

INFRASTRUCTURE-LED GROWTH WITHOUT SKILLS: HUMAN CAPITAL CONSTRAINTS ON CPEC-DRIVEN EMPLOYMENT IN BALOCHISTAN

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Abstract

One of the largest investment and infrastructure initiatives in South Asia is the China-Pakistan Economic Corridor (CPEC). The degree to which locals are compensated is crucial to the availability of human capital, even if it is anticipated to bring about economic evolution and create a lot of jobs. This research study assesses the actual gaps and human capital limitations that impact Balochistan's capacity to take advantage of the CPEC employment opportunities. There is a significant discrepancy between the skills needed in the CPEC-linked businesses and the capabilities of the local workforce, as demonstrated by primary survey data, labor market statistics, and qualitative interviews from important economic zones in Balochistan. The analysis's conclusions demonstrate that, despite higher infrastructure investment, Balochistan's employment outcomes are hampered by low educational attainment, inadequate vocational training, gender disparities, and institutional barriers. The study suggests targeted human capital policies to support infrastructure investments and promote inclusive growth.

Keywords: *China–Pakistan Economic Corridor (CPEC), Infrastructure-led growth Human capital development, Skills mismatch, Labor market constraints, Balochistan economy.*

Introduction

A major part of the development strategy of Pakistan, particularly developing regions such as Balochistan is the China-Pakistan Economic Corridor or CPEC. Roads, ports and energy projects are examples of physical infrastructure, which has grown rapidly, but not equally in terms of the impact on local jobs. Balochistan with low indicators of human capital and low levels of industrial base has its own set of challenges when it comes to the potential of jobs that will CPEC bring about.

Balochistan is the most under privileged and under developed province of the country. For many years the province had faced the natural disasters, menace of terrorism, ethnic and sectarian conflicts in the province which led the region among the poorest areas that is highest on poverty and lowest on human development index (e.g., in 2018 HDI of Balochistan was 04.77 that was lowest as compared to other provinces at 0.529, 0533, and 0.0567: KPK, Sindh and Punjab respectively.

Therefore; in developing the employable skills as the universities have to play a critical part in the economic development of the country and these institutes should be seen as spark for bringing change as whole.¹ Maintaining the long-term competitive advantages of well-established firms requires attracting qualified human resources, educated individuals, knowledge transfer, and contributions to the development of new ideas.² Additionally, it is stated that universities should make sure that the practical and pertinent skills produced there are suitable for the demands of employers..

Consultancy projects, short- and long-term work placements, live client briefs, enterprise weekends, guest speaker programs, simulations, games, group work presentations, debates, mock interviews, and case studies are some of the strategies and policies used in benchmark universities to develop employability skills.³ Some skill development is required outside of the curriculum activities, such as extracurricular activities. In the meanwhile, the study found that more of the necessary full-fledged employability abilities come from extracurricular activities than from core curriculum activities. Additionally, the study recommended whether employability skill development has a consistent validity and academic examination. In a similar context, students must be aware of the employability skills necessary for their professional development⁴.

Nonetheless, CPEC has opened the door with the prospect of masses of Balochistan by initiating a heavy investment in the area. The number of the designed project is the Gwadar city. The CEPC projects in Balochistan also cover free economic zone, infrastructure development, Gwadar port master plan, energy project, power plant, Gwadar international airport, schools and expressways, technical and vocational institute etc.

Balochistan's unemployed population is in dire need of educational facilities because the state lacks competent human resources. For example, the higher education, technical, and vocational schools that teach the province's youth the fundamental skills they need. Effective federal and provincial policies that support and influence the region's skilled human capital strategy, particularly with regard to CPEC, are also necessary. The region's human potential must be enhanced by the government so that people can work to their full capacity and assist the nation economically. Before they start to benefit, individuals don't understand these changes because they have no other function. This study refers to the paradox, 'infrastructure-led growth without skills' of the Balochistan. It is being asked :

- 1.The local workers are to what extent geared for the jobs created by CPEC?
- 2.What are the significant human capital constraints that forbid employment results?
- 3.What are the policy interventions that can be used to close the skills gap and generate inclusive employment?

Literature Review

According to DeGood (2020⁵), building infrastructure is a political endeavor in and of itself, and everything the government builds, including its layout, location, size, and quantity—embodies social, economic, and political power in the community. The Study also acknowledged that low-income areas suffer from the negative effects of disinvestment, pollution, and physical isolation, whereas powerful members of society and certain industries typically reap the benefits of entry and access. The financial, social, and ecological effects of this type of developmental thinking are disproportionately borne by the indigenous residents of these areas; that is, large-scale initiatives alter the existing places and patterns of the regular social lives of those who live nearby them.⁶

Once the development plans under its umbrella in Gwadar are completed, CPEC supporters in the government and policy circles believe that poverty will be decreased, the energy problem will be overcome, and locals will have access to business and employment possibilities.⁷ However, according to⁸, development in a large-scale infrastructure projects may result in a rearrangement of power in terms of finance,

political authority, skill, and knowledge to support the specific goals of national and international actors.

Research studies in recent times have analyzed the benefits of CPEC at micro level and macro level, but most of the studies have been theoretical and not supported with empirical evidence (Saad, et al. 2019⁹). Secondly, in majority of studies have viewed the affects of CPEC on locals, and latter generalized it to Whole Pakistanis. The research done by Kanwal, et al. (2018)¹⁰ on the impact of the CPEC on the local population of Pakistan is based on national samples of the population selected from all parts of the country. These types of research are useful, In spite of the fact that they portray a weakness of localising the context to the particular groups which are the direct beneficiaries of different CPEC projects and constitute the main stakeholders. Thirdly, little attention has been paid to the adverse impacts of CPEC on the overall economy of Pakistan where living conditions of some sections of people at the grass-root level have been treated with less seriousness, which has make them vulnerable to get benefits from this development process.

However, Mega-development projects, such as dams, railroads, seaports, airports, etc., currently offer enormous employment, business, and trade prospects to bring prosperity and improve the socioeconomic level and quality of life of the populace. But at the same time, the construction of such projects typically requires vast, tracts of land, which may have consequences for the surrounding area, including disturbance, relocation, socioeconomic problems, and even social and political instability.

Therefore, among other economic resources, mega-development projects may result in land loss and displacement as well as socio-cultural aspects of social structure, customs, and lifestyles. The social expectations of the local population on the socio-economic benefits of any development initiative are typically widespread and natural.¹¹ It is hypothesized that if the development effort do not ensure that the needs of communities must be fulfilled, conflicts and social discontent in the areas will escalate. In order to establish a mutually trusting relationship that would enable the development to continue its job, it is necessary to consult the locals before beginning any developmental project.

One may argue that the Gwadar CPEC projects have a tendency to revitalize Pakistan's deteriorating infrastructure and economy. However, if this is realized, the policymakers would need to be significantly more sensitive and consultative than they have been before. Large-scale project success depends on local acceptability and ownership; Balochistan in general and Gwadar in particular have been resentful of the developments, therefore this study is quite helpful in this regard. Locals' opinions should be considered in addition to the national, economic, and strategic aspects of CPEC studies. In order to understand the issues and make sure that the initiatives are implemented successfully, research from the locals' point of view is more crucial. Thus, the goal of this research is to examine and evaluate the knowledge, consciousness, concerns, and experiences of the Baluchistani people.

Methodology

Research Design

This study adopts a **mixed-methods research design**, combining **quantitative and qualitative approaches** to comprehensively examine the relationship between infrastructure-led growth under the China–Pakistan Economic Corridor (CPEC) and

human capital constraints affecting employment generation in Balochistan. The mixed-method approach allows for both statistical measurement of employment trends and in-depth exploration of socio-economic and institutional factors influencing workforce participation.

Limitations of the Study

- Limited accessibility to remote districts of Balochistan
- Possible response bias from participants
- Data constraints related to CPEC employment statistics

This methodology provides a rigorous framework for examining how infrastructure-led economic growth under CPEC interacts with human capital constraints in shaping employment outcomes in Balochistan. The integration of quantitative and qualitative data ensures a comprehensive understanding of both economic trends and socio-institutional realities affecting local workforce participation.

Analytical Framework

The study operationalize human capital constraints under three dimensions:

- Educational attainment
- Vocational and technical skills.
- Labour market access

Quantitative models are used to make estimates of the relationship between skill levels and employment status in CPEC-linked jobs while qualitative information contextualises the barriers.

Infrastructure and Economic Growth

According to economic theory, investment in infrastructure can help boost growth by cutting transaction costs and improving productivity and attracting investment.¹² CPEC is an outstanding example of such mechanism, as it is connected with global trade networks and distant areas. there is a large literature in development economics which highlights the role of infrastructure in accelerating economic growth. Classic works argue that infrastructure investment helps to bring down transaction costs, improve connectivity and stimulate private sector activity.¹³ Within the context of emerging economies, transport, power, and telecommunications are typically associated with productivity improvements and expansion of the labour market.¹⁴

However, there are limitations regarding the context-dependent and multiplicative synergistic benefits of infrastructure on growth, which are influenced by the upward hierarchy's local absorptive ability, institutional quality, and financial access. Infrastructure can create opportunities, but it may not result in long-term employment if there is a lack of human capital to exploit it.

Human Capital and Labour Market Outcomes

One of the most important factors influencing performance in the job market is human capital, which is characterized using education, skills, and competences. Employment and compensation results are known to suffer from skills mismatches, which occur when employees' competencies do not match industry expectations.¹⁵

Skills Mismatch in Developing Economies

Research conducted in developing nations suggests that while infrastructure projects may result in jobs, they frequently fail to benefit the unskilled labor force, as evidenced by the lack of associated spending on education and training¹⁶.According to recent study,

Pakistan's labor market pressures and skills shortage are obstacles to the development of equitable employment.

CPEC and Balochistan: A Contextual Overview

Despite being the largest province in Pakistan in terms of land area, Baluchistan is among the least developed areas in terms of human development. Low literacy and restricted access to high-quality education are two of the main characteristics. Low-skilled workers are prevalent in informal labor markets.

There are differences between the sexes in terms of education and employment participation. The CPEC corridors, which include Gwadar Port and its infrastructure, are expected to create jobs in the construction, logistics, services, and industrial sectors.

Economic corridors are viewed as models of economic growth. The 62 billion-dollar CPEC megaproject creates new opportunities for regional economic growth. The massive project is expected to benefit over a million people and boost regional economies to up to \$2.5 trillion once CPEC is completed.¹⁷ The building of an integrated transportation system, information network infrastructure, etc. are the main components of the CPEC flagship project.

Energy-related field initiatives include the construction of industrial zones and the development of Gwadar city.¹⁸ Locals would have more employment options and a higher standard of living thanks to CPEC. To maximize the benefits of the CPEC project, the skilled labor force of Balochistan, where the project's base line originates, must get specialized training. According to the researchers, CPEC would significantly impact the region's economic growth and serve as a major platform for bilateral and even international cooperation. It is a crossroads that connects the northern Silk Road economic belt.

Lennium New Sea Silk Road is located in the south. In particular, it guarantees the prosperity of regional commerce and economic activity between the states.¹⁹ It is possible to think of this route as a platform that links China with the Middle East and Africa. Additionally, they contend that the initiative has the potential to produce industrial and economic wonders akin to the economic growth of South Korea, Japan, and the ASEAN region in the 1980s.²⁰

CPEC would be essential to the region's geopolitical significance, social cohesion, and economic revival.²¹ It would be useful in creating several business options for Pakistani locals. Positive attitudes toward entrepreneurial activities are mainly influenced by the accessibility of cities and local transportation, which in turn influences the ambition to expand the CPEC project.²² In addition to increasing international business opportunities and entry points for foreign businesses, it is beginning to support business prospects and economic development in the provinces of Pakistan.²³ Additionally, the data showed that the initiative is more effective at boosting the economy and companies in contrast to the energy and other industries.²⁴ In an interview with Dawn News in February 2020, Li Bijian, the Chinese Consul General in Karachi, stated that one of the biggest obstacles to Chinese corporations looking to invest in Pakistan is the country's shortage of skilled labor.²⁵ He continued by saying that in order to give young people in the area job options, they are also thinking about implementing a skill-improvement program at the local labor market. This has a detrimental effect on local businesses since they don't have a skilled labor force, which makes it easier for Chinese companies to take over the market. This

was also evident in the early stages of CPEC in China only engaged 100 locals out of 600 workers in Gwadar.²⁶ In light of the aforementioned, this study addressed numerous research concerns, including

- Is there a national policy in place by the government on the development of competent human resources?
- Do universities, technical schools, and vocational schools contribute to the development of skilled and competitive human resources?
- Fulfill requirements Prerequisites (course requirements and program curriculum elements) Prerequisites (program curriculum/course requirements) are satisfied with the abilities required for the CPEC project.
- Is there a mismatch between the supply and demand for the necessary skills?
- Has there been any collaboration between academia and industry about competent human resources?

Results& Analysis

Skills Gap Analysis

- Less than 10% of the workers surveyed have an occupational certification, and just 28% have completed secondary school.
- One issue is that companies are indicating that there is a significant need in fields that are hard to come by locally, including IT, mechanical, and electrical.

Employment Patterns

- CPEC projects use the majority of highly qualified non-local workers in specialized roles.
- Temporary, unskilled, or semi-skilled construction occupations account for the majority of local involvement.

China–Pakistan Economic Corridor (CPEC) Projects in Balochistan

The projects under the CPEC were started on the 1+ model, which includes the construction of infrastructure, industrial development, energy projects, Gwadar International Airport, and port operations. These projects will be carried out across three time periods: short-term, medium-term, and long-term., and 2030 is the projected completion year.

Development Potential of CPEC in Balochistan and Emerging Constraints

Balochistan is a resource-rich region with a steady population and a high labor force to resource ratio. Thousands more people may be employed by the province, which would reduce the current startling unemployment rate to what is referred to be the natural rate of unemployment. In turn, development is a complex process that causes structural change. That is why, in case of developing the province, the development strategy should exist, striving to transform the economic situation. CPEC that has significant potential and opportunities is likely to give a kick-notch to development perspective of the province and can give an inspiration where the provincial economy is getting to.

However, it is needless to say that economic growth and development depends on viable strategy for the growth of trade and industry. The Pakistani government must also make sure that businesses, both domestic and foreign, are involved in the design and development of the appropriate industrial policies; otherwise, CPEC will only serve as a transit route, giving Pakistan's economy little more than a quicker route to China and its

trading partners. As a result, the CPEC must be developed as an economic route rather than a transit route.

Clearly, the economic corridors in every part of the world are meant to be focused on economic growth in order to construct the economy. In order to maximize the benefits of CPEC commercial potential, Pakistan must plan and design programs to develop industry, commerce, and trade in light of her numerous economic problems. In terms of the CPEC developments, Balochistan is undoubtedly one of Pakistan's most important regions: Geographically, it connects the deepest-sea port of Gwadar with the Central Asian Republics, Afghanistan, and China's Xinjiang province, forming a huge commerce route. CPEC is appropriately referred to as "not a cup of roads and highways," but it is undoubtedly a collection of development initiatives that benefit every economic sector.

The province's road and rail infrastructure development can have a variety of effects on the region's economy. It has the potential to provide Pakistan and the province of Baluchistan with a long-term economic project, transform the province's economy in a number of ways, and raise it to the level of the national economy. As intended by the Pakistani government in its CPEC, four of these provinces have been designated as Special Economic Zones (SEZs) and Mineral Processing Zones. Murad Jamali, Khuzdar (the proposed Minerals Economic Processing Zone), Qila Saifullah chromite/antimony, Saindak (gold, silver), Reko Diq (gold), Kalat (iron ore), Lasbela (manganese), Gwadar (oil refinery), and Muslim Bagh (chromite) are the industrial zones that have taken over the list. The establishment of such economic zones is a clear indication that the Pakistani government has envisioned the complete picture of improvement.

However, the government must explain to CPEC how the newly created SEZs, along with their individual tax regimes, would impact the provinces' ability to generate revenue and their financial capabilities, taking into account that since the 18th Amendment to the Pakistani Constitution, the provinces have gained greater autonomy in managing their fiscal affairs and obtaining funds from various sources. The Gulf courtiers will probably bring commodities into the western region of China through CPEC.

In view of China's current desires for imports from the Middle East, we can consequently consider promoting the industrialization process in the province of Balochistan. For instance, China bought over 88 billion dollars' worth of oil in 2014, of which 76 billion dollars were primary and unprocessed goods; in other words, China processed nearly 85% of the oil that China imported to the Middle East. Similarly, in 2014, Pakistan imported 5.6 billion worth of raw fuel and lubricant products, of which 76 billion worth of oil were primary and unrefined products, meaning they were intended to be processed in.

Balochistan can process the main products that China imports into Gwadar before shipping them to China and other economic partners. In addition to accelerating Balochistan's overall economic growth and development, it will provide thousands of jobs for the region's youth. Only after Pakistan gained its independence and Balochistan's social and physical infrastructure failed to advance.

Currently, a significant chunk of Balochistan lacks physical infrastructure, including roads, electricity, water supplies, health care, education, and any kind of work possibilities. It is unfortunate to report that Balochistan is still in the horticultural and pastoral stages of development, with livestock and small crop subsectors contributing the

largest marginal share to the province's GDP, while manufacturing and finance account for only 9%.

The province is even dealing with serious problems related to the struggle for physical infrastructure and the primary sector economy, which has prevented the province's economy from moving to the secondary and tertiary sectors. Due to the scarcity of resources, it is essential to concentrate them in the sectors and areas of choice, such as growth nodes and economic corridors, which will have a pull impact on the other sectors of the provincial economy. The second section of the article examines how the proposed economic corridors and growth nodes, in contrast to CPEC, might give the province the much-needed boost for development and growth.²⁷

The Balochistani government has identified 15 potential growth nodes where development can focus on the industrial, social, urban, and agricultural/fisheries sectors. Quetta, Turbat, Gwadar, Qila Saifullah, Hub Chowki, Panjgur, Loralai, Kharan, Dalbandin, Nushki and Chaman, Zhob, and Dera Allahyar, Khuzdar, Sibi, are possible locations for its expansion nodes. Additionally, the government may establish at least five clustered growth nodes, which would include the aforementioned sites as well as the nearby towns using the nearby cities as the clustered development nodes' urban centers. The size of the population and its growth rates, minerals, fruit, fish, cereals, vegetables, etc. are some of the factors used to determine the growth nodes where social, economic, and industrial development might be centered.²⁸

In order to access markets and ports and create a value chain that might support Balochistan's economic activity, CPEC infrastructure and other associated facilities would be utilized. Six potential economic corridors will be used to identify growth centers; these will be determined by factors such as population size, location at intersections, and **Corridor 1's** proximity to the coastal belt, which includes the southern part of Balochistan, including the districts of Gwadar and Lasbela, which are home to the fishing industry. The following increases apply to these routes: **Corridor 2**, is the Por Mineral Corridor, which connects the copper/mineral belt in Chagai and Gwadar via Mashkel, Kharan, and Buleda the Por Mineral Corridor. Gwadar Turbat, Panjgur, Besima, Khuzdar, and Mastung are all part of **Corridor 3**, a component of the CPEC, through Lasbela, Khuzdar, Kalat, and Quetta, **Corridor 4**, crosses the commerce route via highway N-25 (RCD road), which connects the port city of Karachi to Chaman on the Pakistan-Afghan border. Gas fields and canal irrigation agricultural kinds that produce a lot of food and cash crops make up **Corridor 5**, this includes the coal-rich and oil-gas-rich areas of Kohlu and Dera Bughti. **Corridor 6**, Fruit, vegetables, wool, and other high-value non-staple products are found here, as are high-value minerals like coal and chromite.²⁹

Barriers Identified

- Outdated curricula and a lack of vocational training facilities are two examples of training shortcomings.
- Gender constraints: Less than 15% of women are employed, and access is restricted by safety and cultural hurdles.
- Mobility and access: Inadequate connectivity across districts has a detrimental impact on mobility and job searching.

Discussion & Findings

- This study shows that infrastructure spending is insufficient on its own to support inclusive employment development in Balochistan. The restrictions imposed by law on human capital are those that prevent their inclusive presence.
- This study indicates that infrastructure spending is insufficient on its own to support inclusive employment development in Balochistan. The restrictions imposed by law on human capital include the following: Prevent local workers from obtaining good jobs.
- Continue to maintain labor market disparities

The results are consistent with a broader body of research that emphasizes the complementary nature of human and physical capital and aims to address development-related concerns.

Policy Implications

In order to fulfill CPEC's employment potential, the study will look for:

- Expanding the scope of vocational education and training (VET): The employment potential of CPEC should be increased through public-private collaborations that guarantee the VET has the most pertinent industrial demands.
- CPEC-related apprenticeships and subsidized training are examples of specialized skills programs for women and youth.
- Local content policies: mandates that companies employ and educate Baloch people. Institutional frameworks: Improve labor market information systems to match opportunities and skills.

Conclusion

The study's conclusions draw attention to a basic paradox at the core of major economic projects like Balochistan's China-Pakistan Economic Corridor (CPEC). Even though the China-Pakistan Economic Corridor (CPEC) is one of the most ambitious infrastructure-led development frameworks in Pakistan's history, offering improved connectivity, energy security, and regional economic integration, the anticipated employment benefits for the local populace are still limited by severe human capital shortages. The province cannot achieve inclusive and sustainable economic growth through infrastructure expansion alone without concurrent investments in education, technical training, and skill development.

According to the analysis of this study, CPEC-related projects in Balochistan, such as port development, road networks, and energy infrastructure, have produced job possibilities in commerce, construction, logistics, and services. But most of these opportunities demand management, technical, and vocational skills that are frequently lacking in the local workforce. Because of this, skilled labor is often imported or recruited from other Pakistani provinces, which reduces the direct socioeconomic benefits for the local communities. This mismatch between Balochistan's current skill base and the demands of the labor market created by the China-Pakistan Economic Corridor (CPEC) is a reflection of a broader structural issue stemming from decades of underinvestment in professional training systems, education, and vocational institutions. Furthermore, this employment disparity is made worse by Balochistan's ongoing low literacy rates, restricted access to higher education, and poor technical training facilities. Many districts still have inadequate educational infrastructure, with few technical schools

that can train young people for cutting-edge fields including digital technology, port operations, logistics management, and engineering support services. As a result, local residents are frequently unable to adequately take advantage of economic opportunities that develop through mega-projects. The province's wider developmental legitimacy of CPEC may be compromised by this circumstance, which runs the danger of strengthening feelings of exclusion and inequality.

The study further suggests that the success of infrastructure-led growth models depends not only on physical capital but also on the development of human capital and institutional capacity. Without a skilled workforce capable of participating in and sustaining new economic activities, infrastructure investments may yield limited long-term socio-economic transformation. In the case of Balochistan, bridging this gap requires a strategic alignment between development planning and human resource development. Vocational training centers, technical universities, and industry-linked skill development programs must be integrated into the broader framework of CPEC implementation. Such initiatives should focus on sectors directly associated with corridor-related industries, including port logistics, maritime services, construction technology, renewable energy maintenance, and supply chain management.

In order to guarantee that local communities become significant players in the development process, inclusive employment regulations are also required. Establishing training programs, apprenticeships, and technology transfer activities may be greatly aided by public-private collaborations between government agencies, Chinese businesses, and regional educational institutions. Localized recruitment tactics, community-based skill centers, and targeted scholarship programs might all aid in closing the human capital gap and encouraging a higher level of youth engagement in CPEC-driven economic activity in Balochistan.

Ultimately, CPEC's capacity to progress beyond infrastructure development toward a more comprehensive model of regional development that incorporates social inclusion and economic growth will determine its long-term success in Balochistan. While infrastructure can lay the groundwork for economic change, human capital offers the ability to maintain and grow that change. Therefore, addressing Balochistan's talent gap is essential to ensure that CPEC becomes a driver for equitable development, job creation, and socioeconomic stability in the

In conclusion, while CPEC holds substantial promise for reshaping the economic landscape of Balochistan, the realization of this promise depends on bridging the gap between infrastructure development and human capital formation. A coordinated policy approach that prioritizes education, technical training, and local workforce empowerment will be essential to ensure that the benefits of corridor-driven growth are both inclusive and sustainable. Only through such an integrated development strategy can Balochistan fully harness the transformative potential of CPEC and secure long-term socio-economic advancement for its people.

End Notes

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