6% than the national unemployment rate of 7.1%, there was an overrepresentation of graduates in the labour force who are not employed (14.8%) as compared to those who are employed (8.9%). The unemployment rate for technical and vocational training systems in the country was estimated at around 70% above the demand in the industry. Rashakai's enterprises are mostly in light industrial manufacturing, pharmaceuticals and chemical processing, which are more technical and engineering-based than the generalist degrees that make up KP's university enrolment. The article places this in the backdrop of the existing literature on the issue of disconnection between TVET and industry and teacher quality problems in Pakistan, and suggests the detailed curriculum mapping of TVET curriculum, detailed internship pipelines and articulation between TVET and university as practical mechanisms for alignment.*

Keywords: Skills Mismatch, Graduate Unemployment, CPEC, Rashakai Special Economic Zone, Higher Education, Labour Economics, Khyber Pakhtunkhwa

Introduction

Khyber Pakhtunkhwa (KP) is at a rather uncommon economic juncture. On the other hand, the province was the top province in terms of unemployment rate, with a rate of 9.6%, compared to 7.1% for the country in the latest Labour Force Survey, as reported by Geo News (2025) and The News (2025). In comparison, KP has the flagship industrial project of the China-Pakistan Economic Corridor (CPEC) called the Rashakai Special Economic Zone (SEZ), which is currently in Phase I, and several businesses have been approved (The Nation, 2024; Belt and Road Portal, 2025). What is co-existing with high unemployment among graduates and the growing investment in the industrial base is an institutional question that is more institutional than macroeconomic – does KP's higher education sector produce the graduates that the industries that are associated with Rashakai require? This article considers the issue from a labour economics perspective and considers recent trends in the national labour force alongside data on investments and employment in the SEZ, and draws on the general literature on skills mismatch, TVET-industry disconnect and the quality of higher education in Pakistan. The issue of graduate unemployment is not just about a lack of jobs, but also a part of the mismatch between what the universities are teaching and what industrial employers are looking for in CPEC.

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Literature Review

What is clear from international evidence is that skills mismatch is not only a cause of low- and middle-income countries' high unemployment rate, but also a main impediment to youth employment. Technical and vocational education and training (TVET) systems in these countries often do not effectively bridge the gap between training supply and actual labour market demand, which is exacerbated by inadequate learner support, insufficiently provided teachers and a lack of provider incentives (World Bank, 2023). The Pakistan-specific literature on CPEC is to the same effect. However, Bano et al. (2022) revealed that the TVET system in Pakistan is facing challenges of outdated equipment and a lack of trained technical staff, which has made it difficult for local workers to handle the Chinese-supplied machinery at the project sites of CPEC, thereby hampering one of the objectives of CPEC to develop local technical skills. Hassan and Anees (2024) illustrated the magnitude of the mismatch on the national level by demonstrating that Pakistan's TVET placement system is piecemeal, that job postings are very outdated and that employers give very little feedback. They also reported that, in total, training is creating an estimated 70% more labour than is being absorbed by industry in the trades studied in Pakistan. The services, hospitality, mining, and construction sectors have been identified as having a significant degree of skill gap for KP occupations, based on the skill gap data compiled under the National Skills Information System (NSIS), cited by Hassan and Anees (2024), which overlaps with the industrial profile for which Rashakai is being built.

The mismatch is not confined to TVET; it also shows up in discipline-specific, university-level unemployment patterns. Reporting on Pakistani labour research, Dawn found that engineering graduates face disproportionately high unemployment, specifically in KP, while agriculture graduates face elevated unemployment even in agriculturally rich provinces such as Sindh and Punjab, a pattern attributed to low-skilled graduate output and weak quality control in the disciplines Pakistani universities produce ("Why Graduates," 2023). This is consistent with a broader higher-education quality problem documented within Gomal University's own Institute of Education and Research (IER). Haider and Atta (2025), examining teacher professional attitude and effective teaching skills among secondary school teachers in KP, found gendered and qualification-based differences across teaching-competency domains, suggesting that instructional capacity, a key input into how well students absorb applied and technical content, is itself uneven across the system, feeding university intake. Separately, Dilshad et al. (2025), also based at IER Gomal University, compared the instructional effectiveness of AI tools such as DeepSeek and ChatGPT among postgraduate social-science scholars, underscoring that Pakistani higher education is only beginning to integrate the digital and AI literacy that CPEC-era industries increasingly expect of new hires. Taken together, this literature suggests KP's graduate unemployment problem operates on at least three linked levels: an aggregate oversupply of generalist degree-holders relative to technical demand, a discipline-specific mismatch between what is taught and what industry needs, and an instructional-quality gap limiting how well relevant coursework translates into employable skill.

Regional Economic Opportunity: CPEC and the Rashakai SEZ

The Special Purpose Vehicle arrangement (SPV) for the development of Rashakai SEZ is between Khyber Pakhtunkhwa Economic Zones Development and Management Company (KP-EZDMC) and China Road and Bridge Corporation (CRBC) in Nowshera district, approximately 90 kilometres away from Islamabad and 60 kilometres from Peshawar on the M-1 motorway (The Nation, 2024; Belt and Road Portal, 2025). The first phase of the zone, covering over 1,000 acres, was to include electronics, electrical appliances and automobile-related manufacturing among its industries; several enterprises have already arrived in the zone, including electric bike and scooter producers and medicine, sulphuric acid, electric cable and pharmaceutical manufacturers, with an electric bike and scooter producer in late-stage negotiation (KPBOIT, n.d; Belt and Road Portal, 2025). In theory, 80% of the jobs at the zone are for local KP residents (Belt and Road Portal, 2025), and this should reflect directly in the number of KP graduates that are placed. Meanwhile, a separate piece of commentary on KP's portfolio of SEZs (excluding the long-running Hattar Economic Zone) warns that industrialization has progressed at a lower pace than initially designed, and that Rashakai's own

development has “slipped at various stages before settling into a pace” (The Nation, 2024). It dampens the enthusiasm in the investment numbers, which cheered on in the headlines, and highlights the execution risk as well as the opportunity.

Table 1

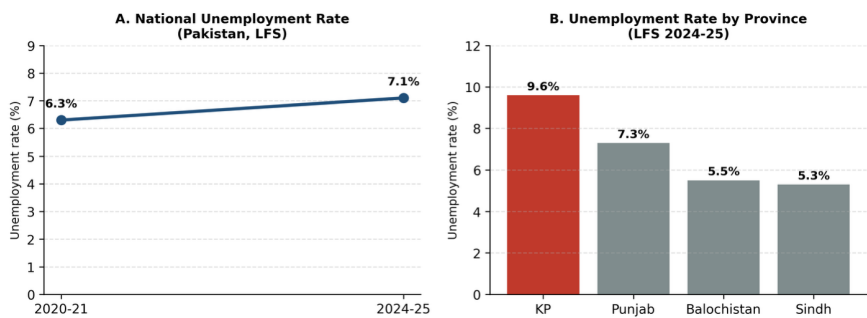
Indicator	Detail	Source
Location	Nowshera district, KP; ~90 km from Islamabad, ~60 km from Peshawar, adjacent to M-1 motorway	Belt and Road Portal (2025); The Nation (2024)
Managing entities	Joint Special Purpose Vehicle between KP-EZDMC and China Road and Bridge Corporation (CRBC)	The Nation (2024); Belt and Road Portal (2025)
Total planned area	More than 1,000 acres, developed in phases	KPBOIT (n.d.)
Target industrial sectors	Electronics, electrical appliances, automobiles, and related manufacturing	KPBOIT (n.d.)
Enterprises approved to date	Includes medicine, sulphuric acid, electric cable, and pharmaceutical manufacturers; an electric bike/scooter producer in late-stage negotiation.	Belt and Road Portal (2025)
Local hiring commitment	80% of jobs reserved for KP residents under the CRBC–KP-EZDMC agreement	Belt and Road Portal (2025)
Implementation status	Advancing but historically uneven; KP's broader SEZ portfolio, apart from the long-established Hattar zone, has industrialized more slowly than planned.	The Nation (2024)

The employment opportunity provided by Rashakai is thus sector-specific, while the technical skills that are needed in industry, electricity, chemicals, pharmaceuticals and light manufacture are in greater demand than the general BA/BSc and social science degrees being pursued by the overwhelming majority of students at KP universities. The contribution of higher education to the province's output within this sectoral profile is an empirical question, which will be discussed in the following section in the context of the province's higher education output.

Graduate Unemployment and Skills Mismatch: Empirical Evidence

The most recent national benchmark is given by the Labour Force Survey (LFS) 2024-25 conducted by the Pakistan Bureau of Statistics (PBS). The overall unemployment rate for Pakistan in 2024-25 increased to 7.1% from 6.3% in 2020-21, which led to an increase in the number of unemployed people from 4.51 million to 5.9 million (Geo News, 2025; The News, 2025). In the country, KP had the highest unemployment rate of 9.6%, followed by Punjab (7.3%), Balochistan (5.5%) and Sindh (5.3%) (Geo News, 2025). Despite KP's labour force in employment expanding by 2.39 million people during the period of employment growth, the employment has not been able to match the growing size of the credentialed labour force (The News, 2025).

Figure 1



The figures for graduates are more specific. In relative terms, a person with university qualifications is over-represented among the jobless in Pakistan, with 14.8% of the unemployed and 8.9% of the employed people having such qualifications (The News, 2025). This is not just about the mismatch in abstract terms because it is observed that Pakistan produces about 70% more labour than the industry needs in the TVET training pipeline on just the categories of occupations studied by Hassan and Anees (2024).

Figure 2

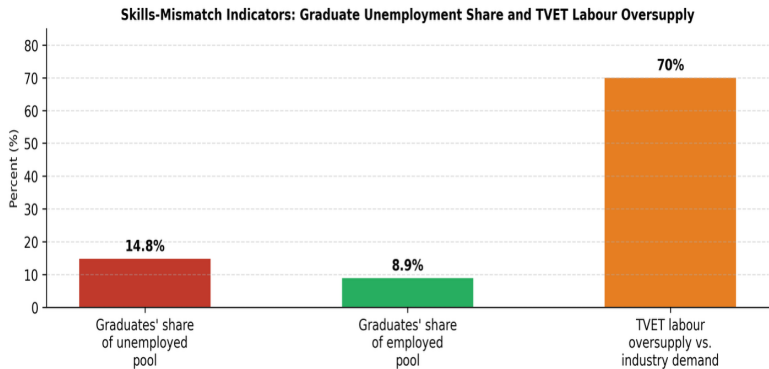


Table 2

Indicator	Value	Source
National unemployment rate, 2020–21	6.3%	PBS (2025)
National unemployment rate, 2024–25	7.1%	PBS (2025)
KP unemployment rate, 2024–25 (highest of all provinces)	9.6%	Geo News (2025)
Punjab / Balochistan / Sindh unemployment rate, 2024–25	7.3% / 5.5% / 5.3%	Geo News (2025)
Graduates' share of the unemployed population	14.8%	The News (2025)
Graduates' share of the employed population	8.9%	The News (2025)
TVET labour oversupply relative to industry demand	~70%	Hassan & Anees (2024)
KP-recognised universities / degree-awarding institutions	25	HEC (2023)
National university graduate output, per year	~445,000	Pakistan Today (2025)

Two additional pieces of information further restrict the diagnosis to a true skills mismatch and away from pure oversupply. There are two other pieces of information that further narrow the diagnosis to a real skills mismatch and not just pure oversupply. First, it is not that engineering graduates are more likely to be unemployed than other disciplines, but that engineering graduates are more likely to be without work in KP, even though engineering is nominally the discipline with the most industrial orientation, whereas, agriculture graduates are more likely to be jobless even in agriculturally strong provinces, indicating that not enough jobs are available, or that there are problems with the quality of the education and/or the currency of training ("Why Graduates," 2023). Second, the National Skills Information System data compiled at the sector level indicates that there are specific skills gaps in the services, hospitality, mining, and construction industrial and skills-based trades, many of which are adjacent to or overlap with the industrial and logistics ecosystem of a functioning Rashakai SEZ, which would be required to be staffed (as cited in Hassan & Anees 2024). KP's base is significant enough to be considered here, and the province has 25 universities and degree-granting institutions that are recognized by the Higher Education Commission (HEC, 2023), with an annual output of approximately 445,000 graduates, primarily in the fields of general arts, humanities and business, which is

still not addressed in provincial plans that prioritize applied engineering, industrial technology and technical-trade programmes.

Discussion: The Alignment Gap

The evidence gathered here suggests that there is a specific and addressable misalignment and not an irreconcilable labour shortage. So far, the approved enterprises in Rashakai are mainly in chemical processing, pharmaceuticals, manufacturing of cables, and light industrial assembly, which are occupations that involve industrial chemistry and engineering (either electrical or electronics), industrial management, and applied technical training, rather than the more generic social-science and humanities degrees that are seeing higher rates of enrolments at many KP-based institutions (Belt and Road Portal, 2025). This is relevant to Bano et al's 2022 finding that Pakistani technical workers have been unable to use Chinese machinery provided at CPEC projects, and that it could therefore be said that in cases where technical programmes are available, it does not necessarily lead to workers being job-ready. This quality dimension relates to Haider and Atta's (2025) research on the uneven professional competence of teachers in KP's teaching workforce, as the pipeline leading to university-level technical programmes is already compromised before students arrive at a Rashakai-relevant classroom if there is an uneven level of teacher professional competence in fundamental STEM and technical subjects. Likewise, Dilshad et al. (2025) reported slower and less even uptake of AI instructional tools for KP's higher education sector, implying that this sector is still establishing a digital-literacy ground floor required by employers that have become technology-transferring and expect digital literacy as an expectation, not a specialization.

None of this means that Rashakai can, or should, take over KP's graduate unemployment problem, however, the employment potential of the zone is limited by the number of graduates the zone can produce, the number of phases of development it has, and the number of enterprises it can host, and the 80% local hiring rate in the zone (Belt and Road Portal, 2025) only translates into graduates being absorbed if KP's education output matches the demand for occupations within the SEZ. The main policy message is therefore that of aligning mechanisms, curriculum mapping, internships linked to the employers, and institutional coordination, but not merely on the question of increasing or decreasing enrolment.

Policy Recommendations

The evidence above indicates that four specific, low-cost interventions deserve attention first by KP's higher education planners and KP-EZDMC:

- Develop SEZ-linked curriculum mapping by HEC-affiliated universities in KP involving KP-EZDMC and HR at the enterprise level in Rashakai: Engineering courses, industrial technology courses and applied science courses should be mapped with the occupational profile of approved and pipeline enterprises in Rashakai, such as Medicine, Sulphuric acid, Electric cables technology, Pharmacy and prospective electric vehicle manufacturing, and changes should be made in elective and lab content.
- Structured, credit-bearing internships: A mandatory internship requirement in relevant BS and diploma programmes to be implemented with specific enterprises in the Rashakai, coordinated by KP-EZDMC, would enable the 80% local hiring policy to become a real placement programme for graduates.
- TVET university articulation pathways: Given that TVET oversupply coexists with graduate-level skills gaps (Hassan & Anees, 2024), KP institutions should build 2+2-style articulation pathways that let strong TVET diploma-holders progress into applied bachelor's programmes aligned with SEZ-relevant trades, rather than treating TVET and university tracks as parallel, disconnected systems.
- Faculty and instructional modernization: Following the concerns raised by Haider and Atta (2025) and Dilshad et al. (2025), targeted faculty development in both technical-subject pedagogy and AI-assisted instructional tools should be prioritized in institutions feeding Rashakai-relevant disciplines, since curriculum reform without the instructional capacity to deliver it is unlikely to close the mismatch.

Conclusion

KP's coexistence of the country's highest provincial unemployment rate and one of CPEC's flagship industrial zones is not a contradiction so much as a coordination failure. The data reviewed here show graduates over-represented among the unemployed, TVET systems structurally oversupplying relative to industry need, and discipline-specific mismatches that persist even in fields nominally aligned with industrial demand. The ongoing development of Rashakai is a clear, geographically based opportunity to determine whether a combination of targeted curriculum alignment, internship pathways, and TVET-university articulation can turn a part of KP's graduate surplus into meaningful employment in the SEZ. That will involve KP's higher education institutions, HEC, and KP-EZDMC to view Rashakai not just as a project for investment, but as a driver for labour-market planning and decision-making that will influence the content and approach of the province's universities' educational programs.

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