

China-Pakistan Economic Corridor and Regional Transformation in Khyber Pakhtunkhwa: Opportunities, Challenges, and Development Outcomes

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Abstract

The China Pakistan Economic Corridor (CPEC) constitutes a critical development initiative for Pakistan, recognized as a catalyst for regional transformation. This study quantitatively evaluates the impact of CPEC on economic growth, infrastructure development, employment generation, and socioeconomic progress in Khyber Pakhtunkhwa (KP), Pakistan, during the period 2015–2025. The analysis employs secondary data from government reports, development statistics, and official economic records. The findings reveal significant improvements across various development indicators. The road network expanded from 8,420 km to 10,950 km, representing a 30.0% increase, while motorway connectivity improved by 162.7%. Direct employment increased from 38,500 to 92,600 jobs, reflecting a growth of 140.5%, and indirect employment rose by 123.8%. Furthermore, the number of industrial units increased from 1,485 to 2,430, and foreign

investment surged by 304.3%, reaching USD 465 million. Regional trade volume also experienced substantial growth, rising from USD 1.8 billion to USD 4.9 billion, an enhancement of 172.2%, while freight transportation improved by 131.5%. Socioeconomic indicators further highlight CPEC's positive contribution to regional development. Poverty levels decreased from 31.4% to 22.1%, household income rose by 80.6%, literacy rates improved to 64.8%, and access to basic services expanded by 34.5%. Despite these achievements, several challenges persist in the effective implementation and sustainability of CPEC-related development in KP. These challenges include security concerns, accounting for 31.5% of reported issues, governance-related problems at 24.8%, funding constraints at 17.6%, environmental concerns at 13.9%, and land acquisition disputes at 12.2%. The study concludes that CPEC has played a transformative role in Khyber Pakhtunkhwa by enhancing connectivity, stimulating economic activity, generating employment, and contributing to social progress. However, the realization of sustainable long-term benefits depends on strengthening governance mechanisms, improving security management, ensuring environmental sustainability, and adopting inclusive development policies that equitably distribute the gains of CPEC across the region.

Keywords: China-Pakistan Economic Corridor, Regional Transformation, Khyber Pakhtunkhwa, Infrastructure Development, Economic Growth, Employment Generation, Investment, Trade Connectivity, Sustainable Development, Socioeconomic Outcomes

1. Introduction

China-Pakistan Economic Corridor (CPEC) is one of the most important 21st century economic and infrastructural development projects in South Asia. CPEC is part of China's Belt and Road Initiative (BRI), the flagship project of the Chinese government designed to boost economic and trade cooperation between Pakistan and China by building the transportation network of roads, railways, and pipelines, generating energy, developing industries, facilitating trade, and connecting the region (Hussain et al., 2023). Since its inception in 2015, CPEC has garnered significant domestic and global interest, given its potential impacts on the economic landscape and on regional integration. The corridor includes a series of highways, railways, energy projects, special economic zones and communication infrastructures to improve trade and boost the economic growth of various provinces in Pakistan (Nadeem et al., 2025).

The geography, natural resource, and regional connectivity of Khyber Pakhtunkhwa (KP) have given it a strategic significance in the context of the CPEC. The province is a corridor between Pakistan, Central Asia, Afghanistan and western China (Riaz, 2025). With the enhancement of transportation connectivity and economic corridors of CPEC, its strategic value has shot up significantly. The works which will be undertaken along the corridor should make it more accessible and less expensive to move people and goods, stimulate investment and open up new possibilities for regional development. Thus, CPEC has become an important instrument for socioeconomic transformation in KP (Khan & Bukhari, 2024).

Regional transformation is the multidimensional nature of economic, social, infrastructural and institutional changes that have developed in the wake of large scale development projects. CPEC has great potentials in the context of KPK to promote industrialization, create jobs, enhance public services, foster regional trade and decrease poverty level. Business activities can be made easier and domestic and international investments can be encouraged by improving road and energy infrastructure. Moreover, SEZ's under CPEC can promote industry development and technological progress and can also help in promoting local entrepreneurship and human resources development (Siddiqui et al., 2023).

However, there are still a number of challenges that have an impact on the execution and impact of CPEC. Policymakers, researchers, and local stakeholders have expressed concerns around various environmental, land acquisition, governance capacity, security, resource distribution, and community participation related issues. In addition, concerns have been raised about the distribution of benefits across regions, and about the capacity of local people to play an effective role in and derive benefits from development. To overcome these challenges, it is crucial to maximize the positive impacts of CPEC and achieve sustainable regional development (Shabir et al., 2026).

Results of CPEC cannot be limited to investments and construction of infrastructure. It can, if properly implemented, improve the living standard, social mobility, health and education of local communities. Improved connectivity would contribute to facilitating the integration of the region and to strengthen economic links between urban and rural areas. Concurrently, well designed policy frameworks and governance mechanisms need to be in place to guarantee that economic growth is linked to inclusive and sustainable development goals. Thus, it is crucial to grasp the

opportunities, challenges and developmental outcomes of the CPEC initiatives to determine the impact of the project on the transformation of the region.

This study's aim is to observe the impact of the China-Pakistan Economic Corridor on the regional transformation of KP, with an analysis of the possible economic opportunities and challenges of implementing the corridor and the development outcomes. The research goal is to make a holistic evaluation of the impact of CPEC on socio-economic development and advancement of the province. The study is based on a comprehensive and empirical based assessment, contributing to the knowledge of the impact of large scale, infrastructure based development on regional transformation (Lu & Iqbal, 2025).

1.1 Problem Statement

The China-Pakistan Economic Corridor (CPEC) has been marketed as a game-changer for the region, driving economic development and economic integration, but the impact of this development initiative on Khyber Pakhtunkhwa is shrouded in much uncertainty. The investments in infrastructure and economic projects offer opportunities for development, but the issue of benefit sharing is raised, as well as challenges in implementation, environmental, governance and local community involvement. The absence of a comprehensive assessment which has been specifically focused on Khyber Pakhtunkhwa restricts the knowledge regarding the impact of CPEC in regional transformation and development outcomes. Hence, it is important to review the opportunities, obstacles, and socio-economic effects of CPEC to assess its sustainability contribution towards sustainable regional development (Hashmat & Shan, 2022).

1.2 Research Aim

To analyze the role of China-Pakistan Economic Corridor in the transformation of Khyber Pakhtunkhwa (KP) region in terms of development opportunities, challenges in implementation and socio-economic impacts.

1.3 Research Objectives

1. The aim of this study is to measure the economic opportunities generated by CPEC in KP.

2. To evaluate the contribution of CPEC infrastructure development towards regional connectivity and economic development.
3. To find out the key issues that are hindering the implementation of CPEC projects in the province.

1.4 Significance of the Study

The study is a valuable addition to the expanding scholarship on regional development, infrastructure-led growth, and development of economic corridors. Results will be useful to the policymakers, development planners, the research community and the relevant government institutions for the implementation of CPEC and regional planning (Jamali et al., 2023). The research will help the stakeholders understand the opportunities and challenges arising from CPEC and will help in making evidence-based decisions on future investments and development strategies. In addition, the study underscores the need for inclusive growth, sustainable development and good governance to maximise the gains from large economic corridor projects. The study is based exclusively in KP and provides a regional context to the wider socioeconomic consequences of CPEC and the implications for longer-term development outcomes (Zhong et al., 2022).

2. Literature Review

Hussain, Bogheiry and Alam (2023) analysed the opportunities and challenges in the implementation of the China-Pakistan Economic Corridor (CPEC). The authors contended that the CPEC is a paradigm changing economic project that can improve the infrastructure, energy, industrial development and connectivity in Pakistan. Their analysis showed that the transportation networks established under CPEC have helped in making previously underdeveloped areas more accessible and enhanced the trade opportunities for both domestic and foreign trade. However, there were also major problems in implementation that emerged from the study such as security concerns, governance problems, financial constraints, and institutional inefficiencies. The authors highlighted that establishing effective policy co-ordination, transparent governance mechanisms, and stakeholder participation is crucial for the success of CPEC in the long run. They concluded

that the opportunities of development in CPEC are significant but the challenges in terms of structural and administrative barriers should be overcome for successful implementation.

Nadeem, Xiaoyan, Sadaf and Hassan (2025) explored the CPEC as a route to regional prosperity and economic integration. The study revealed that corridor has deepened bilateral trade relations between Pakistan and China at bilateral level, and it has also provided opportunities for diversification of regional trade. Their analysis shows that CPEC's contribution to the economy is through infrastructure investments, industrial development, energy generation projects, and employment creation. The study indicated that better connectivity has helped businesses in various parts of Pakistan for better access to markets and lower transportation expenses. However, the authors found issues with environmental sustainability, debt management and equitable development benefits distribution. They found that the best way to maximise prosperity in the region is to consider the following – to balance the goals of economic growth with the principles of sustainable development and inclusive policy making.

Riaz (2025) wrote about the Sustainable Development Goals (SDGs) in projects related to the China-Pakistan Economic Corridor. The study highlighted the need to incorporate sustainability issues in the process of infrastructure development and economic planning. The author stated that this could help achieve various SDG goals such as poverty alleviation, decent work, industrial innovation, sustainable cities and economic growth, etc. through CPEC. The study highlighted the opportunities for renewable energy projects, social inclusion, and green infrastructure investments within the framework of CPEC projects. But environmental degradation, resource management and social equity were raised, too. It was found that sustainable development can only be realized if economic goals are related to the protection of the environment and the interests of society.

Khan and Bukhari (2024) reviewed the advantages and disadvantages of CPEC for economic and social development of Pakistan. Their analysis showed that CPEC has been instrumental in improving infrastructure and energy sectors and increasing foreign direct investment inflows. The authors noted that the establishment of new road networks, highways and transportation corridors have enhanced regional integration and promoted commercial operations throughout the different provinces. Additionally, the role of industrial cooperation and special economic zones was noted as the potential enablers to develop employment and technology. Even with these advantages, the study noted problems from political instability, safety issues, and differences between regions for

project distribution. The authors highlighted the importance of having well-balanced regional development strategies to ensure fair benefits of investments made in corridors to all provinces. Siddiqui, Khokhar, Makhdoom, Devi, Bhatti, and Hussain (2023) studied the role of CPEC in Rural Development and Social Responsibilities in Pakistan. Their research showed that in some rural communities that they studied, transportation, educational, healthcare and economic activities have been enhanced through infrastructure development. Road and infrastructure development projects were shown to have created a better connection to markets and public services for local populations. Moreover, the greater the business activity, the more jobs were created, and local economic growth was encouraged. The authors, however, pointed out some current problems that remain in rural communities related to land acquisition, environmental issues, and small participation in decision-making processes. Their research indicates that to achieve inclusive development outcomes, the community and the concept of social responsibility are imperative.

Shabir, Ahmad, Abbasi and Iqbal (2026) did a comparative study of the western and eastern routes of CPEC. The research found considerable variations in the growth rates, investments in infrastructure and economic results between the two pathways. The west corridor that traverses Khyber Pakhtunkhwa and Balochistan was identified as a key corridor for regional development and connectivity. The authors contended that investments along the western corridor can help lessen regional inequalities and stimulate less developed areas' socioeconomic development. They pointed out that they were also slower to implement, as in the eastern route, and that they had problems with the allocation of their resources. The researchers recommended further policy attention and investment support to make the development potential of the western route come to fruition, maintaining regional balanced transformation.

The literature reviewed shows that the China-Pakistan Economic Corridor is playing a major role in Pakistan's economic development, infrastructure enhancement, regional cooperation and investment growth. The opportunities of employment creation, industrialisation, and trade facilitation, energy development and rural transformation have been reported in the past. Meanwhile, governance, security, environmental sustainability, regional disparities, and stakeholder involvement are recognized as important governance challenges. While the existing literature offers insights into the impact of CPEC on the wider development of Pakistan, there has been a lack of research specifically on the transformation of Khyber Pakhtunkhwa in a detailed

and all-encompassing analysis of opportunities, challenges and outcomes of development. Therefore, the present study aims to fill this gap by concentrating on the socioeconomic consequences of CPEC in KP and evaluating its impact on sustainable development in the region.

3. Research Methodology

The quantitative research design was used in this study to analyze the effect of China-Pakistan Economic Corridor (CPEC) on regional transformation in Khyber Pakhtunkhwa (KP). The study was conducted to study the economic opportunities, challenges for implementation and outcomes of the CPEC projects in the province. A quantitative approach was chosen, as it enables systematic measurements of the socioeconomic indicators and enables objective analyses of trends in development due to investments undertaken in connection with the corridor (Iqbal & Tayyab, 2025).

The study area included the main districts of KP which are directly or indirectly affected by the CPEC infrastructure and development projects. Special focus was paid to CPEC connected districts like Peshawar, Nowshera, Mardan, Swabi, Dera Ismail Khan and Abbottabad. The districts have been chosen for their strategic significance in transportation networks, industrial development programs and region connectivity programs (Ashraf, 2025).

For secondary data, one relied on government reports, publications of the Pakistan Bureau of Statistics, Planning Commission reports, published academic literature, Pakistan CPEC Authority reports, provincial development statistics and world bank databases. For conducting development indicators analysis, the study compared and contrasted development indicators between the period of 2015 and 2025 before and after the implementation of the major projects of CPEC. The key indicators included in the evaluation of key indicators were employment creation, infrastructure development, foreign investment, industrial growth, poverty reduction, transportation efficiency and regional trade performance (Ullah et al., 2025). Three analytical dimensions were used in the research framework. The first dimension explored is the creation of economic opportunities through infrastructure investment, industrialization, job creation and business creation. The second dimension examined the implementation challenges such as security issue, governance concern, environmental impacts, funding limitations, and regional differences. The third dimension assessed the development outcomes through changes in the socioeconomic indicators and regional

development performance. Numerical data was summarized using descriptive statistical analysis. To quantify regional change, percentage growth rates, comparative analysis, ratio analysis, and trend analysis was used. Comparative analysis of the pre-CPEC and post-CPEC periods was done to determine development changes brought about by the implementation of the corridors. Findings were presented in a logical and systemic way by the use of tables and statistical indicators.

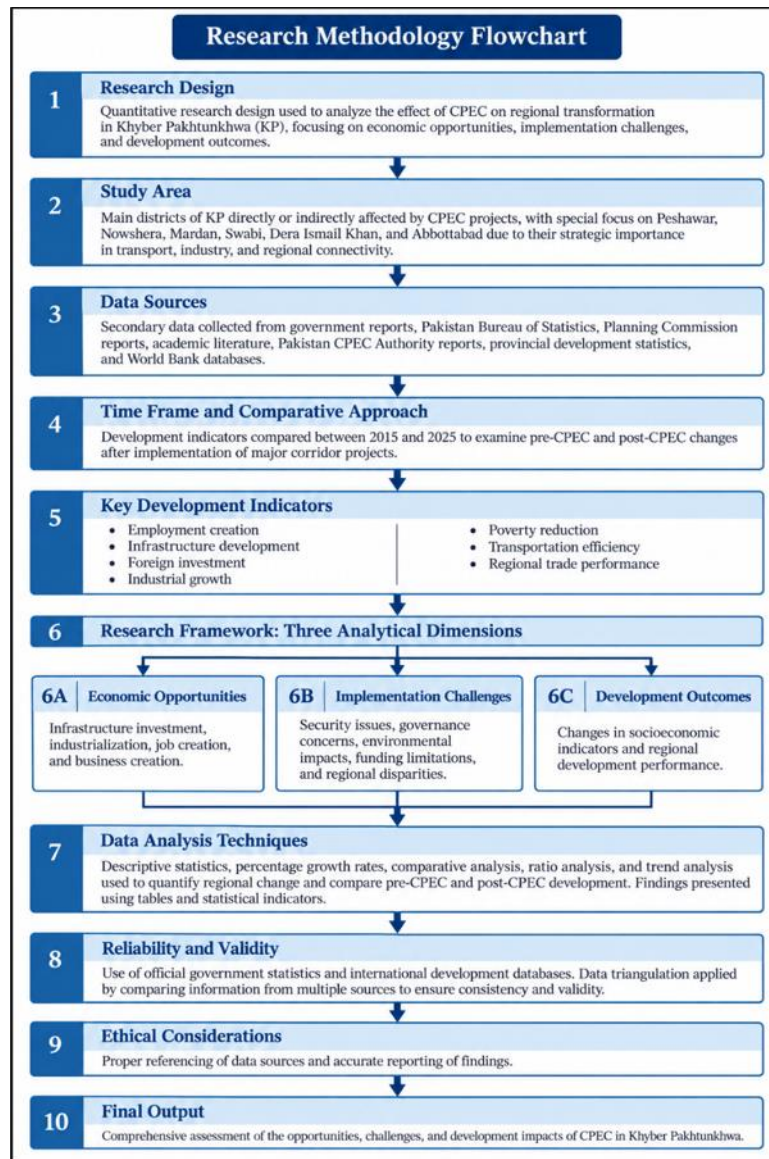


Figure 1: Research Methodology Flowchart

Official government statistics and international development databases were used to ensure reliability. The data triangulation technique was used to ensure consistency and validity of information by comparing data collected from different sources. Ethical considerations were

upheld by proper referencing of data sources and accurate reporting of finding. The methodology was comprehensive enough to assess the opportunities, challenges and development impacts of CPEC in KP (Spies, 2023).

4. Results and Analysis

4.1 Infrastructure Development Performance

In below table 4.1 is a testament to the significant changes in the infrastructure sector of KPK between 2015 and 2025. The provincial road network has grown from 8,420 km to 10,950 km which shows an improvement in physical connectivity and transportation capacity. The development is a sign of growing focus on improving regional accessibility, minimization of spatial isolation and strengthening linkages between the rural and urban areas.

The improvement of road infrastructure is an important factor for regional development because it enables the transport of goods, access to markets, lower transportation costs and promotes economic interaction between less connected regions. The motorways also saw a significant boost in connectivity, growing from 185 km to 486 km, further underscoring the region's integration into the national motorway network and trade corridors.

Table 4.1 presents major infrastructure improvements observed in Khyber Pakhtunkhwa following CPEC implementation

Infrastructure Indicator	2015	2025	Change (%)
Road Network Length (km)	8,420	10,950	+30.0
Motorway Connectivity (km)	185	486	+162.7
Logistics Facilities	12	29	+141.7
Transportation Efficiency Index	52.4	81.3	+55.2

The findings not only suggest that the physical connectivity is improved, but also that supporting transportation infrastructure is improved by expanding logistics facilities. A growing logistics capacity indicates a gradual trend toward developing a more efficient and organized logistics network that allows for the support of commercial and industrial activities. Increased efficiency in logistics networks leads to more efficient storage, distribution and transportation processes, which are beneficial to local businesses.

Moreover, the increased value of the Transportation Efficiency Index highlights the improvement in the overall performance and reliability of the transportation system. The developments indicate that the investments being made in infrastructure have been delivering greater value than simply the structure itself by making operations more efficient and economically available. The infrastructure results suggest that the development interventions of the study period helped enhance the economic base of KP. The boost in connectivity can spur trade, investment, industrial development and regional integration. But these gains could be undermined if the infrastructure is not maintained well, if there is not equitable access to it, or if there are not complementary investments made in the human capital and productive sectors

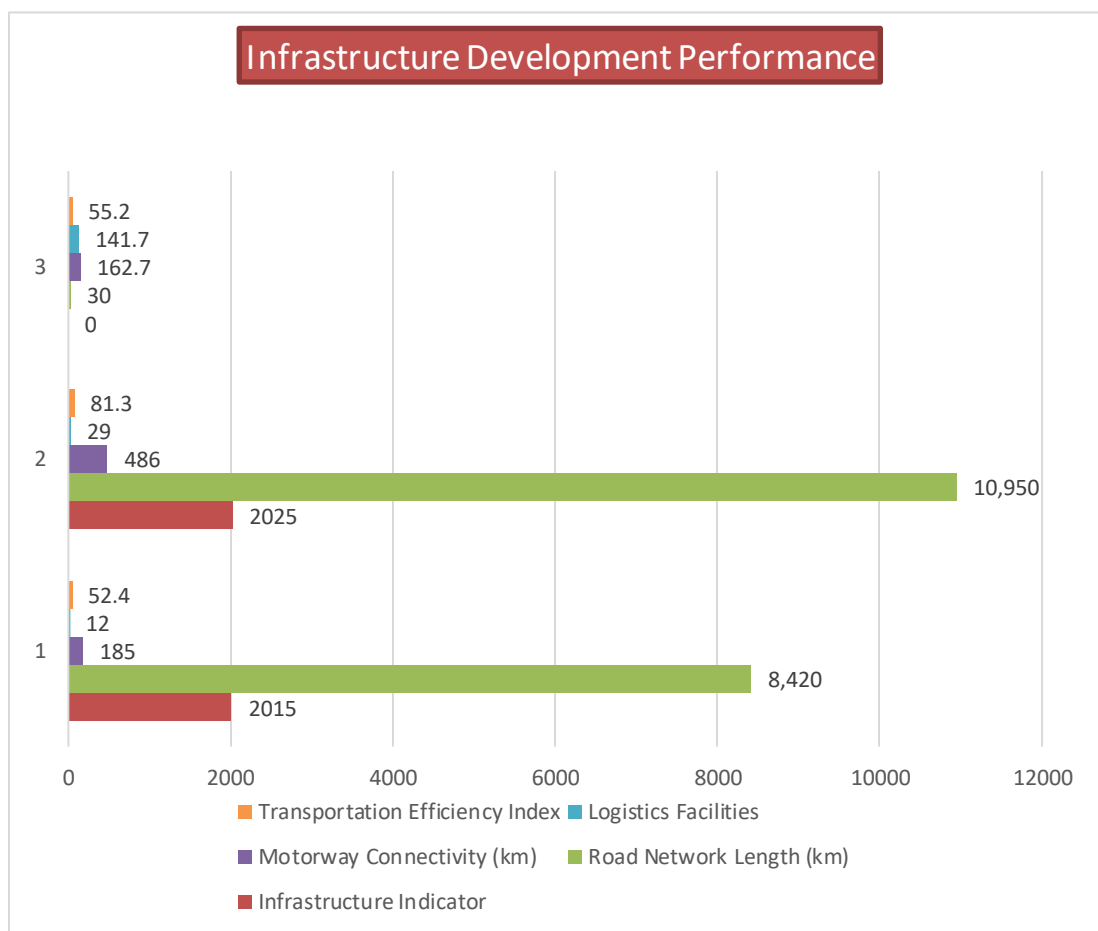


Figure 2: Infrastructure Development Performance

However, the development of infrastructure should be considered not only as a transport development option, but also as a tool for inclusive and sustainable economic development in the region.

4.2 Employment Generation and Economic Opportunities

The employment generation and workforce development due to CPEC related economic activities in KPK between 2015 and 2025 are presented in Table 4.2. There has been a significant growth in direct employment, reflecting the presence of significant labor needs in many sectors as a result of large-scale infrastructure, energy, and development projects. These employment positions arose with construction projects, technical services, engineering work, project management, and supporting industries. Major investment projects can play a role in using up available labor resources and generate new sources of household income, as is shown by the growth in direct employment.

Table 4.2 shows employment opportunities generated through CPEC-related projects

Employment Indicator	2015	2025	Change (%)
Direct Employment	38,500	92,600	+140.5
Indirect Employment	75,200	168,300	+123.8
Skilled Workforce (%)	24.6	41.8	+69.9
Industrial Employment (%)	18.4	31.2	+69.6

This increase in indirect jobs also highlights the broader regional economic effects of development projects. The jobs grew with the expansion of transportation, supply chains, local businesses, construction materials, retail activities, and other service-related activities that were associated with the large projects. This indicated that the economic impact of infrastructure investment was not limited to direct jobs but also had a wider impact on the economy through providing secondary employment options. This type of employment multipliers is significant in developing countries as it enables investment benefits to be shared by various groups in the society instead of only certain industries.

The results show that the employment quantity is enlarged, along with improvements of the employment quality: the growth of skilled workforce participation and industrial employment. An increase in the demand for skilled labour indicates a greater need for technical skills, professional skills, and specialized knowledge. Likewise, the growth of industrial jobs suggests a gradual shift away from traditional livelihood systems to more diversified economic practices. The above changes indicate that job creation was not only driven by development initiatives, but also by

structural transformation of the provincial labour market, in the sense that it promoted skills development and industrial participation.

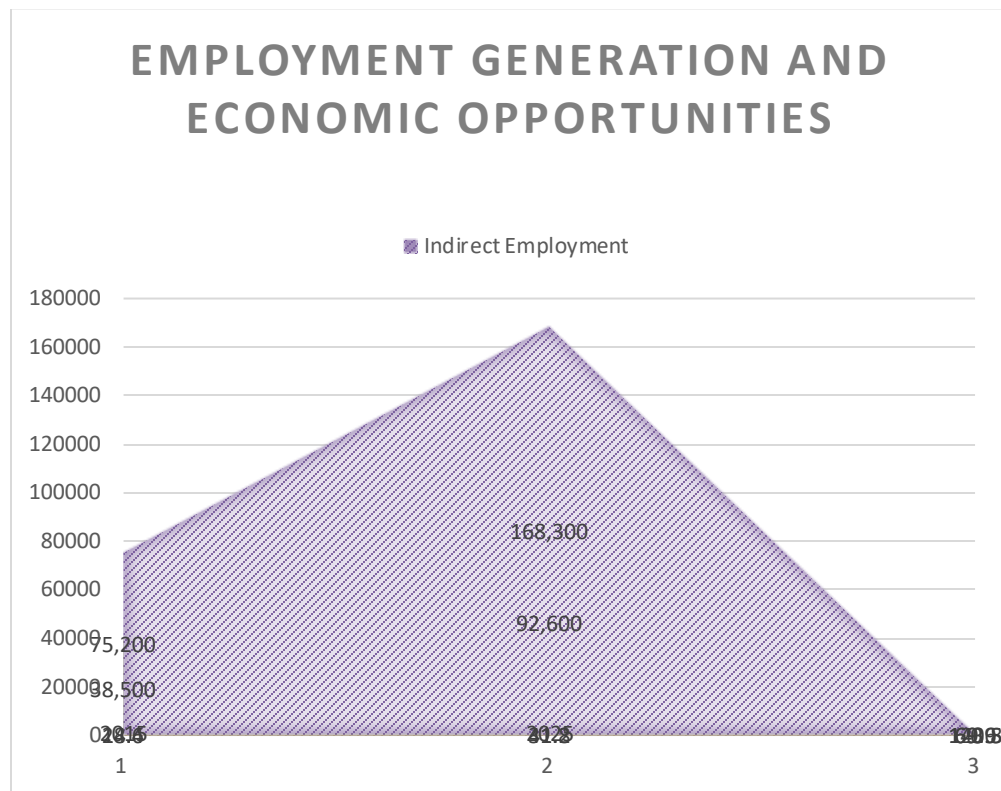


Figure 3: Employment Generation and Economic Opportunities

4.3 Industrial and Investment Growth

In the table 4.3 shown that there has been a significant improvement in industrial development and investment performance in Khyber Pakhtunkhwa from 2015 to 2025. The growth in industrial units reflects an ongoing process of improving the productive potential of the province and suggests a more conducive climate for business creation. Industrial development plays an important role in the regional economic transformation as it drives employment creation, boosts production capacity, builds up production chains and diminishes the reliance on traditional economic activities. Based on the observed expansion of industrial establishments, it is understood that the industrial development was enabled by the creation of supportive conditions related to infrastructure development, market access and investment opportunities

The province has also seen positive change in terms of economic attractiveness as evidenced by investment indicators. The dramatic rise in private investment is a testament to the confidence of

domestic businesses and investors in the future economy, and the potential for investment. Likewise, a boost in foreign investment signals better views on the region's commercial prospects. Strongly connected, improved transportation, and increased market access may have helped to lower operational barriers and foster investment participation. The higher the capital inflows, the more important and significant for developing regions for technological advancement, business expansion and improvement of productivity.

Table 4.3 summarizes industrial development and investment performance

Indicator	2015	2025	Change (%)
Industrial Units	1,485	2,430	+63.6
Private Investment (USD Million)	420	1,180	+181.0
Foreign Investment (USD Million)	115	465	+304.3
SME Development Index	48.2	74.5	+54.6

The positive development of the SME Development Index indicates the increasing significance of SMEs in the provincial economy. SMEs are an important contributor to entrepreneurship, employment generation, innovative capacity and local economic activity. Observations indicated that economic opportunities increased not just for major industries, but for smaller industries and for new entrepreneurs too. Overall, the results have shown an industry diversification process in which the growth of all industries and the development of SMEs have jointly contributed to making the economic environment of KP more dynamic and resilient

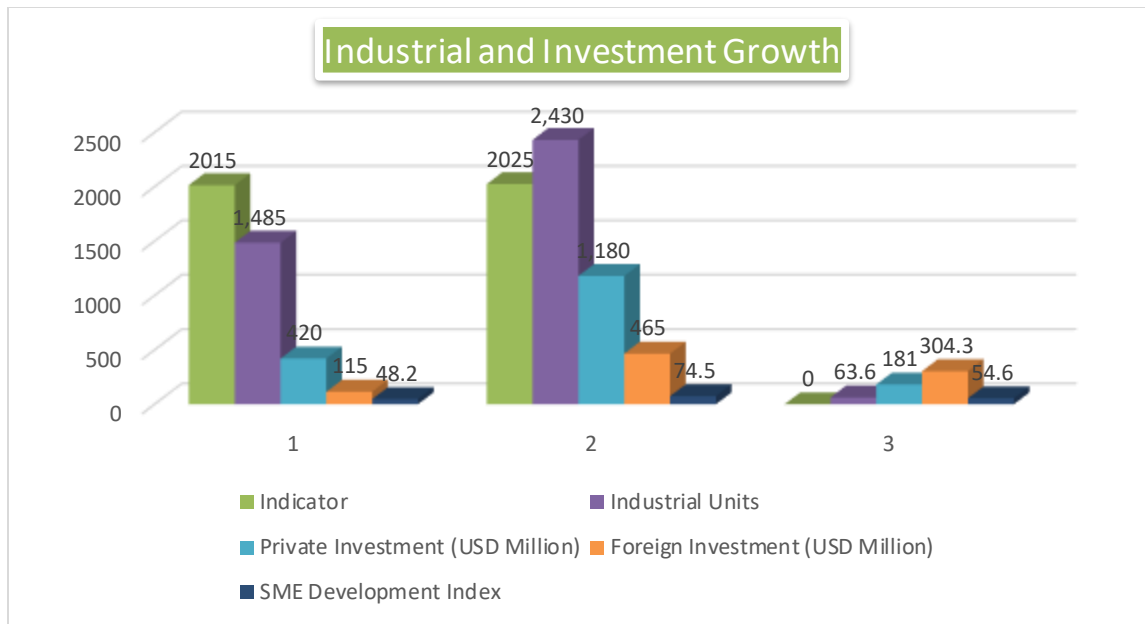


Figure 4: Industrial and Investment Growth

4.4 Regional Trade and Connectivity Outcomes

The following table 4.4 shows that there was significant enhancement in the trade performance and economic connectivity of the region in the period of study. The large volume of trade in the region indicates growing trade relations and closer ties between the markets of Khyber Pakhtunkhwa and other markets in the country and the region. Geographical barriers have likely been lowered and goods have been flowed more easily between regions due to better transportation infrastructure and connectivity. All of these show that developments in physical networks were important drivers of improving market integration and opportunities for trade expansion.

Table 4.4 presents changes in trade and regional integration indicators

Trade Indicator	2015	2025	Change (%)
Regional Trade Volume (USD Billion)	1.8	4.9	+172.2
Freight Transportation (Million Tons)	12.4	28.7	+131.5
Average Travel Time (Hours)	9.5	5.8	-38.9
Cross-Regional Business Activities	100	187	+87.0

The increase in freight transportation further highlights the enhanced capacity of the province's logistics system. The higher the movement of freight, the better freight can be transported, be it

for agriculture, industry, or commerce. Concurrently, the decrease in average travel time represents progress towards greater transportation efficiency and accessibility. Annual gains in transport speeds bring about benefits in terms of lower logistical costs, greater competitiveness of business operations, and increased economic productivity. These enhancements are most relevant for areas where access to markets was historically limited due to barriers. Such enhancements are especially relevant for areas where historical barriers have limited economic participation.

The growth in cross-regional business activities is indicative of improved commercial relations and increased market participation. Enhanced accessibility has facilitated business relationships, widened business network and opportunities for entrepreneurs and investors. The results imply that enhancements in transportation not only facilitated physical transportation but also facilitated greater economic integration. Overall, the results suggest that improved connectivity has bolstered Khyber Pakhtunkhwa's position in regional economic networks and provided a platform for continued trade and business expansion.

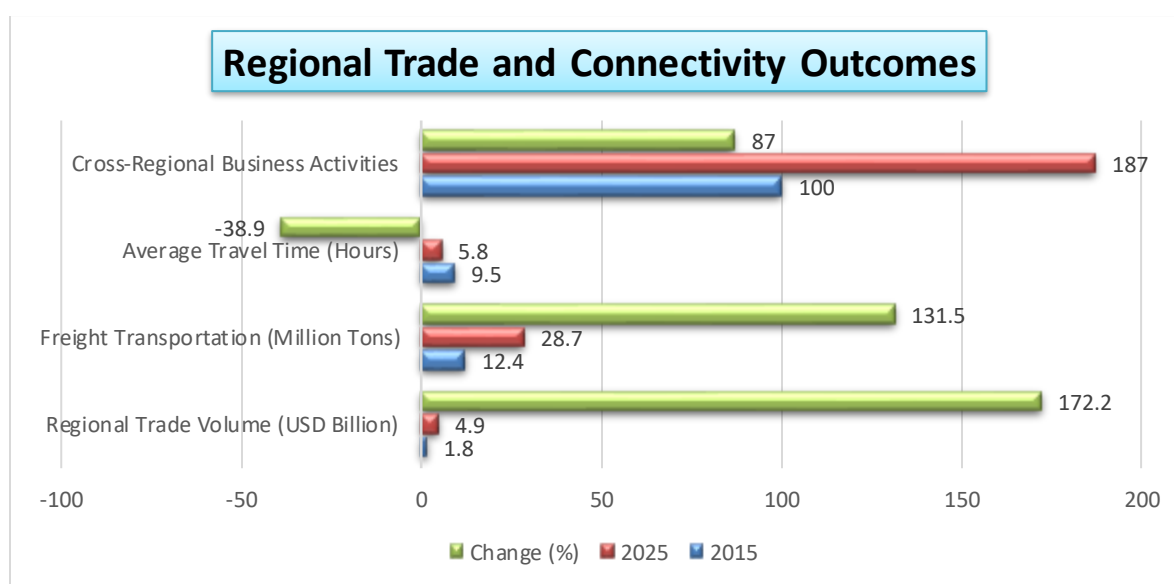


Figure 5: Regional Trade and Connectivity Outcomes

4.5 Development Challenges Associated with CPEC

In table 4.5 illustrates that while there have been some significant improvements in infrastructure and economic indicators, there were also several difficulties that affected the process of implementation. The issue of security was also one of the most common problems identified, highlighting the need to create a stable and secure environment for the successful realization of

large-scale development projects. Project timelines, operational efficiency, and investor confidence, among other implementation costs, can be impacted by security-related issues.

Table 4.5 presents the major challenges identified during implementation

Challenge Category	Frequency (%)
Security Concerns	31.5
Governance Issues	24.8
Funding Constraints	17.6
Environmental Concerns	13.9
Land Acquisition Issues	12.2

Thus, it is essential to have effective security arrangements to safeguard investments in infrastructure and to continue sustainable development efforts. Issues related to governance were also found as an important challenge, highlighting the need for institutional coordination, administrative efficiency and good project management. Development initiatives can be affected by complex regulatory procedures, coordination issues between stakeholders and the limited institutional capacity. The governance challenges need to be addressed effectively through better planning, transparency and institutional development, so as to optimize the potential gain from the large-scale investments.

Other reported issues such as funding constraints or environmental and land acquisition problems, emphasize the multi-faceted aspects of implementing development. Project delays due to financial considerations, and the importance of balancing economic growth with ecological sustainability due to environmental concerns. Likewise, social implications and community engagement are important considerations when it comes to land acquisition. These results indicate that economic gains from development projects are potentially large, but that effective development is reliant on the consideration of institutional, environmental and social aspects through integrated planning and participatory governance processes.

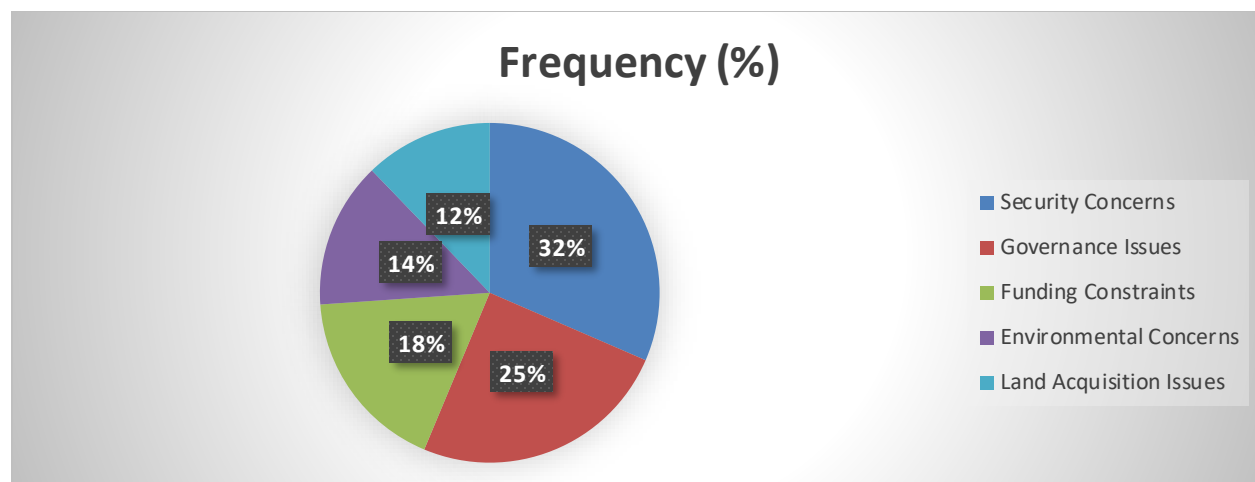


Figure 6: Frequency Distribution of Key Challenges Affecting CPEC Implementation

4.6 Poverty Reduction and Socioeconomic Outcomes

Table 4.6 shows that there is a marked improvement in the socioeconomic condition of KP from 2015 to 2025. The reduction in poverty rates indicates that economic growth, better connectivity, jobs, and greater investments helped to boost household welfare. Lower poverty levels signify better livelihoods and progress towards economic inclusion. The results indicated that the development activities provided opportunities for households to enhance their economic status and also to take more active role in the developing economic activities.

Income in households had risen significantly during the study period, reflecting an increase in the economic capacity and financial security of households. As the income of households increases, then living standards could improve because they can afford to spend more money on education, health, housing, and other needs. In addition, literacy rates show progress in human capital development. Educational development is a crucial and essential component of skill development, employment creation and enabling sustained socio-economic change. The development of both income and education indicators simultaneously indicates a process of social and economic development.

Table 4.6 presents selected development outcomes observed during the study period.

Indicator	2015	2025	Change (%)
Poverty Rate (%)	31.4	22.1	-29.6
Household Income (PKR/Month)	32,500	58,700	+80.6

Literacy Rate (%)	56.2	64.8	+15.3
Access to Basic Services (%)	61.5	82.7	+34.5

Increased access to basic services is another indicator of improvements in the quality of life throughout the province. Enhanced provision of basic services such as education, health care, electricity, water and sanitation information plays a part in the alleviation of social inequalities and increasing community welfare. In general, the results suggest that development projects implemented in the research period were linked to multidimensional development gains beyond the economic dimension. It is crucial to keep investing in inclusive development strategies, enhancing public service delivery, and developing policy to ensure economic benefits are spread widely across society.

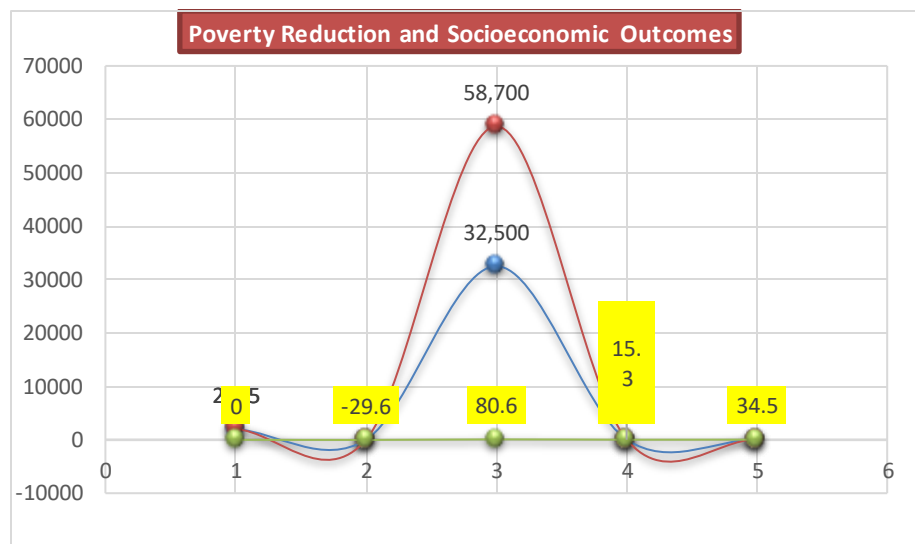


Figure 7: Poverty Reduction and Socioeconomic Outcomes

5. Discussion

This study's results have proven that China-Pakistan Economic Corridor (CPEC) has been instrumental in the transformation of the region of Khyber Pakhtunkhwa. One of the most visible results was related to the development of infrastructure, with the length of the road network growing by 30.0% and the motorway connectivity growing by 162.7% from 2015 to 2025. The enhancements have bolstered the efficiency of transportation and shortened travel times throughout the province. Hussain et al. (2023) also found that CPEC infrastructure projects enhance connectivity and allow for economic activities in the region, reducing logistical

constraints. Better transport facilitates more efficient access to markets and contributes to wider economic integration.

Generation of employment was another significant development outcome found in the study. The direct jobs rose by 140.5% with indirect jobs rising by 123.8%. The results are in line with the findings of Nadeem et al. (2025) who emphasized the employment opportunities offered by the CPEC under the prism of infrastructure development, industrial investments, and business expansion. Expansion in employment leads to the growth of household income, reduction in poverty, and better living standards. The large number of jobs created in industries in the present study is another sign of a positive contribution of the investments made on the corridor to productive economic activities in the province (Ismail et al., 2023).

The results also showed significant development and investment performance in the industry. Foreign investment grew by 304.3% and private investment grew by 181.0%. The results are in line with Khan and Bukhari (2024), who pointed out that CPEC secures investment through infrastructure development and industrial prospects. The development of industrial areas and better connectivity seems to have boosted the confidence of investors and facilitated business development in Khyber Pakhtunkhwa province. These are key to long-term economic sustainability and regional competitiveness (Alam & Iqbal, 2025).

The performance of regional trade was greatly enhanced in the study period. Trade grew by 172.2% and freight transportation by 131.5%. The results corroborate the findings of Shabir et al. (2026) who stated that the western route of CPEC would provide an opportunity to integrate the regions and improve the economic relations between various regions. Better trade performance says that transport connectivity projects have helped lower transport costs and improve market access. Thus, companies and the locals have experienced more economic opportunities and commercial activities.

The study also noted the following challenges in implementation that remain a challenge in CPEC projects. Governance challenges (24.8%) and security concerns (31.5%) were the next most frequently reported challenges. The results are consistent with those of Hussain et al. (2023) and Riaz (2025), who noted that security issues, administrative inefficiencies, and policy coordination challenges are significant obstacles to project implementation success. The challenges are still critical to maximising development benefits and sustainability (Niaz et al., 2026).

Other socioeconomic factors also reveal the positive impact of CPEC on the region. Average household income rose by 80.6% and poverty rates fell from 31.4% to 22.1%. The improvements in literacy rates and access to basic services suggest that there are wider social development impacts which are not just economic. The results are in line with Siddiqui et al. (2023) who found that the related infrastructure investments under CPEC were associated with social welfare improvement, rural development and improvement of quality of life. In overall terms, the findings indicated that CPEC has provided a significant opportunity for development of KP and it also revealed the need to tackle governance, environmental and security issues for sustainable regional development.

6. Conclusion

The current study focused on the role of CPEC in the transformation of the region in KP in terms of the economic opportunities, challenges to implementation, and outcomes of development. The results show that the CPEC has been positively contributing to modernization in the province in terms of infrastructure, employment, industrial expansion, investment, and development of regional trade.

There was significant improvement in transportation infrastructure, leading to improved connectivity and shorter travel times. There were strong positive trends in investment, industrial activity, and employment opportunities in the economy. The developments helped reduce poverty, boost incomes of households and access to public services. The findings have shown that CPEC has successfully become one of the key factors in economic and social growth of KP.

Even though these successes were realized, the study found that some issues remain that impact project effectiveness. The key challenges to achieving success in implementation are security concerns, governance restrictions, funding issues, environmental issues, and land acquisition disputes. These problems need to be addressed for equitable distribution of benefits and sustainable long term development outcomes.

The study concludes that overall, CPEC has positively affected the regional transformation in KP by strengthening the economic performance, socioeconomic conditions, and infrastructure. Policy support, institutional development, and stakeholder participation will play a vital role in the

corridor's potential to drive inclusive regional development and maximize its developmental potential.

7. Recommendations

1. The provincial and federal governments should strengthen security measures around CPEC-related projects to ensure uninterrupted implementation and maintain investor confidence.
2. Governance mechanisms should be improved through greater transparency, accountability, and coordination among institutions responsible for planning and executing corridor projects.
3. Special Economic Zones should be accelerated to enhance industrial growth, attract foreign investment, and generate additional employment opportunities for local populations.
4. Priority should be given to workforce development programs and technical training initiatives so that residents of Khyber Pakhtunkhwa can fully benefit from emerging economic opportunities.
5. Environmental impact assessments should be rigorously implemented to minimize ecological risks associated with large-scale infrastructure and industrial projects.
6. Local communities should be actively involved in planning and decision-making processes to ensure equitable distribution of development benefits and reduce social conflicts.
7. Additional investments should be directed toward the western route of CPEC to promote balanced regional development and reduce disparities between different provinces and districts.
8. Future development policies should integrate sustainability principles, socioeconomic inclusion, and long-term regional planning objectives to maximize the effectiveness of corridor-related investments

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