# Implications of China Pakistan Economic Corridor on Energy, Infrastructure, Trade and Human Capital

# The China-Pakistan Economic Corridor:

# Implications for Energy, Infrastructure, Trade, and Human Capital

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Abstract

The China-Pakistan Economic Corridor (CPEC) is a $60+ billion project between China and Pakistan to create a network of highways, railways, and pipelines between these regions. It is the flagship project of China's One Belt, One Road Initiative (OBOR), also known as the Belt and Road Initiative (BRI) and the New Silk Road. This roughly 2,000-mile route runs from China, across Pakistan, toward the newly built seaport of Gwadar, which is advantageously positioned on the Arabian Sea in the Balochistan province of Pakistan, connecting Asia to the Arabian Sea and the Strait of Hormuz. Several energy and infrastructure development projects that will boost economic growth along the pathways from north to south through Pakistan are discussed in detail.

This project is pivotal for the region. Operating in a continent that includes three nuclear-armed countries, it is critical to maintain peace, prosperity and stability. China has taken the lead not just in Asia but also among countries in Europe and Africa. However, the project also creates regional instability due to rivalries between Pakistan and India, and with China and other global economic superpowers.

Answers to many of the complex issues in this project can be found in more data, transparency, and first-hand accounting of social, political, and cultural dynamics in the region. Since the majority of the CPEC projects depend on the use of non-renewable resources—even for making renewable power bases—it is imperative that both China and Pakistan phase out the use of coal and oil and depend more on sustainable energy. This is also one of the major goals of the United Nations' Sustainable Development Goals (SDG), and both China and Pakistan have signed this international agreement.

This research tests this possibility by scaling the powerplant power supply and its distribution to replicate the power distribution to a previously determined number of residents. This can be achieved through reliable and available government data and power company databases. The confounding variable is the number of residents who are nonregistered, who attach to power lines for their power supply. Since the number

of such residents is only estimated, compiling accurate data would give project leaders proper insight into this issue that has persisted for several years.

It is also imperative to note how much coal use is put into yield results. If five times more coal is used to create only a small output, is it worthwhile when massive air pollution is created? This data could be used in a five to ten-year timeframe to allow scientists and policymakers to assess the effects of non-renewable energy in addition to the positive or negative consequences of using renewable resources.

This research concludes that CPEC will generate more power. However, solving the energy crisis demands a multipronged approach that considers population, energy demands, and early harvest production results. There continue to be reports of several hours of electricity outages in many regions, especially areas with concentrated populations. In order to control or reduce the demand for electricity, the use of new technologies based on renewable energy must be given priority. Incentivizing such projects could allow each industry (industrial, commercial and residential) to identify and implement a sustainable model.

In order to ensure ultimate success, both the administration and the people of Pakistan work to prevent CPEC from becoming a victim of the political squabbling and governmental lethargy present in the previous administrations. Although a sizeable number of people view CPEC with cynicism and political controversy, there are more who are have welcomed it enthusiastically with high optimism.

Plans for the CPEC are lofty but feasible; improvements in infrastructure will allow for greater regional connectivity and expansion of trade. The creation of Gwadar Port will encourage increased trade and exports. Human resource development and human capital must be utilized effectively to reap current *and* future gains for both nations. Human capital will aid CPEC to fully utilize the positive impacts of this mammoth project. The economic corridor has the potential to change the outlook for both Pakistan and China. Therefore, the momentum must not be lost, and the people and government of Pakistan, in bilateral cooperation with China, must endeavor to complete the economic project for a better future for each nation.

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Lastly, to my research adviser Dr. Doug Bond, and Thesis Director Prof. Asim Ijaz Khwaja, Director of Center for International Development (CID) at Harvard University: their support in every way, shape, and form, has encouraged me in developing this project. It is my intention that this literature and its small contribution will assist in policy-making decisions while also furthering academia for future generations.

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# Chapter I

## Introduction

The China-Pakistan Economic Corridor (CPEC) is a $50 billion project signed between China and Pakistan to create greater connection between these regions through a network of highways, railways, and pipelines. CPEC begins from western China near Xinjiang and runs through Pakistan. The Pakistani government unveiled three main routes: (1) an eastern route through Sindh and Punjab provinces; (2) a western route through Balochistan and Khyber Pakhtunkhwa (KPK) provinces; and (3) a central route through Pakistan. The main 2,000-mile route runs from China across Pakistan to the world's largest deep-sea port located in Gwadar, which is advantageously positioned on the Arabian Sea and connects Asia to the Arabian Sea and the Strait of Hormuz.

Gwadar occupies a geopolitically advantageous position connecting Asia to the Arabian Sea and the Strait of Hormuz. Thirty-five percent of global oil shipments passes through this region, approximately 20 million barrels or 15 tankers per day. Along these vast pathways are numerous infrastructure development projects to will boost economic growth for both countries. Figure 1 illustrates the three pathways in the CPEC.


Figure 1. Map of CPEC, with major pathways

Source: https://commons.wikimedia.org/wiki/File:China_Pakistan_Economic_Corridor.jpg.

The Strait of Malacca is a body of water surrounding Malaysia, where cargo is imported and exported to and from China. This long, funnel-shaped route is 500 miles long and 40 miles wide. Plagued by piracy and extreme bottlenecking, the Strait of Malacca continues to be perilous for Chinese shipments passing through the region. This narrow pathway will no longer be needed once the project is fully completed as part of China's "One Belt, One Road" vision (OBOR), also known as the Belt and Road Initiative (BRI), viewed by many as Asia's future for globalization and regional connectivity.

Other routes join Xi'an in central China to Moscow, Rotterdam, and Vienna. The Xinjiang province of China is a region full of ethnicities, cultures, and natural resources. Urumqi is the capital of the Xinjiang Uighur Autonomous Region of the People's Republic of China, in northwest China. Xinjiang's open land region is suitable for agriculture and raising cattle. Geographically, the Xinjiang region comprises one-sixth of the entirety of China, but less than one percent of the population live there—a sparsely populated but vast area of land.

## Research Objective

This research provides a qualitative analysis of certain sectors of the project. Energy, infrastructure, trade, and human capital are industries of utmost importance in this project. Each sector is carefully broken down, with explanations of its effects on the population and economy, along with analysis of the influence of CPEC in each industry and how such results could impact the region as a whole. I invite the reader to look into each chapter and determine whether each industry (all of which are critical to the economic status of Pakistan) will actually advance Pakistan out of years of stagnation and into socioeconomic development—or is CPEC merely another promise to this nation of 200 million people seeking answers to their economic plight.

## Impacts and Benefits of CPEC

In 2013, Chinese Premier Li Keqiang visited Pakistan to affirm that CPEC will act as a bridge for the vision of a maritime "Silk Route." Premier Li stated: "China, as always, firmly supports Pakistan's efforts to uphold independence, sovereignty and territorial integrity, and achieve national stability and development" (Ing & Li, 2013). With clear support for infrastructure development and energy

production in Pakistan, this vision will connect three continents: Asia, Africa, and Europe via Gwadar Port.

China's investment of $35 billion has created a push for projects focused on renewable energy, including coal, solar, hydroelectric, liquefied natural gas, and power transmission. The project will create numerous job opportunities that will focus on reducing energy shortages and diminishing carbon emissions in the atmosphere.

## New Trade Routes

Trade along China's original route through the South China Sea takes about 45 days and over 5,000 miles. However, the new trade routes connecting Kashgar to Gwadar, will take approximately 10 days and save more than 2,000 miles. In fact, some transport has already begun and was carried out successfully. On October 28, 2016, Pakistan and China celebrated the first trade activities in Hunza, the last city on the Karakoram highway before it reaches Xinjiang, China. On November 13, 2016, 250 containers from China were exported to Bangladesh, Sri Lanka, and United Arab Emirates through Gwadar Port. On December 2, 2016, the first cargo train followed a direct route from China to Pakistan along the CPEC route.

## Incentives for Regional Stability

Pakistan and India have had their differences since the inception of both nations, forcing each side to navigate with caution, especially with the looming threat of nuclear insecurity. India and Pakistan (as well as North Korea and Israel) are all non-signatories of the Nuclear Non-Proliferation Treaty, meaning security measures are needed. Successful trade and economic integration between neighboring nations

creates a powerful incentive for stability and can be a precursor to the promotion of peace and prosperity.

### Electricity Supply

There are often widespread blackouts and electricity shortages in many regions of Pakistan due to distribution issues and energy supply shortages. This will only worsen as Pakistan's population continues to increase.

### Employment Opportunities

A lack of available jobs directly impacts education and youth. Most of Pakistan's educated population either leave the country or—if they are fortunate—secure a job; however, many Pakistani youth are unemployed and under-educated or uneducated. Those who cannot leave and have little or no education and no employment prospects will look for illicit alternative means of supporting themselves and their family.

It is projected that CPEC will create over 700,000 jobs, which will provide unemployed and job-seeking adults and youth access to a plethora of opportunities in different sectors and industries related directly or indirectly to the economic corridor. Increasing amounts of commodities and resources will encourage trade in and between provinces. China will have a pathway to the Middle East through the CPEC and through to the strategic port of Gwadar.

### Sustainable Development Goals

The drive by the United Nations to develop Sustainable Development Goals (SDG) resulted in a joint agreement among 193 countries and inaugurated in

September 2015. The economic corridor caters to many of the SDGs, which I will discuss in the following chapter. Chinese investment into Pakistan's renewable energy, if successful, will generate over 17,000 megawatts of energy. This will virtually double the current capacity to account for any shortages. Fourteen of these would produce over 10000 MW of energy by the completion of the Early Harvest Projects. More than 40 sites will assist with renewable energy projects, encourage investment, and provide thousands of job opportunities. However, the more personnel there are, the more security risks increase. To protect the Chinese workers from terrorist attacks to the project, kidnapping, and any other forms of pressure, the Pakistan Army will ensure the safety and security to the Chinese foreign labor personnel for mutual progress of CPEC. Figuratively speaking, China and Pakistan are both in this ship together; no one side can express shortcomings, and each country must complete its allotted mission in this economic project. Unlike projects in Myanmar, Indonesia, and Sri Lanka, the CPEC was welcomed with open arms, further strengthening the ties between allies in the Asian region.

Table 1. CPEC Project Details

| Project Details | Estimated Cost (US$ billion) |
|---|---|
| Energy Sector | 33.793 |
| Transport Infrastructure | 9.79 |
| Gwadar Port including city and Gwadar region socio-economic development | 0.793 |
| Mass Transit Lahore | 1.6 |
| Fiber Optic Project | 0.044 |
| **Total Cost** | **46.013** |

Source: CPEC.GOV.PK

Overall, both Pakistan and China will mutually benefit through trade, increased employment opportunities, an alleviation of the energy crisis, enhanced infrastructure, and encouraging development of Pakistan's human capital. There are surely some obstacles that will arise along the way, including corruption and political infighting. But these should not determine the outcome of CPEC, which will benefit millions of people and greatly impact the entire continent. There is a general positive outlook, and the region is already seeing the fruits of this collaboration.

# Chapter II

## Energy

Over the last 100 years, energy has evolved from a luxurious commodity to a basic human necessity. The ability to provide a nation with adequate supplies of energy is a feasible task—one that developed nations have achieved—yet under-developed and developing nations are still striving to accomplish. For centuries, fossil fuels dominated the energy industry, enabling humans to develop, implement, and speed up mass transportation. However, as global population has increased, demand for energy accessibility has risen exponentially, and where populations increase, supplies of energy have not kept up with growing demand. Pakistan has experienced this conundrum first-hand as it persistently encounters a limited and uneven supply of energy. Less attention has been devoted to finding solutions for Pakistan's energy predicament—solutions that are integral to unlocking the potential of this young (1947) and vibrant nation.

The China-Pakistan Economic Corridor (CPEC), as part of China's Belt and Road Initiative, is an attempt to solve this energy dilemma. Policymakers and government officials have indicated their desire to overcome these hurdles once and for all. Pakistan has suffered from an energy crisis, without respite, since the early 1990s—and it continues to suffer. This has caused a 4% to 7% slump in economic growth in Pakistan's annual Gross Domestic Product as a result of slower outputs, exports, and employment rates (Ali, 2018). Energy plays a vital role in elevating the living standards of people in both rural and urban centers.

There is only limited literature available regarding the future of energy and its lackluster oversight, especially as it relates to CPEC. For this reason, this thesis analyzes the energy predicaments facing Pakistan. It begins with an energy-based perspective, since more than half of the investment (approximately $34 billion) in the bilateral project has been earmarked for energy-related projects. Energy has become an increasingly urgent matter for the Chinese government as well, since domestic energy consumption and geopolitical tensions over trade and energy have increased China began to develop a shale gas industry in Szechuan province, but it has not been profitable in comparison to its competitor, the United States, which has successfully implemented shale gas technologies.

This chapter explains the role of energy in Pakistan, and considers whether the Sino-Pakistani bilateral project will create a sustainable model for use. It focuses on the current status of energy in the CPEC, while also assessing likely impact in Pakistan. I will define the role of renewable energy resources in creating a pragmatic solution for filling the void between the demand and supply. The high energy imbalances associated with slow or gradual growth in an atmosphere of falling energy prices is instrumental in begetting a vicious circle. Figure 2 shows the CPEC corridor, and the various projected energy developments there.

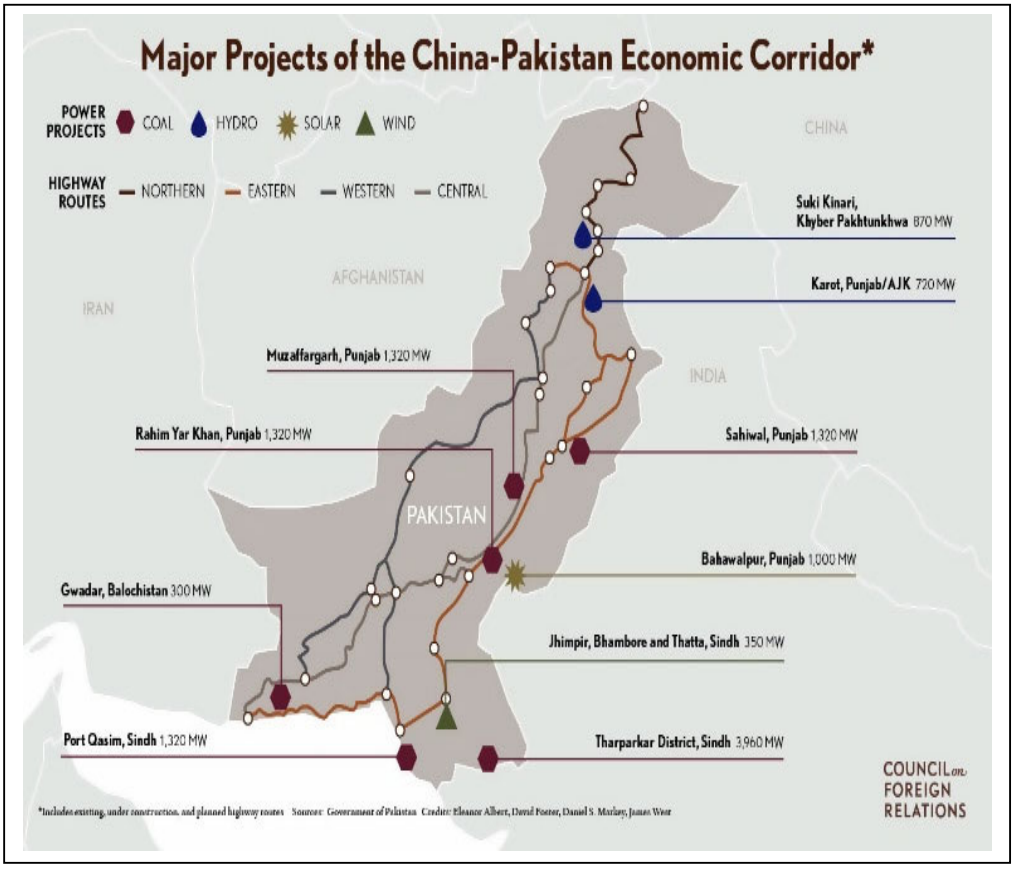


Figure 2. Major CPEC projects.

Source: Markey & West, 2016.

The use of energy, particularly electricity, varies by region. According to data from the Population and Housing Census of 2017, Pakistan's rural area increased 2.2% from 1998 to 2017; urban regions saw a 2.7% increase. Of the total population in Pakistan in 2017, 40.5% live in urban areas (80.7 million) while 59.5% live in rural areas (118 million). Worldometer (2019), a live-time website that shows current estimates based on statistics and projections from official organizations, found that in 2019 the urban population in Pakistan comprises 39.8% (81.5 million) of total population. This information is key because the largest consumer of electricity is the household sector, which devours 45.1% of the total consumption of electricity. Then

follows the manufacturing industry at 29.7%, agriculture at 11.5%, commercial sector at 7.2%, government sector at 6%, with the remaining 0.5% consumed for streetlights and similar use features (Raza et al., 2019).

Another aspect to be considered is financial support and accountability. For example, power companies routinely complain about partial or late payments from government agencies. Concurrently, distribution companies have poor collection rates which exacerbate the financial shortcomings facing this sector (Aziz & Ahmad, 2015). Residents and businesses that use generators or battery-powered units and other power sources pay far more and at significantly higher rates. While five distribution companies showed loss of levels below 20%, others continue to encounter losses of more than 35%. In cities such as Hyderabad, Sukkur, Quetta, and Peshawar, collection rates have fallen from about 80% to 60% (Aziz & Ahmad, 2015). Moreover, Pakistan still depends more on imported energy than on indigenous generated energy. Hence, increasing indigenous supply of energy and decreasing import of energy will not only decrease the price of energy, but will, more importantly, support the developing economy.

## Impacts of CPEC on Pakistan's Energy Sector

This section analyzes the likely impact that the CPEC energy sector will have on Pakistan. Although available literature on this topic is scarce, the material that is available is generally aligned. Hence, this section will delve into details that will help the reader to understand potential solutions that the impact analysis will likely create.

The household, manufacturing, and agricultural sectors are the backbone of every developing nation. Unfortunately, all three sectors are hit hard by energy shortages and/or outages that occur every day. The purpose of CPEC's energy

endeavor is clear: to close the large gap between supply and demand while self-generating a mix of energy options and, if needed, be prepared with an option to export extra production supply. Today there is a major shortage of energy distributed to businesses and households, which means hours each day when there is no electricity. In 2013, Pakistan's electricity system generated at its peak capacity of 22,812 MW by combining production from the state and private sector. However, by July 2013, output (as compared to capacity) was only 14,000 MW—about 60% of the system's total capacity. To put things in perspective, between 2006 and 2013, power generation capacity increased by 3,000 MW and quickly grew to 7,000 MW in 2011 as demand for energy steadily rose—but supply remained stationary (Aziz & Ahmad, 2015). The supply of energy compared to population numbers are inversely related, and with high unemployment rates added, the energy sector faces a condition of decline.

Currently, Pakistan's power generating capacity is approximately 22,718 MW. According to Pakistan's Water and Power Development Authority (WAPDA), in 2020 the nation's electricity requirement will likely increase sharply to 40,000 MW, while the annual consumption rate, which rose 4.8% since 2013, will most likely rise to 8-10% (Raza et al., 2019). Thus the development of renewable energy is vital to large consumers of energy, both commercial and residential, and for the economy as a whole. Table 2 shows energy sector projects under CPEC and their respective capacities.

Table 2. Energy Sector Projects Under CPEC's Development Agenda.

| Power projects | Prioritized projects | Actively promoted projects | Installed Capacity (MW) |
|---|---|---|---|
| Coal | 7 | 5 | 13140 |
| Wind | 4 | 1 | 350 |
| Solar | 1 | – | 900 |
| Hydel | 2 | 1 | 2693 |
| Gas | – | 1 | 525 |

Source: National Electric Power Regulatory Authority (NEPRA)

During Phase One of CPEC, of 21 new energy projects, 14 implemented coal and renewable energy projects will generate 10,400 MW of added power to the grid. The 14 power plants are set to be completed by 2020, and will amply meet or exceed the current demand of about 4,500 MW on average (Hussain, 2017). Most of the electricity-generating projects are based on coal and hydroelectric (hydel) technologies. Virtually all coal power projects currently run on imported coal, with the exception of two power projects that will be powered by domestic coal. While reliance on imported coal could be an issue longer term, the real issue is with coal combustion. China and Pakistan have agreed on a clean coal combustion mechanism as the safest form for the environment. However, there are only a handful of countries that are able to practice this, China being one—maybe the only one. Of the high-priority projects, seven have been successfully completed; the rest are under construction.

Foreign direct investment (FDI) is a major source of funding for energy projects. By the end of 2018, $19 billion had been provided through FDI, with growth of 3,240 MW of electricity on the national grid. As a result of this investment, Pakistan's GDP for fiscal year 2019 is expected to increase.

Thirty-thousand jobs have been created as a result of these "early harvest" energy-related projects (see Table 3). As such, the likely impact not only bridges the supply and demand of megawatts of electricity, but also provides employment to Pakistanis. This synergy will likely impact the economy and help Pakistan recover from the consecutive years of declining GDP.

Table 3. Workers Employed on CPEC Projects.

| Name of Project | Pakistani workers employability |
|---|---|
| Early Harvest Project | 30,000 |
| Energy sector | 16,000 |
| Port Qasim power plant | 5,000 |
| Sahiwal solar power project | 3,000 |
| Quaide e Azam solar power project | 3,000 |
| Transport sector | 13,000 |
| Free zone project in Gwadar | 2,500 |

Source: Mirza et al., 2019

Major portions of the project are directed toward construction of power projects to produce 17,045 MW of electricity, where 10,400 MW of generation capacity are to be installed on a priority basis for use by present energy sources, and the rest to be completed in following phases (Mirza et al., 2019). Currently, there are six power production projects based on original coal with a collective capacity of 4,290 MW and seven power projects of 5,200 MW; both are in different phases of completion. They began in 2017 and are set to be completed in 2021.

Due to Pakistan's geographic location in South Asia, Pakistan receives an average of 3,000 to 3,300 hours of natural sunlight per year (Raza et al., 2019) which would enable solar technology and power production to flourish in many regions.

Figure 3 shows solar power implementation to the power grid in developing rural areas of Pakistan. From 2020 onward, the rural areas is expected to show an exponential increase, from 100 MW to 1,000 MW within about 10 years and will continue to increase annually.

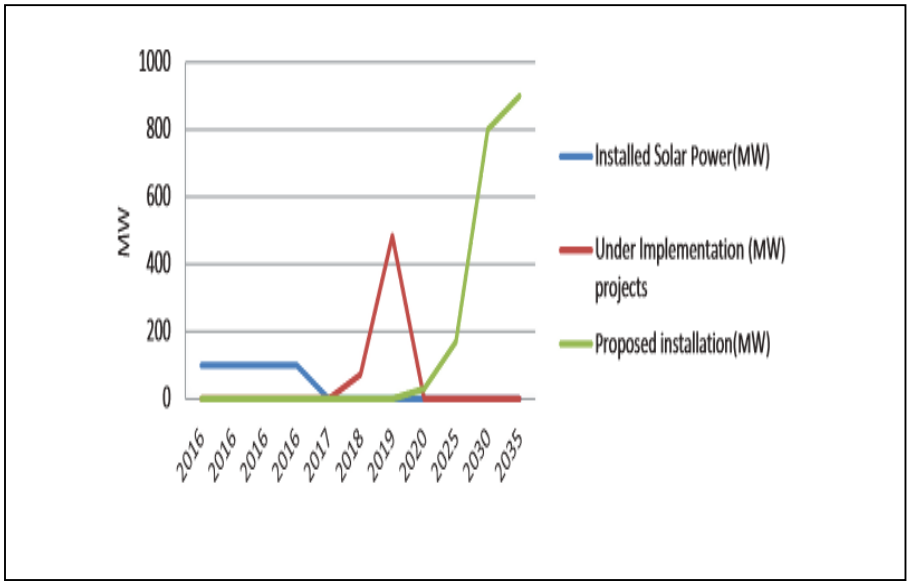


Figure 3. Solar Power Implementation for Rural Areas in Pakistan.

Source: Pakistan Economic Survey, 2017-2018.

Tables 4(a) and 3(b) below provide data regarding installed and future solar projects in rural Pakistan. Although not every year is identified as proposed or under implementation, the table shows that the majority of these projects are or will be located in Punjab, Sindh, and Balochistan provinces. The northwest province, called Khyber Pakhtunkhwa is not mentioned given its cold and mountainous terrain compared to the desert terrain in the other three provinces.

Table 4(a). Installed Capacity of Solar Power in Rural Areas of Pakistan.

| Year | Installed Solar Power(MW) | Under Implementation(MW) projects | Proposed installation(MW) | Provinces |
|---|---|---|---|---|
| 2016 | 100 | - | - | Punjab |
| 2016 | 100 | - | - | Punjab |
| 2016 | 100 | - | - | Punjab |
| 2016 | 100 | - | - | Punjab |
| 2017 | - | - | - | - |
| 2018 | - | 72.52 | - | Punjab |
| 2019 | - | 484 | - | Sind |
| 2020 | - | - | 30 | Baluchistan |
| 2025 | - | - | 170 | Sind |
| 2030 | - | - | 800 | Sind |
| 2035 | - | - | 900 | Punjab/Sind |
| | 400MW | 556.52 | 1900 | Total |

Source: Pakistan Energy Vision, 2014

Table 4(b). Rural Electrification in Pakistan.

| No. of Observations in Rural Areas | No. of Observations in Urban Areas | % (rural) | % (urban) | Province |
|---|---|---|---|---|
| 2,760 | 1917 | 44.8 | 43.5 | Punjab |
| 1,094 | 1,162 | 21.9 | 26.3 | Sind |
| 572 | 586 | 11.4 | 16.8 | Baluchistan |

Source: Pakistan Economic Survey, 2016-17.

## CPEC Contributions to Solving the Growing Demand for Energy

During Phase One of CPEC, of the 21 new energy projects, 14 implemented coal and renewable energy projects now generate 10,400 MW of added power to the grid. These were completed by the end of 2018, and now amply meet or exceed the current demand of about 4,500 MW on average (Hussain, 2017). Table 5 shows projects inaugurated, in progress, and completed.

Table 5. Progress of CPEC Projects.

| *Project* | *Completion* |
|---|---|
| Sahiwal, 1320 MW Coal-fired Power Plant, Punjab | Completed in May and July 2017 |
| UEP 100MW Wind Farm (Jhimpir, Thatta) | June 2017 |
| Sachal 50MW Wind Farm (Jhimpir, Thatta) | June 2017 |
| Haveli Bahadur Shah, 760 MW | July 2017 |
| Chasma Nuclear Plant-3, 340 MW | Inaugurated December 2016 |
| Bhikki 1200 MW, | Inaugurated in May 2017 |
| Haveli Bahadur Shah 1200 MW | Inaugurated 20 June 2017 |
| Quaid-e-Azam | Partially started |
| Cross Border Optical Fibber Cable | Work on 220 km completed |
| Faqeer Primary School, Gwadar | April 2017 |

Source: developed by thesis author, 2019.

The completion of all these projects will generate a total of 3,770 MW capacity of energy. If the energy gap is 4,000 to 7,000 MW, then completion of these projects will make a significant difference. Power generation projects instituted by the CPEC will, as they are implemented, reduce the gap between supply and demand. However, there is still much work to be completed, especially as there is another $10 billion worth of projects remaining.

## The Energy Mix

The primary energy sources in Pakistan are traditional fuel and commercial fuels. Traditional sources of fuel include firewood, crop residue, and animal waste or biofuel; commercial sources of fuel include coal, oil, natural gas and hydropower. The technologies under the renewable energy resources include solar, oil, wind, compressed natural gas (CNG), biomass, natural gas, liquefied natural gas (LNG), and coal, with use of fossil energy providing more than 57.9% of the energy consumed in Pakistan (Raza et al., 2019). Figure 4(a) shows the mix of energy consumption in

Pakistan between coal, hydel, natural gas, oil, nuclear energy, and LPG. Figure 4(b) illustrates the breakdown of natural gas consumption in various sectors.

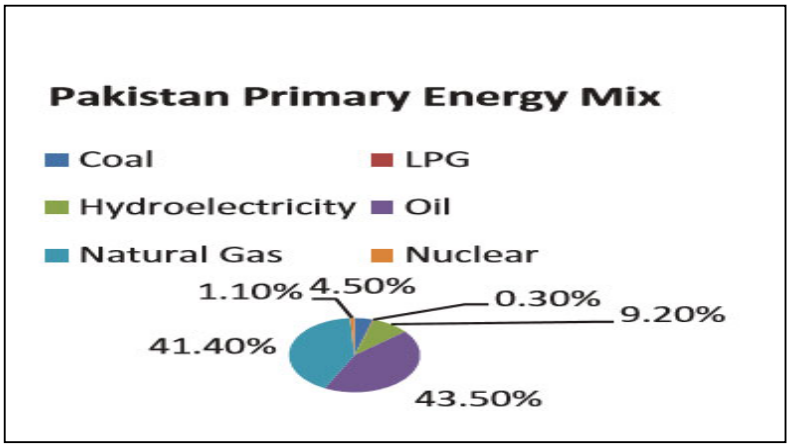


Figure 4(a) Primary Energy Mix

Source: Pakistan Economic Survey, 2017-2018.

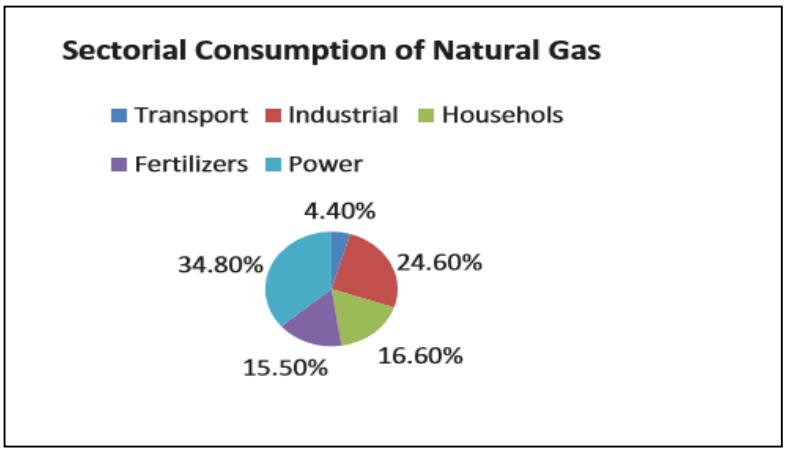


Figure 4(b) Consumption of Natural Gas by Sector.

Source: Pakistan Economic Survey, 2017-2018.

According to these figures, oil and natural gas were most highly used in FY 2017-2018, primarily due to the import of crude oil from the Middle East through the Strait of Hormuz. The limited extraction of domestic oil, juxtaposed with natural gas, offers much cleaner and more eco-friendly forms of energy. Coal is being used at a very low rate at this time, but CPEC is investing heavily in the extraction and use of

coal, primarily from major coal reserves in the Tharparkar Desert in Sindh province. This region has total reserves of 175.51 billion tons of coal in an area covering 4,500 square miles (Aized et al., 2017).

It should be noted that there is widespread apprehension about carbon dioxide emissions in the coal-based thermal power plant projects. Although the combustion of coal and emissions of coal carbon are not within the scope of this thesis, it is essential to determine how all this coal will be used, as well as what noxious consequences (if any) the use of coal will have on the environment. The governments of both Pakistan and China have collaborated on policy documents to ensure that the CPEC will be environmentally sustainable, specifically by adopting clean coal-combustion technologies that adhere to international standards (Murad, 2018). This will help to ensure efficient uses of coal by reducing the detrimental effects to the environment, while at the same time significantly increasing Pakistan's supply of energy.

## Cost of Energy Projects

Table 6 below contains detailed information on the total number of projects that will be pursued under the CPEC project with respect to both the capacity of megawatts and cost (Ahmed et al., 2018). The total MW is approximately 16,692 MW, while the cost of this mammoth project is $33.73 billion. Among these are high priority (first tier) and secondary priority (second tier).

Table 6. Total MW Outputs and Cost for CPEC Projects.

| Sr. | Project name | MW | Cost ($ million) |
|---|---|---|---|
| *CPEC-energy priority projects* | | | |
| 1 | Port Qasim Electric Company Coal Fired, 2×660, Sindh | 1,320 | 1,980 |
| 2 | Sahiwal 2×660 MW Coal-fired Power Plant, Punjab | 1,320 | 1,600 |
| 3 | Engro thar 4×330 MW Coal-fired, Thar, Sindh | 1,320 | 2,000 |
| 4 | Surface mine in Block II of Thar Coal field, 6.5 metric ton per annum (mtpa), Thar Sindh | | 1,470 |
| 4 | Gwadar Coal/LNG/Oil Power Project, Gwadar | 300 | 600 |
| 5 | HUBCO coal power plant 1×660 MW, Hub Balochistan | 660 | 970 |
| 6 | Rahimyar Khan Coal Power Project, Punjab | 1,320 | 1,600 |
| 7 | SSRL Thar Coal Block 1-6.5 metric ton per annum(mpta) Thar, Sindh | | 1,300 |
| 9 | SSRL 2×660 MW Mine Mouth Power Plant,Sindh | 1,320 | 2,000 |
| 8 | Quaid-e-Azam 1,000 MW Solar Park, Bahawalpur, Punjab | 1,000 | 1,350 |
| 9 | Dawood 50 MW wind Farm, Bhambore, Sindh | 50 | 125 |
| 10 | UEP 100 MW wind Farm, Jhimpir, Sindh | 100 | 250 |
| 11 | Sachal 50 MW Wind Farm, Jhimpir, Sindh | 50 | 134 |
| 12 | Suki Kinari Hydropower Station, KPK | 870 | 1,802 |
| 13 | Karot Hydropower Station, AJK & Punjab | 720 | 1,420 |
| 14 | Matiari to Lahore transmission line | | 1,500 |
| 15 | Matiari to Faisalabad transmission line | | 1,500 |
| *CPEC-energy actively promoted projects* | | | |
| 16 | Gaddani Power Park Project (2×660 MW) | 1,320 | 3,960 |
| | Gaddani Power Park Project (Jetty + Infrastructure) | | 1,200 |
| 17 | HUBCO coal power plant 1×660 MW, Hub Balochistan | 660 | 970 |
| 18 | Kohala Hydel Project, AJK | 1,100 | 2,397 |
| 19 | Pakistan Wind Farm II 2×50 MW(Jhampir, Thatta, Sindh) | 100 | 150 |
| 20 | Thar mine mouth oracle, Thar Sindh | 1,320 | 1,300 |
| 21 | Muzaffargarh Coal Power Project, Punjab | 1,320 | 1,600 |
| 22 | Gas Power Plant 525 MW | 525 | 550 |

Source: http://cpec.gov.pk/energy

Table 7 below shows 17 high-priority projects among the 22 total projects, as well as the priority projects that have been completed from late 2018 to early 2019. The total megawatts from these projects is 11,110 MW at a cost of approximately $24 billion. From this we can infer that 11,000 MW is only 5,000 MW short of the total project with a cost of 5,000 MW equaling approximately $10 billion. This information is vital because not only do news articles in 2017 and 2018 indicate that the shortage of national electric megawatts will be solved by the completion of Phase One but, more importantly, that coal-fired power plant projects in Sindh, Punjab, and Balochistan are the most costly. The second most costly projects are the hydropower

stations in KPK, AJK, and Punjab. The third most costly are the transmission lines in Sindh and Punjab; the fourth most costly project is the Quaid-e-Azam solar park in Punjab.

Table 7. Prioritized Energy Projects Under CPEC.

| | Project Name | MW | Estimated Cost (US$M) |
|---|---|---|---|
| 1 | 2 × 660 MW Coal-Fired Power Plants at Port Qasim Karachi, Sindh | 1,320 | 1,980 |
| 2 | Suki Kinari Hydro power Station, KPK | 870 | 1,802 |
| 3 | Sahiwal 2 × 660 MW Coal-fired Power Plant, Punjab | 1,320 | 1,600 |
| 4 | Engro Thar Block II 2 × 330 MW Coal fired Power Plant | 660 | 2,000+1,470 |
| | TEL 1 × 330 MW Mine Mouth Lignite Fired Power Project at Thar Block-II, Sindh, Pakistan | 330 | |
| | ThalNova 1 × 330 MW Mine Mouth Lignite Fired Power Project at Thar Block-II, Sindh, Pakistan | 330 | |
| | Surface mine in block II of Thar Coal field, 3.8 million tons/year | | |
| 5 | Hydro China Dawood 50 MW Wind Farm(Gharo, Thatta) | 50 | 125 |
| 6 | Gwadar Coal/LNG/Oil Power Project, Gwadar | 300 | 600 |
| 7 | HUBCO coal power plant 1 × 660 MW, Hub Balochistan | 660 | 970 |
| 8 | 300 MW Imported Coal Based Power Project at Gwadar, Pakistan | 300 | 600 |
| 9 | Quaid-e-Azam 1000 MW Solar Park, Bahawalpur, Punjab | 1,000 | 1,302 |
| 10 | UEP 100 MW wind Farm, Jhimpir, Sindh | 100 | 250 |
| 11 | Sachal 50 MW Wind Farm, Jhimpir, Sindh | 50 | 134 |
| 12 | SSRL Thar Coal Block-I, 6.8 mtpa &SEC Mine Mouth Power Plant(2 × 660 MW) | 1,320 | 2,000+1,300 |
| 13 | Karot Hydropower Station, AJK & Punjab | 720 | 1,420 |
| 14 | Three Gorges Second Wind Power Project | 50 | 150 |
| | Three Gorges Third Wind Power Project | 50 | |
| 15 | CPHGC 1,320 MW Coal-fired Power Plant, Hub, Balochistan | 1,320 | 1,940 |
| 16 | Matiari to Lahore Transmission line | | 1,500 |
| | Matiari (Port Qasim) — Faisalabad Transmission Line Project | | 1,500 |
| 17 | Thar Mine Mouth Oracle Power Plant (1320 MW) & surface mine (Thar Block IV) | 1,320 | 1,300 |
| | Total | 11,110 | 23,943 |

Source: Ali, 2018.

It is noteworthy that coal power consumes a significant portion of the investment. In order for renewable energy technologies to be successful, five key policy points must be considered: (i) power utilization, (ii) positioning of the power plants, (iii) fossil fuel expenses, (iv) output of the renewable energy, and (v) technology (Raza et al., 2019). These comprehensive policies allow for long-term

conservation and implementation of the new power mix that will be created for public use. If companies in the private sector generate energy that will be managed and disseminated by each provincial government, it is imperative to follow each key point where power utilization and positioning are key to finding the right location. Limited imports of fossil fuel and self-generation of renewables is key to not only improving trade but also creating technology to improve the environment.

Assessing the impacts of the energy sector is complicated, especially based on the supposed completion of the Early Harvest project, which is expected to significantly alleviate the energy crisis. What we do know is that it will definitely take longer than the estimates given by the mentioned literature and the official CPEC website.

Hydro projects are forecasted to be the highest producers of power. As mentioned at the beginning of this chapter, the gap between supply and demand for sufficient MWs of energy is clearly satisfied based on the prediction modeled in Figure 5. However, as 2030 approaches, hydel will become the chief provider of

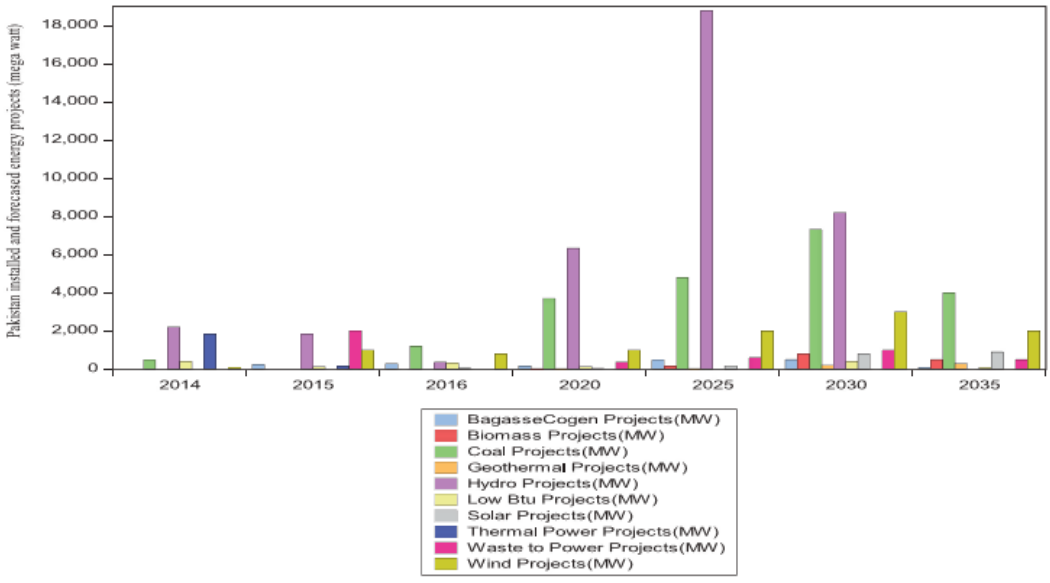


Figure 5. Trends of Power Projects in Pakistan, with installed capacity.

Source: Pakistan Energy Vision, 2014.

energy to the population, while the use of coal will decline significantly and wind projects are likely to increase. This would be beneficial not only for the climate, but more importantly, for the population, since power would be cleaner and locally generated. This could lead to cheaper costs and the ability to export extra supplies of power to regional provinces and regional allies.

The cost of generating electricity has also risen exponentially since 2004 (see Figure 6), as well as the cost of electricity generation and the population. This means that demand will also increase.

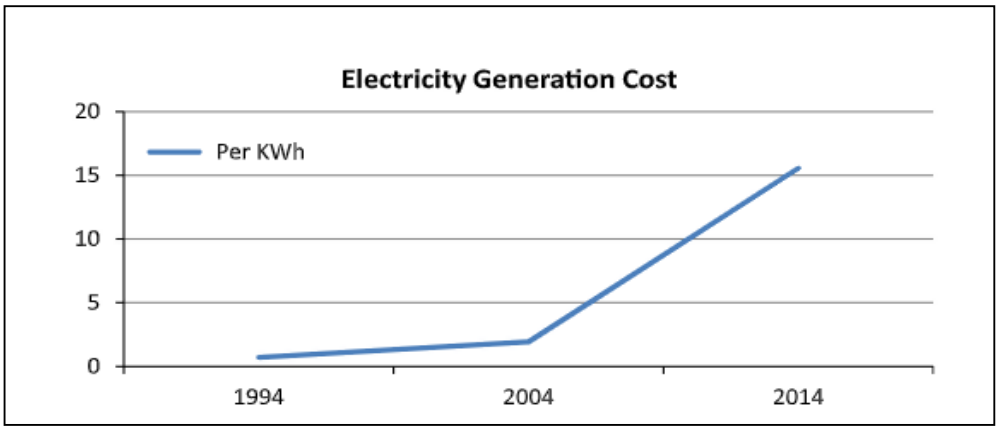


Figure 6. Electricity Generation Cost per KWh (in Rs).

Figure 7 illustrates the average cost of energy sources, showing that solar and wind cost less, and their costs are expected to continue to decline.

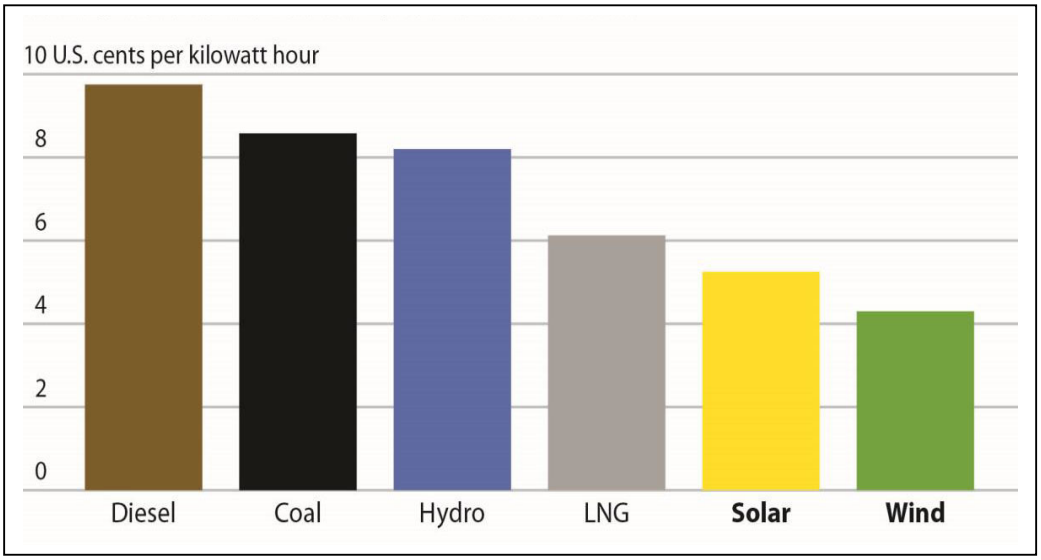


Figure 7. Average Costs Determined by NEPRA for Energy Sources in Pakistan.

Source: Nicholas & Buckley, 2018.

Figure 8 illustrates the declining use of fossil fuels, accompanied by the simultaneous growth in the use of wind and solar.

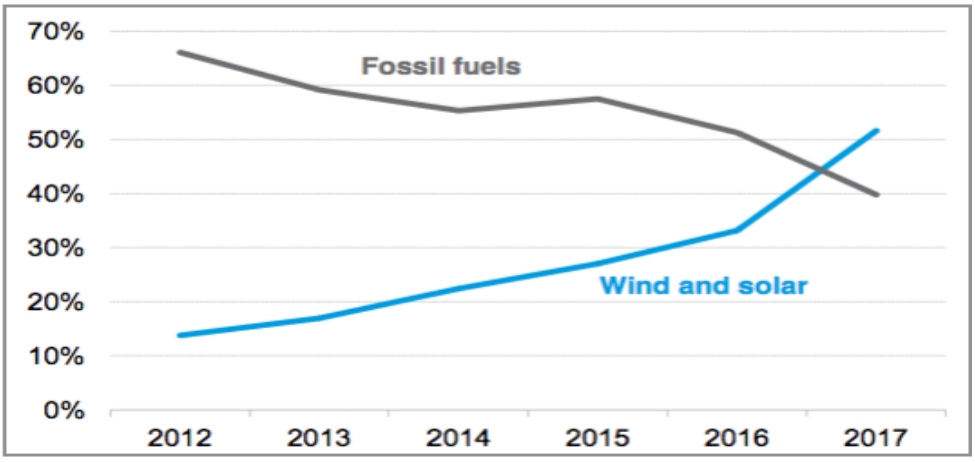


Figure 8. Future of Sources of Pakistan Power.

Source: Nicholas & Buckley, 2018.

However, since hydroelectric and thermal projects have been given priority, it is imperative to investigate their past generation to better understand the possible outcome (see Figure 9 below). Since its inception in 1960, hydro electricity generation has experienced ups and down, and after some decline, hydel enjoyed an uptick in the early 1980s before a sharp decline that lasted until 2015. On the other hand, thermal electricity generation increased from 1960 onward, despite suffering a steep decline in the early 1980s. According to estimates based on Early Harvest projects, hydel electricity generation may supersede thermal electricity. It seems likely that thermal electricity generation will continue to grow, as well as hydel electricity generation.

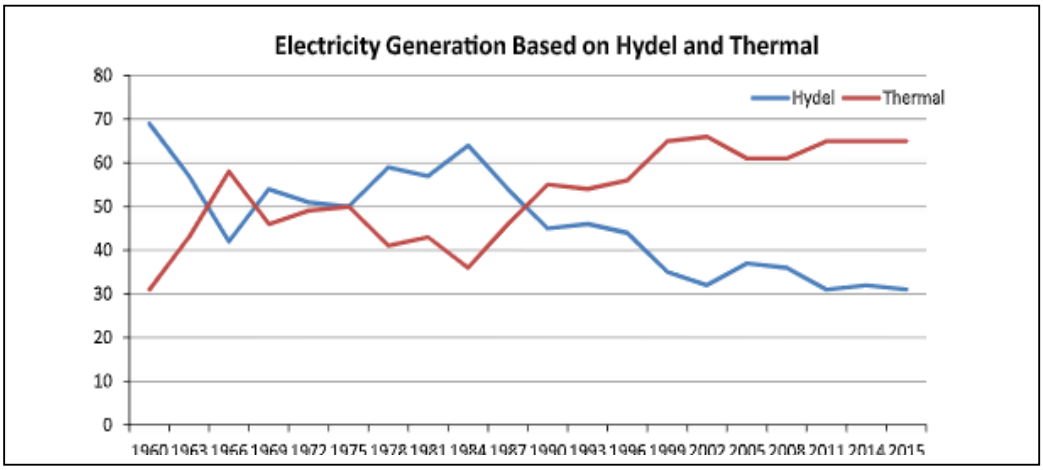


Figure 9. Decreasing Share of Hydel Electricity Generation (%).

Source: Shakeel et al., 2016.

Figure 10 illustrates the increasing demand for energy and the likely increase that would follow over time. It shows that the demand for electricity doubled between 2009 to 2016.

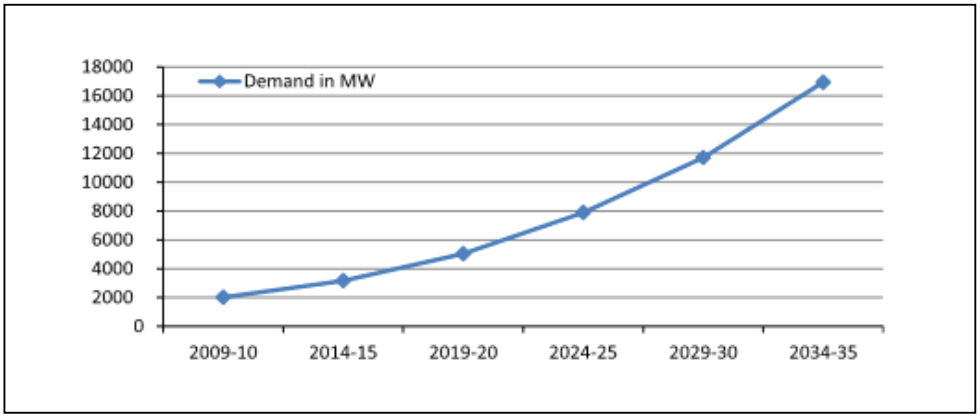


Figure 10. Electricity Demand Forecasts, 2011-2035.

Source: Shakeel et al., 2016.

According to recent estimates, there is a gap of 4,000 to 7,000 MW of power, which these projects must fulfill. According to this forecast, the next five years will see an 8,000 MW of demand, and by the completion of CPEC in 2030, there will be demand for 12,000 MW. The figure shows that prior to Early Harvest projects, the total production of the energy sector of CPEC is equal to 16,700 MW of production at its peak, which should satisfy demand by 4,700 MW by 2030.

## Current Operational Projects

Among the prioritized projects mentioned above, six are completed and are fully operational. Brief descriptions of each are provided below.

(1) Coal-fired Power Plants at Port Qasim in Karachi, Pakistan
Cost: $1.9 Billion; Capacity: 1,320 MW

| Project Name | Progress Update | Pictures |
|---|---|---|
| 2×660MW Coal-fired Power Plants at Port Qasim Karachi | • Financial Closed (FC) achieved<br>• Civil works on site started in May 2015<br>• Jetty completed<br>• Plant 2 months ahead of schedule<br>• Energization in October 2017<br>• Ist Unit Inagurated in November 2017<br>• Second Unit Commercial Operation Date (COD) 25th April 2018<br>• Project completed 67 days ahead of schedule<br>• Current Status: Operational |  |

(2) Coal-fired Power Plant, Sahiwal, Punjab
Cost: $1.9 Billion – Capacity 1320 MW

| | | |
|---|---|---|
| Sahiwal 2x660MW Coal-fired Power Plant, Punjab | • Financial Closed (FC) achieved on December 2015<br>• Project Completed in 28th October 2017<br>• Project has been connected to National grid<br>• Current Status: Operational |  |

(3) Hydro China Dawood Wind Farm, Gharo, Thatta
Cost: $112.5 Million – Capacity: 49.5 MW

| | | |
|---|---|---|
| Hydro China Dawood Wind Farm(Gharo, Thatta) | • Financial Closed (FC) achieved on March 27, 2015<br>• Commercial Operation Date (COD) attained 5th April, 2017<br>• Current Status: Operational |  |

(4) & (5) UEP and Sachal Wind Farms, Jhimpir, Thatta
Cost: $250 Million; Capacity: 99 MW
Cost: $134 Million; Capacity: 49.5 MW, respectively.

| | | |
|---|---|---|
| UEP Wind Farm (Jhimpir, Thatta) | • Financial Closed (FC) achieved on March 30, 2015<br>• Commercial Operation Date (COD) : 16th June, 2017<br>• Current Status: Operational |  |
| Sachal Wind Farm (Jhimpir, Thatta) | • Financial Closed (FC) achieved on December 18, 2015<br>• Commercial Operation Date (COD) attained 11 April, 2017<br>• Current Status: Operational |  |

(6) Three Gorges Wind Power Projects, second and third, Jhimpir, Thatta
Cost: $150 Million; Capacity 49.5 MW.

| | | |
|---|---|---|
| Three Gorges Second Wind Power Project<br>Three Gorges Third Wind Power Project | • LOS issued in August 2016.<br>• EPA initialed on 30th November, 2016.<br>• Financial Close March 2017.<br>• COD: Three Gorges Second Wind Farm(TGTWF) : 30th June, 2018<br>• COD: Three Gorges Third Wind Farm(TGTWF): 9th July, 2018<br>• Current Status: Operational |  |

Perhaps one of the most significant aspects of the energy development projects concerns how Pakistan's Vision 2030 agenda aligns with that of United Nations 2030 SDGs agenda. This follows implementation of a 15-year period of the Millennium Development Goals in Pakistan. During this period, many obstacles arose, such as

corruption, terrorism, and defiance of law and order. This caused the primary focus to shift toward relief and recovery, which proved to be effective in the long run.

The CPEC squarely supports several of the UN SDGs (Ali, 2018):

- SDG 7 (Affordable and Clean Energy),
- SDG 8 (Decent Work and Economic Growth),
- SDG 9 (Industry, Innovation and Infrastructure),
- SDG 11 (Sustainable Cities and Communities) and
- SDG 17 (Partnerships to Accomplish Goals).

Much of the cooperation between other developing nations occurred during meetings with the G77+China group, in which Pakistan participates. The efforts of the CPEC tackle some of the major barriers hindering economic development, such as bottlenecks, poor connectivity, and lack of foreign investment. More importantly, after the 2015 inauguration,[1] the newly installed government achieved its targeted number of sustainable development goals while resolving these barriers.

After considering the status of the bilateral projects under the CPEC, we can see the obvious high demand for energy, driven by an increase in Pakistan's population. At the same time, we see that energy generation in Pakistan is reaching a stalemate, with the ensuring effect that much of the country's energy is now imported. Because of the 4,000 to 7,000 MW gap, the CPEC project is necessary in order to bridge this gap, which will likely increase as the project moves forward, recover from the 2% to 5% annual GDP loss, provide affordable accessibility to the energy mix, and increase exports to jumpstart the economy. Based on this information, it is expected that these predicaments should be resolved upon the successful completion of the China Pakistan Economic Corridor.

[1] I was fortunate enough to witness the inauguration first-hand while interning at the Permanent Mission of Pakistan to the United Nations under Permanent Representative H.E. Maleeha Lodhi and Deputy Permanent Representative Nabeel Munir.

# Chapter III

## Infrastructure

One of the key factors that differentiates developed from developing nations is a country's physical infrastructure. A lack of basic facilities and physical infrastructure greatly hinders a nation's economic growth and prosperity. It is infrastructure that enables developed countries to thrive. The interconnectivity provided by ancient waterways (e.g., Tigress, Euphrates, Nile, Indus) enabled not just the transport of commodities but also the transfer of ideas, customs, and language throughout the Middle East and Asia—much like the original Silk Road enabled diverse nations to flourish centuries ago. The development of infrastructure uplifts production facilities, reduces transaction costs, and provides employment opportunities in developing nations. Conversely, the lack of infrastructure increases trade costs by 40% to 60%, which in turn suppresses economic growth (Nisar et al., 2017). Hence, the development of trade depends heavily on the development of infrastructure and its ability to support transportation and trade. In this chapter, I analyze various infrastructure projects in the CPEC to determine which provinces will experience the most and least infrastructure development and the corresponding impact this could have on each region.

The essence of the Chinese Belt and Road Initiative and the China Pakistan Economic Corridor is the following:

> To improve the lives of the people of Pakistan and China by building an economic corridor to promote bilateral connectivity, construction, exploration of potential bilateral investments, economic and trade, logistics and people-to-people contact for regional connectivity. (CPEC website, Vision and Mission)

With the construction of an economic corridor, CPEC offers an extraordinary opportunity for Pakistan to tackle major impediments to development, such as poor connectivity, dilapidated roads and highways, and a lack of interconnectivity in and between provinces. This mutual project between China and Pakistan is meant to signal a huge economic transformation for Pakistan by engineering new projects and ameliorating the current infrastructure. The effect will be to heighten development by promoting economic and socioeconomic development through the enrichment and elevation of underdeveloped regions and sectors

## Background

In the 1940s, the entirety of China contained about 70 cities; by 2007 there were about 670 cities—a nearly ten-fold increase. In 1980, China's urban population was 191 million; by 2007, that number had risen to 594 million (World Bank, 2008). That exponential population growth meant the nation was pressed to provide adequate support for its citizens. With a burgeoning population and low economic growth, China had to overhaul its economic system, along with its core infrastructure. A burst in GDP occurred between 1953 and 1978, typically increasing up to 6.7% annually (Congressional Research Service, 2019). With renovations and the creation of new infrastructure projects, China was not only able to accommodate for its swelling population in a relatively short period of time, but had also increased its GDP and presented itself as a robust competitor in the international market.

China is exemplary in Asia, a continent where many countries remain under-developed even as China continued to excel. China's railways extend over 10,000 miles of track, running 120mph to 150mph—longer than the rest of the world's rail networks combined. This is due to large-scale foreign investment and employment in

the transportation and infrastructure sectors. Such a scenario will be replicated in Pakistan as Chinese foreign labor workers build similar structures in Pakistan via CPEC. Major cities and provinces will be connected by access to high-speed highways, motorways, bridges, tunnels, and railways. Not only will this transform the outdated railway system in Pakistan but, more importantly, it will attempt to build on modern development patterns (Wang & Zhao, 2019). This development was made possible due to successful infrastructure construction in China, and it is expected that a similar level of potential exists in Pakistan. Unfortunately, a lack of connectivity both hinders economic success and thwarts the promise of globalization. It is hoped that CPEC will bring regional connectivity and create economic independence in Pakistan. Through construction of an economic corridor, CPEC offers an extraordinary opportunity for Pakistan to tackle its major development impediments, such as poor connectivity, dilapidated roads and highways, and a lack of interconnectivity in and between provinces. This mutual project between China and Pakistan is meant to signal a huge economic transformation for Pakistan by engineering new infrastructure and ameliorating the current foundation. The effect will be to heighten development by promoting economic and socioeconomic development through the enrichment and elevation of underdeveloped regions and sectors. The benefits of globalization experienced by developed nations is largely omitted from many rural and suburban parts of Pakistan. Infrastructure improvements take years before these improvements are fully integrated throughout the nation.

As outlined in the previous chapter, the energy sector of the economic corridor has received the major financial allotment of the project. The second largest allotment will go to infrastructure, with an allocation of approximately $10 to $11 billion (Rana, 2019), which would equal 26% of total planned investment for the various CPEC

projects. It is significant to note that some of the projects have been funded by the transport and communications sectors of the Pakistani government under the Public Sector Development Program (Ali, 2018).

There is one further point: the construction of Gwadar Port is critical to CPEC, since it is the most integral part of CPEC's infrastructure endeavor. If no deep-sea port were constructed in Balochistan, it is unlikely that China would have invested in the economic corridor.

It is should be noted that I found it difficult to gather substantive quantitative data, for two reasons: (1) the project has just emerged from its fledgling stages; and (2) the Pakistani government deliberately withholds information from the public for reasons it deems germane to national security. I did find a few reports from reputable articles to news outlets. Therefore, I conducted a qualitative analysis to provide the current status of infrastructure under CPEC and to highlight the likely impacts over the next decade as CPEC nears fruition in 2030.

## Current Infrastructure Projects Under CPEC

The transportation industry is one of the most vital economic sectors whose success is dependent on successful accomplishments in the infrastructure portion of the CPEC project. The transportation industry contributes 10% toward the nation's GDP, with highways and roads accounting for 96% of both passenger and freight transportation. The erosion of efficient transportation costs the country an average of 5% annually (Ali, 2018). Thus, improving these roads and railways will not only reduce transportation costs but will also diminish travel time while fostering safety and security for both goods and people.

The development of infrastructure stretches more than 2,000 miles and includes networks of highways, railroads, oil pipelines and optical fiber connecting Kashgar, Xinjiang in China's western autonomous region all the way to Gwadar, Balochistan, in Pakistan's southwest province. Within this vast area of land are numerous projects distributed among various provinces. Table 8 below lists each province and the expected projects therein. Some provinces have larger populations, others have large industrial factories. In any case, they will ultimately contribute to a growing, interconnected economy.

Table 8. Infrastructure Projects by Province.

| Province | Project |
|---|---|
| **Balochistan** | **16 Projects**<br>1. Khuzdar-Basima Highway (N-30)<br>2. D.I. Khan-Quetta Highway (N-50)<br>3. Hubco Coal Power Plant<br>4. Gwadar Power Plant<br>5. Gwadar-Nawabshah LNG Terminal & Pipeline<br>6. Gwadar Eastbay Expressway<br>7. Gwadar New International Airport<br>8. Gwadar Smart Port City Master Plan<br>9. Expansion of Multi-purpose Terminal, including Breakwater & Dredging Wastewater<br>10. Treatment Plants for Gwadar City<br>11. Gwadar Primary School<br>12. Gwadar Hospital Upgradation<br>13. Gwadar Technical & Vocational College<br>14. Gwadar Eastbay Expressway II<br>15. Fresh Water Supply<br>16. Gwadar Free Zone |
| **Sindh** | **13 Projects**<br>1. Matiari-Lahore Transmission Line<br>2. Matiari-Faisalabad Transmission Line<br>3. Port Qasim Power Plant |

| Province | Project |
|---|---|
| | 4. Engro Thar Power Plant & Surface Mine in Block II of Thar Coal Field<br>5. Dawood Wind Farm<br>6. Jhimpir Wind Farm<br>7. Sachal Wind Farm<br>8. China-Sunec Wind Farm<br>9. Upgradation of ML-1<br>10. Thar Coal Block I & Mine Mouth Power Plant<br>11. Gwadar-Nawabshah LNG Terminal Pipeline<br>12. Karachi-Lahore Motorway (Sukkur-Multan)<br>13. Joint Feasibility Study for Upgradation of ML-I |
| **Punjab** | **12 Projects**<br>1. Optical Fiber Cable from Rawalpindi to Khunjrab<br>2. Haier &<br>3. Ruba Economic Zone II<br>4. Kaachi-Lahore Motorway (Sukkur-Multan)<br>5. Joint Feasibility Study for Upgradation of ML-I<br>6. Upgradation of ML-I, Sahiwal Coal-Fired Power Plant<br>7. Rahimyar Khan Coal Power Plant<br>8. Karot Hydro-Power Plant<br>9. Lahore Orange Line Metro Train<br>10. Matiari-Lahore Transmission Line<br>11. Matiari-Faisalabad Transmission Line<br>12. Quaid-e-Azam Solar Park in Bahawalpur |
| **KPK** | **8 Projects**<br>1. Joint Feasibility Study for Upgradation of ML-I<br>2. Establishment of Havelian Dry Port<br>3. KKH II (Havelian-Thakot)<br>4. Upgradation of ML-1<br>5. KKH III (Raikot-Thakot)<br>6. D.L. Khan-Quetta Highway (N-50)<br>7. Suki Kinari Hydropower Project<br>8. Optical Fiber Cable from Rawalpindi to Khunjrab |
| **Total** | **49 Projects** |

Source: Malik, 2018.

Table 9 below identifies length and cost of each priority project. The longest and most costly is the Peshawar-Karachi Motorway, while the shortest and least costly is rail sector project for Havelian Dry port.

Table 9. Priority Infrastructure Projects.

| # | Project Name | Length (KM) | Estimated Costs |
|---|---|---|---|
| **Road Projects** | | | |
| 1 | KKH Phase II (Thakot -Havelian Section) | 118 | US$1,315 M |
| 2 | Peshawar-Karachi Motorway (Multan-Sukkur Section) | 392 | US$2,889 M |
| 3 | Khuzdar-Basima Road N-30 (110 km) | 110 | 19.19 B Rs |
| 4 | Upgradation of D.I.Khan (Yarik) - Zhob, N-50 Phase-I (210 km) | 210 | 76.486 M Rs |
| 5 | KKH Thakot-Raikot N35 remaining portion (136 Km) | 136 | 8.15 B Rs |
| **Rail Projects** | | | |
| 6 | Expansion and reconstruction of existing Line ML-1 | 1,830 | US$8,172 M |
| 7 | Havelian Dry port (450 M. Twenty-Foot Equivalent Units) | NA | US$65 M |

Source: http://cpec.gov.pk/infrastructure

Note: It is important to note that none of the projects mentioned above are yet operational, according to the official website.

The first project, the Thakot to Havelian section, began in August 2016 and is expected to be completed by 2020. As part of my thesis research, I found further details regarding this project:

- Phase I of the project ended in November 2018, and Phase II has begun.
- However, the website shows that only the first project has started into a second phase.

Although the project is scheduled for completion in 2020, the public remains uninformed regarding its progress. Neither is it mentioned specifically where, exactly, the work progression ends in the 70+ miles of the project, nor the remaining progress required before completion, or even simple progress updates. The only information given is demarcations of focus points. Concealing this information makes it difficult

for those communities that will be directly impacted by this project to understand the scope and impact of its effects, either positive or negative. This information is vital for the business community, which relies on transportation and groundwork for enabling trade to continue in the agriculture, textile, and service sectors. Similarly, other projects in the infrastructure sector encounter the same dilemma, and the lack of information may foment distrust among outside spectators and within the general population. It is not the responsibility of the public to extract information.

## Progress of Infrastructure Projects

The vast infrastructure projects in CPEC include not only pipelines, railways, motorways, and Gwadar Port, but also a fiber-optic cable network as part of the Early Harvest Projects. This was one of the first projects presented in 2007 when the early Memorandums of Understanding (MOUs) were signed under General Musharraf. The cable project cost about $45 million and was implemented by the Special Communications Organization, which is officially a sub-component of the Ministry of Information and Technology but was in fact run by the Pakistan Army (Boni, 2019). The fiber-optic cable aims to connect both China and Pakistan via a network that runs across the northern disputed areas of Pakistan. It also aims to show the good faith of the military, whose engagement is vital to the project and to the protection of foreign workers.

Although energy projects require the costliest payout, infrastructure projects require a longer time period and require more work. They are also the most beneficial in the short and long run, as opposed to energy-related projects that require a long-term vision because they are more beneficial in the long run due to timeliness of

constructing the power plants and determining distribution of energy. Table 10 shows infrastructure costs.

Table 10. Costs of Infrastructure Projects.

| Projects | US $Million |
|---|---|
| Energy | 33,793 |
| Transport and Infrastructure | |
| • Roads | 6,100 |
| • Rail Networks | 3,690 |
| • Gwadar Ports | 786 |
| Others | 44 |
| Total | 44,413 |

Source: CPEC.gov.pk

The first CPEC infrastructure projects was completed on October 31, 2016, when more than 100 containers from China arrived at the Sost Port in Hunza. On November 6, the shipment was transported from XinJiang to Balochistan, then a week later from Kashgar to Gwadar. Overall, the journey covered nearly 2,000 miles (Ahmed et al., 2018). The Chinese Ambassador to Pakistan at the time summarized the project best when he said: “It [CPEC] proves the connectivity of the local roads and realization of the concept of one corridor with multiple passageways.”

The most recent infrastructure project update from CPEC discusses construction of the New Gwadar International Airport, where a $4.4 million allotment has been recently issued for the 2019-2020 fiscal year (Rana, 2019). This will be crucial for businesses that rely on air transportation of goods and commodities.

Table 11 shows the progress of projects during the Early Harvest Phase; the three most progressive projects are that of the Lahore Orange Line Metro Train, the Optical Fiber Cable from Rawalpindi to Khunjerab, and Gwadar-Nawabshah LNG

Terminal and Pipeline. Three of the largest projects take place in the regions of Gwadar to Nawabshah, from Rawalpindi to Khunjerab and the last one in Punjab. This is due to the large urban population that rely on mass transport for both personal and business-related purpose.

Table 11. Progress of Infrastructure Projects.

| | | | |
|---|---|---|---|
| 1 | Gwadar-Nawabshah LNG Terminal and Pipeline, 700 km | To be inaugurated | 40 |
| 2 | Haier & Ruba Economic Zone Phase II | Feasibility stage | 15 |
| 3 | Optical Fiber Cable, Rawalpindi to Khunjerab | Under construction | 50 |
| 4 | DTMB Demonstration Project | Government MOU signed | 5 |
| 5 | Lahore Orange Line Metro Train | Under construction | 60 |
| 6 | Promotion of TD-LTE commercialization in Pakistan | Feasibility stage | 15 |

Source: CPECinfo.com

The following section provides recent updates about the progress of each prioritized project and assesses its likely impact.

## Detailed Impact Analysis of Major Projects

This section provides a recent progress update on each of the infrastructure projects. These estimates are from the CPEC website, where the Pakistan-China Institute is collaborating with China Radio International, whose goal is to connect China to the rest of the world by reporting global affairs to its international audience. This collaboration is intended to disseminate information and enable stakeholders to connect with CPEC by way of a comprehensive information collection system and verification mechanisms with stakeholders that are directly involved in order to

enhance their knowledge on the bilateral cooperation for mutual gains (CPECinfo.com).

1) The first major project is the KKH Phase II construction in the Havelian-Thakot Section:

| Project Name | Company Name | Status | Progress |
|---|---|---|---|
| KKH Phase II (Havelian- Thakot Section), 120 km | China Road & Bridge Corp | Under Construction | 70% |
| Project Description | Length: 120km<br>• Thakot-Havelian (120km) is in early harvest Project category, in implementation phase after signing of commercial and financial agreements.<br>• Start Point: Havelian<br>• End Point: Thakot<br>• Type of Road: Expressway/Access Controlled Highway (Class-II)<br>Responsibility:<br>• Proposing Agency: Ministry of Communications<br>• Implementing Agency: National Highway Authority<br>• Supervising Agency: Ministry of Communications, Government of Pakistan | | |
| Location | (Thakot -Havelian) Khyber Pakhtunkhwa | | |
| Province | Khyber Pakhtunkhwa | | |
| Estimated Cost | US$1,366 M | | |
| Executing Company/Sponsors | M/s China Communications Construction Company Ltd | | |
| Financing | Government Concessional Loan | | |
| Project Progress Update | • Work commenced in September, 2016<br>• Contractor mobilized<br>• To be completed by March 2020<br>• Havelian-Abbotabad-Mansahra (39 km) completed May 2018 | | |

Source: CPECinfo.com/transportation

2) The next prioritized project is the Karachi to Lahore motorway which is 70% completed as of April 2018. As of mid-2019, it is estimated to be 90% or more completed. This project is a 243-mile reconstruction of a section within the 683-mile motorway that begins in Karachi and runs through Hyderabad to Sukkur. The main parts of the project take place in the provinces of Punjab and Sindh. Much of this $3 million project was completed in April 2018, and the full project was scheduled for completion by August 2019.

| Project | Peshawar-Karachi Motorway (Multan-Sukkur Section) |
|---|---|
| Project Description | Length: 392km<br>• Karachi to Peshawar Motorway envisages construction/development of 6-lane access-controlled motorway having total length of 1,100 km. The proposed Motorway shall be a tolled facility. It shall originate from Karachi through Motorway M-9 (136 Km) up to Hyderabad. From Hyderabad onward, the proposed alignment shall run 345 km to Sukkur. The Sukkur Multan section, essentially follows the Left Bank of River Indus.<br>• Type of Road: 6-Lane, Access-Controlled Motorway<br>• Start Point: Multan<br>• End Point: Sukkar<br>Responsibility:<br>• Proposing Agency: Ministry of Communications<br>• Implementing Agency: National Highway Authority<br>• Supervising Agency: Ministry of Communications, Government of Pakistan |
| Location | Provinces of Punjab and Sindh |
| Estimated Cost | US$2,889 million |
| Executing Company | M/s China State Construction Engineering Corporation |
| Financing | Government Concessional Loan (GCL) |
| Supervising Agency | Ministry of Communications, Government of Pakistan |
| Project Progress Update | • Construction commenced August 2016<br>• Project Completed and inaugurated 5 November 2019 |

Source: http://cpec.gov.pk/project-details/29

3a) The project shown below, a study to determine the feasibility of upgrading the ML1 and establishing the Havelian Dry Port, is reported to be completely finished.

| Project Name | Company Name | Status | Progress |
|---|---|---|---|
| Joint Feasibility Study for Upgrade of ML1 and Establishment of Havelian Dry Port | China Railway | Feasibility study completed;<br>Framework Agreement signed | 100% |

Source: http://www.cpecinfo.com/road-infrastructure

3b) Following completion of the feasibility study, CPEC actually started the $65 million project to upgrade the ML1 and establish the Havelian Dry Port. The project will utilize railway land, railhead facilities, high-capacity stock, and an off-dock terminal to handle bonded import/export containers. The new port will sit 420 miles from China's borders. It improves the handling of goods and stock from shipments in and out of the region, including shipments from Khunjrab at the Chinese border.

The prioritized listing shows this project to be only 25% complete in April 2018 after being implemented in May 2017. As of mid-2019, the New Havelian Dry Port is likely 50% complete.

| Project Name | Company Name | Status | Progress |
|---|---|---|---|
| New Havelian Dry Port | TBD | Feasibility study completed. Project to be put on fast track. Framework Agreement signed in May 2017 | 25% |

4) The following project is a 68-mile long project approved in May 2017; as of April 2018 it was 25% complete; as of mid-2019 it is most likely 50% complete. A MOU was signed bilaterally for construction of this $80 million project. (CPECinfo.com).

| Project | Khuzdar-Basima Road N-30 (110 km) |
|---|---|
| Province | Balochistan |
| Cost | US$80 million |
| Project Progress Update | • Feasibility and PC-1 completed<br>• LOI forwarded to Chinese side<br>• Procedural formalities to be completed shortly (ECNEC approved project May 2017)<br>• Framework Agreement shared with Chinese side |

5) The penultimate prioritized project is Thakot to Raikot. The project is 85 miles long and costs approximately $720 million. Although the MOU was signed between the two nations, there is no concrete information about the completion of this project, except the reported completion of 25% of the project.

| Project Name | Company Name | Status | Progress |
|---|---|---|---|
| KKH Phase II (Raikot-Thakot section) 280 km | TBD | Feasibility and PC-1 completed.<br>LOI forwarded to Chinese side.<br>Procedural formalities to be completed shortly | 25% |

| Project | KKH Thakot-Raikot N35 remaining portion (136 km) |
|---|---|
| Est. Cost | US$719.8 million |
| Project Progress Update | • Feasibility and PC-1 completed<br>• LOI forwarded to Chinese side<br>• Procedural formalities to be completed shortly |

Source: CPEC.gov.pk, 2018

6) The last project, Dera Ismail Khan to Zhob, is 130 miles long and costs $195 million. The *Express Tribune* of December 11, 2018, stated that financing by China would be formalized by the CPEC Joint Cooperation Committee meeting on January 1, 2019.

The first portion is 30 miles long, with a four-lane motorway from Yarik on the Indus Highway to Sagu. It was approved in April 2017 and by April 2018 was 15% completed. At this rate, it is most likely at 25% completion.

| Project Name | Company Name | Status | Progress |
|---|---|---|---|
| D.I. Khan-Quetta Highway (N-50) 533 km | TBD | Feasibility stage | 15% |
| Project | Upgrade of D. I. Khan (Yarik) – Zhob N-50 Phase 1 (210 km) | | |
| Province | Khyber-Pakhtunkhwa-Balochistan | | |
| Cost | US$195 million | | |
| Project Progress Update | • PC-1 Approved by ECNEC, 12 April 2017<br>• Land acquisition in progress<br>• Framework Agreement forwarded to MOC | | |

Source: CPEC.gov.pk, 2018

Although it is difficult to measure the real-time updates, it is clear that no project is yet fully operational. Nevertheless, construction of such massive projects takes considerable time and precision. Each project must be dealt with carefully by technical engineers to ensure its long-term stability. After every project is completed, there is no doubt that the transportation sector will foster exponential growth for both trade and employment.

## The Gwadar Deep-Sea Port

The Gwadar Deep-Sea Port is the key component of the CPEC infrastructure initiative. This enormous deep-sea port will enable access to the Strait of Hormuz, the Middle East, East Africa, and regions surrounding the greater Indian Ocean. That

connectivity is attractive to foreign investors, offering the economic incentives that come with special economic zones.

Table 12 below highlights the progress of key Gwadar projects. Most are still in the rudimentary stage, perhaps one-quarter complete. The Gwadar Eastbay Expressway, Gwadar International Airport, and Gwadar Free Zone projects were approximately half completed by April 2018. By now they are probably three-quarters complete.

Table 12. Progress of Key Gwadar Projects

| Project Name | Company Name | Status | Progress |
|---|---|---|---|
| Gwadar Eastbay Expressway (19 km), connecting Gwadar Port to Mehran Coastal Highway | TBD | Government Framework Agreement Signed | 60% |
| Gwadar New International Airport | Civil Aviation Authority | Government Framework Agreement Signed | 40% |
| Gwadar Free Zone | China Overseas Ports Holding Company Ltd. (COPHC) | 1st phase completed | 60% |
| Gwadar Smart Port City Master Plan | TBD | Contract negotiations underway | 20% |
| Expansion of Multi-purpose Terminal, including breakwater and dredging | TBD | Feasibility stage | 15% |
| Gwadar Eastbay Expressway II (19 km) connecting Eastbay Expressway I to New Gwadar International Airport | TBD | Feasibility stage | 15% |
| Fresh Water Supply, Wastewater Treatment Plants for Gwadar City | TBD | Feasibility stage | 15% |
| China-Pakistan Faqeer Primary School Project | China Communications Construction Company Ltd. | Completed | 100% |
| Gwadar Pakistan-China Friendship Hospital Upgrade | TBD | Feasibility study underway | 10% |
| Gwadar Pakistan-China Friendship Technical and Vocational College | TBD | Feasibility study underway | 10% |

Source: CPEC.gov.pk, 2018

Among these projects, the China-Pakistan Faqeer Primary School Project is the only project shown to be fully complete. These projects show the name of one of

the few disclosed financing contributors: China Communications Construction Company, Ltd.

In addition to large-scale infrastructure projects, there are industrial cooperation projects (see Table 13) to engage various regions of Pakistan by resourcing mobility, economic integration, and information connectivity. By April 2018, the 435-mile Gwadar-Nawabshah LNG Terminal Pipeline was 40% completed, while the Lahore Orange Metro Train, financed by the China North Industries Group, is shown to be 70% complete as of April of 2018. At this rate, these two projects will probably be 60% and 90% complete, respectively.

Table 13. Industrial Cooperation Projects.

| Project Name | Company Name | Status | Progress |
|---|---|---|---|
| Gwadar-Nawabshah LNG Terminal and Pipeline, 700 km | China Petroleum Pipeline Bureau | To be inaugurated | 40% |
| Haier & Ruba Economic Zone PhaseII | Haier Electrical Applications Corporation Ltd. | Feasibility stage | 15% |
| DTMB Demonstration Project | TBD | Government MOU Signed | 5% |
| Lahore Orange Line Metro Train | China Railway-China North Industries Group Corporation(CR-NORINCO) | Under construction | 70% |
| Promotion of TD-LTE commercialization in Pakistan | TBD | Feasibility stage | 15% |

Source: CPEC.gov.pk, 2018

The infrastructure projects of CPEC, including industrial cooperation and the Gwadar construction projects, while less costly, also require more efforts to both prepare and complete than do projects in the energy sector. This conclusion is justified because none of the infrastructure projects are yet fully operational, whereas, the energy projects have at least six operational plants. Railway, pipeline, and

motorways can take years to complete, but if needed labor support is available, such projects will likely be complete sooner rather than later.

The upgraded infrastructure will foster greater connectivity in and between provinces via network of connection for roads and motorways, including pipelines for direct trade access. Additionally, neighboring regions, such as Iran and Afghanistan, will also enjoy positive spill-over effects since improved transportation will allow greater mobility, which ultimately creates more stability and trade within the vicinity. For these reasons, the infrastructure portion of the CPEC will promote businesses and consumers and allow greater economic development for Pakistan.

# Chapter IV

## Trade

The Belt and Road initiative, also known as the New Silk Road, emulates the ancient Silk Road. What facilitates connections between regions that are naturally separated by mountainous areas and bodies of water is: trade. This also encourages the exchange of language, ideas, and culture. Mutual attention to local economies and trade is a prime example of how such cooperation between nations can benefit their general populations. One of the primary purposes of the CPEC is for both China and Pakistan to reap substantial trade benefits not only with each other but also with other nations in the region.

Key factors for facilitating regional trade include transportation, special economic zones (SEZ), and foreign direct investment (FDI). Transportation is comprised of two parts: transportation (such as trains and vehicles), and the associated infrastructure of transportation (including motorways and railways). A lack of well-functioning transport infrastructure results in a slow-moving economy and less cooperation. For the status of transportation, please refer to the previous chapter.

Trade is an integral factor leading to mutual prosperity in the China-Pakistan Economic Corridor. I will analyze the crucial factors affecting trade and the effects of trade on the wider region. From a bird's eye perspective, the import and export sector of Pakistan appears to be imbalanced due to persistent import dependencies which inevitably lead to an ever-increasing trade deficit. Figure 11 below shows that in every fiscal year from 2004 to 2018, Pakistan's balance of trade has deteriorated steadily, exacerbating the imbalance every fiscal year.

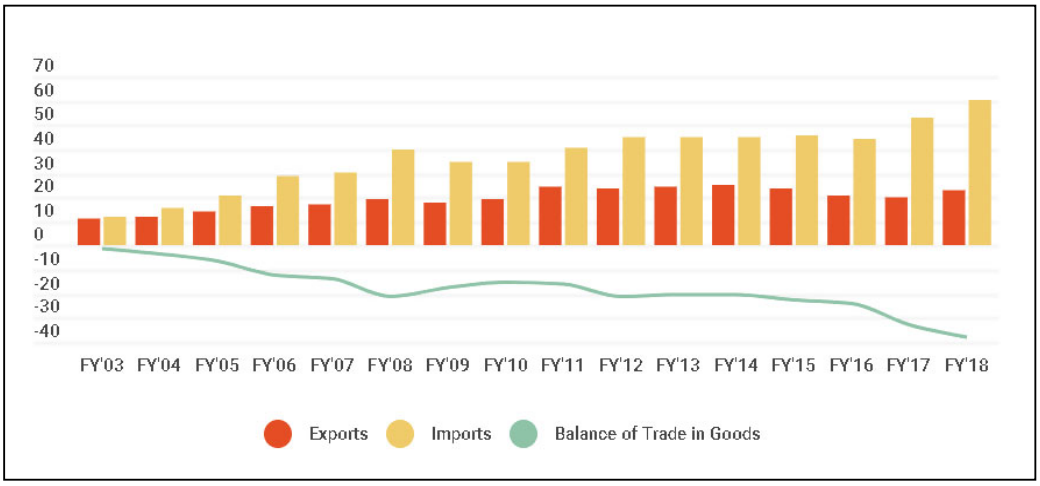


Figure 11. Balance of Trade in Goods.

Source: Syed & Rehman, 2019.

As Figure 11 above shows, exports have generally been stagnant, whereas imports have generally increased every year. Any nation's economy cannot flourish if there is little or no activity on both sides of the trade coin. One-sided trade will skew an economic relationship and create habitual reliance that can derail the economy.

Pakistani exports include both commodities and services. While many countries have a variety of commodity exports, Pakistan is most successful in the commodities shown in Figure 12 below.

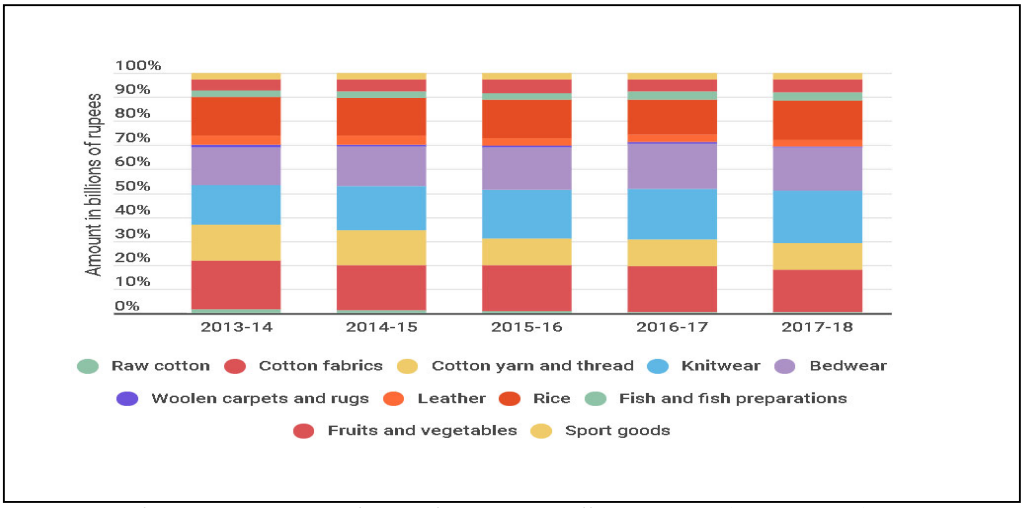


Figure 12. Exports by Major Commodity Groups (2013-2018).

Source: Syed & Rehman, 2019

The heavyweight among commodity exports from Pakistan is cotton fabrics, which is the highest export every year. Despite that fact, in 2013-2014 exports amounted to 20.3%, and have steadily decreased every year; now the amount hovers around 17%. The second most exported good from Pakistan is knitwear, with exports of 16.8% in 2013 and 2014, and incrementally increasing to 21.72% in the 2019 export cycle. The third most popular exported commodity is bedwear, which amounted to 15.7% of total exports six years ago and now has increased to 18.1%. The last large export comes from the food industry: rice. Six years ago, rice totaled 15.9% of Pakistan's export economy; in 2019, increased by less than 1%, to 16.4%.

In terms of services exported, commercial services are a key component. In 2014, exported commercial services amounted to nearly 38% of exports, and in 2019 the segment increased to 43.2% of the export economy. The second-largest export service is government goods and services. This segment composed 24.2% of the export economy in 2014 but had shrunk to 13.5% in 2019—a 10% decline. The third-largest export segment is tied between business services, transport and telecommunications, and computer and information services. The transport segment in 2014 made up 14.6% of total exports but dwindled to about 9.2% by 2018. The business services segment made up 8.8% of the total economy in 2014 and increased to 15.5% in 2018. Finally, telecommunications and computer & information services held 8.65% of the export economy in 2014 and rose to 11.7% to 2018.

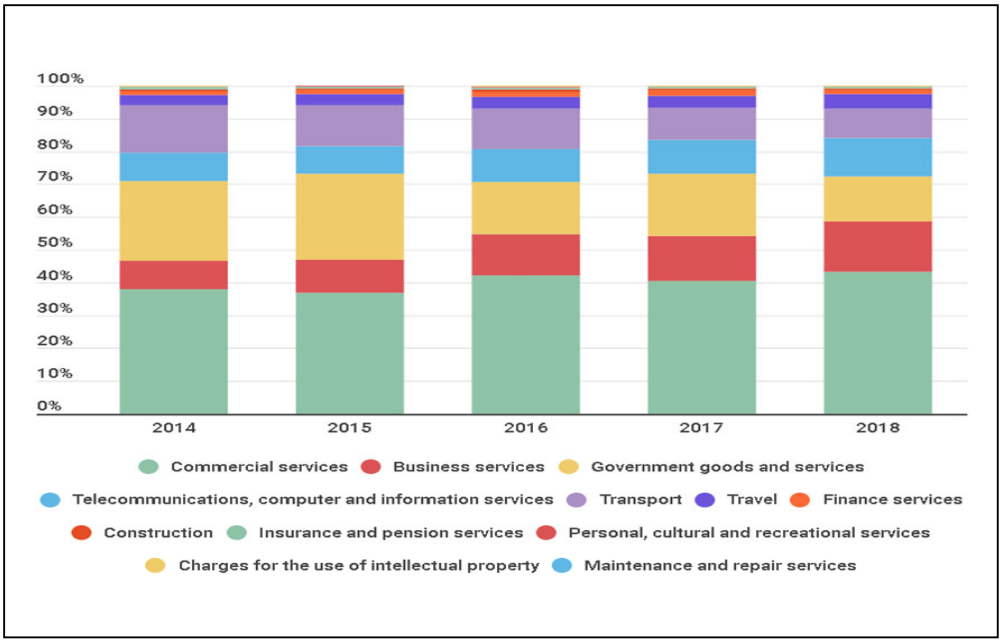


Figure 13. Exports of Services (2014-2018).

Source: Syed & Rehman, 2019

Compared to China and India in terms of overall contributions to trade, Pakistan exports the least of the Central Asian countries. Typically, trade between neighboring countries is usually high, the question must be asked: why is trade between these neighboring nations so low? For example, Tajikistan is only 260 miles away, yet exports from Pakistan to Tajikistan were only $8.6 million in 2017 (Syed & Rehman, 2019). It seems likely that the trade stalemate cannot be blamed on low exports but on the decline of trade relations between Pakistan and its neighboring states.

Of special note is Pakistan's agricultural trade sector. Although goods and commodities comprise much of the export economy, Pakistan's economy is largely agricultural, contributing approximately 25% to the national GDP and employing 45% of the country's workforce. Agricultural work is the central source of work for 70% of the rural population (Raza et al., 2019).

## Special Economic Zones

Special economic zones (SEZ) are essential to the economies of developing nations. A SEZ is essentially a demarcated area designed to encourage industry, manufacturing, and services for exports. SEZs are generally characterized by more liberal economic policies than those governing the country in which the SEZ is located. The goal is to attract foreign capital, boost exports, and create jobs. Special Economic Zones also stimulates industries and improves existing infrastructure. A handful of countries in Asia (particularly China), have set aside land for Special Economic Zones, and have considerable experience in building SEZs for the sole purpose of encouraging investment and employment.

One of the most successful SEZs is the example of Shenzhen, China. Originally it existed as a small city of 310,000 residents and fewer than 30,000 workers. By the end of 2000, however, the population had grown to 4.3 million and its labor force to 3.1 million. Shenzhen City designated four of its nine districts as SEZs, comprising a total area of 493 sq. km. In 2010, the SEZs were expanded to include all the rest of the city (Shenzhen City, 2019). The SEZ collectively attracts about $2.8 billion, with an 86% annual growth of its industrial output. Shenzhen is located close to Hong Kong and both areas enjoy close trade relations, with 80% of its foreign investment coming from Hong Kong (Yeh, 1985).

The incentives provided in Pakistan's SEZ Ordinance of 2012 (and amended in 2015) foster an investor-friendly status for both domestic and foreign investors in Pakistani SEZ. The amended ordinance of 2015 was an effort by Pakistan's government to create an environment that was conducive to both domestic and foreign investments through business conception opportunities which would lead to job creation, technology transfer, and further the development of industrial infrastructure.

For instance, in Bangladesh, the total SEZ employment swelled to some 144,000 in 2003-2004; in Sri Lanka, the SEZs account for 10% of manufacturing employment (Malik, 2018). Table 14 identifies the SEZs currently functioning in Pakistan. Under the CPEC agreement, the government plans to launch SEZs in each province in order to enhance trade, investment, and the socioeconomic status of people through job creation for both skilled and unskilled workers.

Given the significant rate of youth unemployment, creating SEZs (in addition to other innovative solutions) is critical for jumpstarting the economy. There are approximately 4,800 SEZs worldwide, with Pakistan receiving inflow of $2.5 billion in 2016 and $2.8 billion in 2017 by attracting foreign investments related to the Belt & Road Initiative for CPEC (World Investment Report, 2018).

Table 14. CPEC Special Economic Zones.

| # | SEZ Project Names | Area covered | Industries Supported |
|---|---|---|---|
| 1 | Rashakai Economic Zone , M-1, Nowshera | 1,000 acres | Fruit, food, textiles |
| 2 | China SEZ, Dhabeji, Sindh | No description available | No description available |
| 3 | Bostan Industrial Zone, Balochistan | 1,000 acres | Agriculture, pharmaceutical, auto mechanics, ceramics |
| 4 | Allama Iqbal Industrial City (M3), Faisalabad, Punjab | 3,000 acres | Textile, pharmaceutical, agricultural, plastics, steel |
| 5 | ICT Model Industrial Zone, Islamabad | 200-500 acres | Food processing, printing and packaging, pharmaceutical medical |
| 6 | Industrial Park at Port Qasim near Karachi, Sindh | 1,500 acres | chemical, steel, pharmaceutical, textile steel |
| 7 | SEZ at Mirpur, AJK | 1,100 acres | Mixed industries |
| 8 | Mohmand Marble City FATA | No description available | No description available |
| 9 | Moqpondass SEZ, Gilgit-Baltistan | 250 acres | marble/granite, steel, iron ore processing, fruit processing, mineral processing, leather |

Source: http://cpec.gov.pk/special-economic-zones-projects

With the establishment of these SEZs, economic strain will be alleviated, bringing about a reinvigorated era of industrialization characterized by strong employment opportunities and a better livelihood for the population. The total territory of all the SEZs amounts to 9,350 acres of land. This is enough to encourage trading activity and foreign direct investment into each province.

## Foreign Direct Investment

Foreign Direct Investment (FDI) is crucial for countries with developing and/or transitional economies. It helps to guide a country toward accomplishing sustainable economic growth that will, in turn, permit economic integration. Just as SEZs function in part as an invitation for investment, FDI links the economies of diverse countries, with the host country promoting its products in the global market by creating, in many cases, a crowd-in effect on regional economics. In a ripe environment, FDI has a positive impact on productivity and growth through the transfer of technology and managerial expertise. It encourages faster economic growth through the infusion of capital, advanced technology, and development of human capital (Malik, 2018). Many Asian countries have provided FDI, including China, Hong Kong, Singapore, and, more recently, Kyrgyzstan. International trade has doubled, and FDI flows have increased dramatically over the last few decades.

The CPEC package represents the largest FDI into Pakistan in the past 60 years, but especially from 2015 to 2018. FDI from China reached $593.9 million in 2015-2016, making China the largest FDI partner in Pakistan (Wang & Zhao, 2019). Institutions like the China Development Bank and the Export-Import Bank of China were specifically developed to amass investment capital to pour into developing economies.

One investor in the Faisalabad SEZ voiced his opinion about the role of FDI in SEZs. Kashif Ashfaq of the Faisalabad Industrial Estate Development and Management Company (FIEDMC) took the initiative to attract local and foreign direct investment from more than 20 Chinese companies at the Allama Iqbal Industrial City. At the time, he remarked that the Pakistani government had decided to finance the cost of providing gas and electricity to all the SEZs of FIEDMC (Kiani, 2019). He also mentioned that the 40 MW grid in the energy sector station has already been completed, and an additional 20 MW would be required by December 2019, as sales had already started. This offers an indication that SEZs are being directly impacted by FDI.

In 1963, China offered $50 million as an interest-free loan to Pakistan to be used for economic and infrastructural development; between 1965 and 1971, China provided foreign aid totaling an estimated US$445 million (Hussain, 2017). Pakistan and China's Infrastructural friendship continued to solidify, which is when the construction of the Karakorum Highway took place; there is no natural geographical partition between the two nations, except for the incredible Himalayan mountains. Though the natural border is difficult to traverse, people have managed to maneuver through the mountains for many years. This outdated border-crossing method fell obsolete upon the inception of the Karakoram Highway (1959-1986), which formed the very first step of physical connectivity between the two Asian neighbors.

Chinese assistance in Pakistan began to appear and solidify during the early 2000s when Premier Zhu Rongji committed China to a $198 million support package for the first stage of the new seaport of Gwadar in 2001. At the time, the completed project was to have the same capacity as that of the Karachi port. That same year, China pledged an additional $250 million to assist in the modernization of the old

railway system. Two years later, in 2003, China committed $500 million for the modernization and development of the railway system and production of new tracks. The same talks included construction of highways north of Gwadar to Dalbandin and east from Gwadar along the coast of Makran (Garver, 2006). All this activity signifies that the idea of utilizing Gwadar had been considered through many administrations. Momentum was the only missing piece, and that was found with the establishment of the Belt and Road Initiative.

This physical link from China to Gwadar resembles the point in time when Egypt became the center of physical connectivity upon completion of the Suez Canal in 1869, or when the Panama Canal was completed in 1914. The development of regional connectivity, affecting both maritime and land routes, represents a critical moment in regional trade and economics, made possible only through multi-billion dollar, state-backed projects. The Suez Canal's main objective was to obtain large amounts of FDI, which would consequently increase foreign exchange earnings, support export-oriented growth toward integration into the global markets, reduce widespread unemployment with many jobs, and support wider economic reform. Likewise, the primary objectives of the Panama Canal were to increase profitability and productivity, efficiently manage large volumes of trade, and implement business practices that would enhance good corporate governance. Similarly, CPEC offers connectivity by allowing access to the Ocean, maritime pathways, bridging the energy demand gap, providing employment, and improving the population's overall standard of living (Nisar et al., 2017).

Table 15. Pakistan-China Bilateral Trade, 1960 to 2014 (US$ million).

| | |
|---|---|
| 1960 | 18.3 |
| 1970 | 73.4 |
| 1980 | 401.6 |
| 1990 | 424.6 |
| 2000 | 722.1 |
| 2010 | 10.854.7 |
| 2011 | 11,211.6 |
| 2012 | 13,061.14 |
| 2013 | 15,033.02 |
| 2014 | 17,082 |

Source: IMF, 2015.

Table 15 delineates the amount of bilateral trade between China and Pakistan. Trade relations increased with each consecutive decade, with a dramatic rise between 2000 and 2010. This was chiefly due to the 2007 Free Trade Agreement (FTA) which was proposed to boost mutual trade. After signing the FTA and creating the CPEC, bilateral trade rose to $17 billion by 2014, and by 2019 it has grown to $19 billion (Wang & Zhao, 2019).

In July 2013, 52 memorandums of understanding (MOU) were signed bilaterally for CPEC projects. Pakistan's Prime Minister Nawaz Sharif emphasized the various projects in his first address to the nation. The MOUs would be overseen by the Joint Cooperation Committee (JCC) which is the CPEC body where all decisions are taken and approved at meetings held biannually (Khan & Sargana, 2017). After signing the second "Free Trade Agreement Panacea for Socio-Economic Development in Pakistan 2019," Hassan Daud Butt, Project Director of CPEC, said that the CPEC is now entering its second phase, and the new FTA supports the planning of the new phase. He noted that difference between the previous and current FTA is that this time the current government and its officials are working on negotiations with their counterparts in China to safeguard policies to (1) protect local

industries, (2) include a system of balance of payment, and (3) add a robust system of data-exchange to account for issues regarding goods and commodity services so that both sides can contribute even more. He went on to say that the previous FTA included many challenges but negotiations under the current FTA should be able to achieve great results since the government is working as quickly as possible on trades and negotiations.

The FTA further stated some specifics of the meeting including reasons why industry is not increasing, especially for products where Pakistan has a natural endowment, such as agriculture and textile, where there has been a significant decrease in exports. The top priority under the new prime minister is the ease of doing business, especially for industrial cooperation. He ensures that the government is engaged and active in this sector, that new technological data can be exchanged, and that investors have confidence their investments are taking place in the most conducive markets in Pakistan.

Table 16 provides an overall picture of Pakistan's regional trade in 2014. It is clear that trade with China is by far the most expansive at $17 million. Trade with other neighboring countries run considerably less: India amounts to approximately $2.9 million, Iran $2.3 million, and Afghanistan $2.4 million. What is most striking about the regional trade is the sharp imbalance between the import and export. The total export in 2014 amounted to only $5.7 million, but the import had amounted to about $19 million – more than three times the total export! Under the status of trade, it becomes evident that Pakistan must export more than it imports, or – at the very least – should balance up to par.

Table 16. Pakistan's Regional Trade with Neighbors, 2014 (US$ million).

| No | Country | Exports | Imports | Total |
|---|---|---|---|---|
| 1 | China | 2,509 | 14,573 | 17,082 |
| 2 | India | 481 | 2,400 | 2,881 |
| 3 | Iran | 501 | 1,801 | 2,302 |
| 4 | Afghanistan | 2,222 | 195 | 2,417 |
| Total | | 5,713 | 18,969 | 24,682 |

Source: IMF, 2015.

## The Likely Impact of Trade on the Economy and Regional Influence

The impact of trade at this scale is colossal. Trade influence reach not only urban and rural environments, but also across state borders. For example, Tehran and Islamabad have long desired a pipeline, but Pakistan has not been able to build its share due to financial constraints. China has indicated its commitment to finance this project under the CPEC banner (Kugelman, 2017). The likely impact will be reduced oil imports from Saudi Arabia and other Middle Eastern countries and increasing amounts of oil imports from Iran and/or other regional allies. Because something similar to CPEC is not yet available in India, Pakistan is using its advantage to attempt an economic transformation by generating new infrastructure and connectivity through China to efficiently shorten both the distance and speed access to large international markets.

CPEC is guiding Pakistan on a path to become a transit state in South Asia by using the strategic location of Gwadar to provide access to the Arabian Sea, Persian Gulf, and Indian Ocean. It is a true symbol of trade connectivity. The closest primary ports near Gwadar Port are Iran's Chabahar port; Oman's Muscat port; the UAE's port of Jebel Ali; and the three Saudi ports: Al Jubail commercial port, King Fahad industrial port, and King Abdul Aziz (Dammam) port. The passageway that connects

all these locations to the rest of the world is the Strait of Hormuz. Gwadar's strategic location near the Strait of Hormuz, which widens into the Arabian sea, makes it the ideal pathway for China to circumnavigate the bottlenecking and piracy that is rampant in the Strait of Malacca (see Figure 14). This would encourage the flow of energy resources to the thriving industrial capacity in China, which continues to expand. For these reasons, China has chosen to invest in this project in order provide the country better access to regional resources over the long run, while also enabling Pakistan to revamp its economy and steer the nation into a new era.


Figure 14. The Strategic Location of Gwadar Port from China and Other Ports.

Source: Belt & Road News, 2019.

India is also affected by trade under CPEC. For example, India estimates that national use of natural gas will double from 7% to 15% by 2022. The country is also looking for alternatives to oil-based products, including power generation and transportation (Kugelman, 2017). In 2016, India signed an accord with Iran and Afghanistan to develop the Chabahar seaport in southern Iran and to build a railroad

from the port to the Afghanistan border to provide India with the best route for direct access to central Asia. If this aim is realized, it will enable the country to transport energy supplies and imports via railroad and sea.

Moreover, due to the U.S. administration's tight sanctions currently in place on Iran, this may complicate New Delhi's ability to finance the project with Iran and Afghanistan. India has also turned its attention to the Act East policy (Kugelman, 2017) which aims to foster deep engagement with India's Asian neighbors and is now in the process of exploring energy opportunities in the broader Indo-Pacific region, spurred on by high energy demands. For example, India and Bangladesh have worked out arrangements whereby India provides electricity to Bangladesh, and in return Bangladesh provides Internet bandwidth (Kugelman, 2017).

# Chapter V

## Human Capital

One of most important sectors in the CPEC is human capital, defined as the investment of people surging into a country, and the resolution of inevitable domestic issues. When a country experiences an influx of foreign labor, it can undermine the potential of the host country's own domestic human capital. With hundreds or thousands of laborers arriving into a host country, it also gives economic incentives to a foreign nation's economy. It is akin to outsourcing work, which is beneficial for Company X but detrimental to the host country's economy as a whole.

In the case of CPEC, foreign investments alone will not bring prosperity when the nation is inundated with foreign labor to work on a multi-billion-dollar project. Human capital is significant to every nation's agenda in its natural utilization of potential and promotion of economic growth. For persistent growth, the best industry in which to invest in is, in fact, human capital. This means an investment in education and other ways of tapping human potential for long-term use. National capacity is essential for providing an environment that enables individuals, corporations, and markets to flourish.

Human capital development is the practice of investing in people as an important resource. In a long-term scheme, companies and countries function more efficiently when they apply human capital effectively. According to the Global Human Capital Report, in the section of Global Human Capital Index, the top performers in 2017 were small European countries such as Switzerland, Norway, and

Finland, along with Germany and the United States. Pakistan ranks 125 with a score of 46.34 (World Economic Forum, Global Human Capital Report, 2017).

Human capital and human development are two distinct categories. Human capital can be defined broadly to cover value, but it is primarily defined in terms of human qualities that can be employed as "capital" in production, the same way physical capital is usually defined. Consequently, the capacity of a human improves through education and becomes more valuable based on economic measurements. Moreover, education leads to a better understanding of health care, socioeconomic status, and other factors that promote economic liberty (UNDP, National Human Development Report, 2017). This social development manifests itself in the promotion of productivity and economic growth. If capital invested in education makes one a more efficient commodity of production, then this becomes the realized potential of human capital as it adds to the value of economic production (and salary/income to the beneficiary). Likewise, the same individual, with the increased value of education, also benefits from reading, communicating, discussing, and so on. The fruits of education thus extend well beyond its role in human capital in the production of commodity. This broader human resource development and human capability are closely related.

## Current Status of Human Capital in CPEC

Pakistan is a diverse nation with an array of geographic landscapes, languages, and governance styles. It has a population of 220 million, with nearly 50% under 30 years of age. This accentuates the potential for economic development via human capital. How companies and economic agencies in the government tap into this abundance of human capital is dependent on strategic management. Currently,

Pakistan annually loses thousands of professionals and laborers to the Middle East, Europe, and the Americas, and these losses remain consistent year after year (Asghar, 2019). The underlying cause of this problem is a prevalence of companies and agencies in Pakistan that are unwilling or unable to hire skilled and unskilled laborers and even recent graduates of universities, including those who are highly trained in professions such as technology, medicine, and engineering.

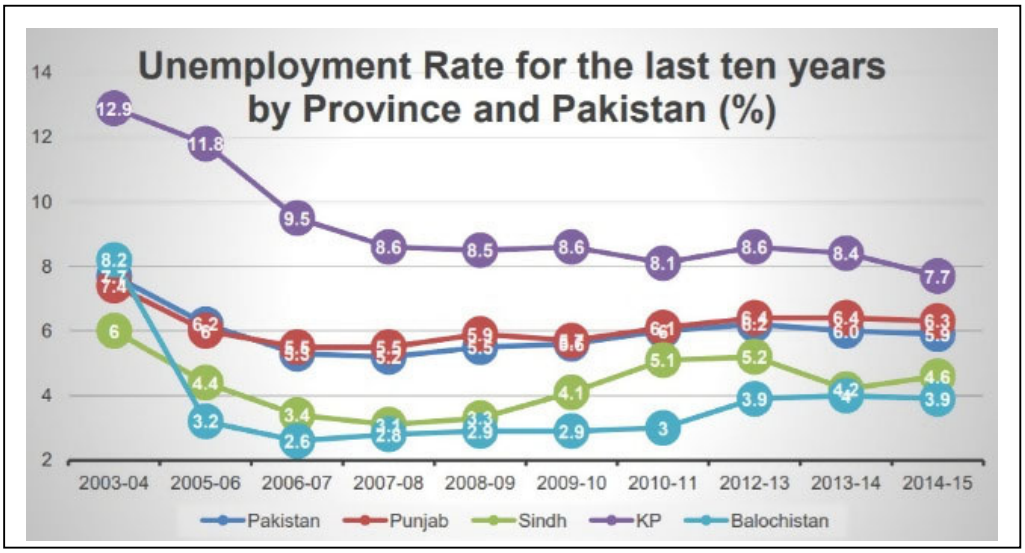


Figure 15. Unemployment Rate in Pakistan.

Source: Public Bureau of Statistics, 2018.

Inversely, current policies benefit foreign workers because their own country is not pursuing development in human capital. In order to satisfy the demand for jobs, workers (mostly Chinese) are working in developing nations that have low human capital, which only exacerbates the entire downward spiral of unemployment and lack of human capital development. For example, the United Arab Emirates, Bahrain, and Oman all experienced a 6.27%, 4.41%, and 3.75% decline, respectively, in incoming laborers in 2016. On the other hand, Qatar and Kuwait have increased their absorption

of semiskilled and skilled laborers from Pakistan who work in technical construction and development projects. This is owed partly to Qatar's *Vision 2030* (Nisar, 2019).

Low supplies of human capital and the lack of skills development has had a detrimental impact on socioeconomic growth and development by creating high levels of unemployment each year. Nearly 2.5 million Pakistanis enter the job market while, currently, the unemployment rate stands at 6%. This is due not only to the requirements of skilled labor to perform a job, but a more general lack of specific skillsets needed to enter the job market. The discrepancy exacerbates the problem, causing two issues: either skilled candidates usurp all the area's available jobs, or others emigrate for work to other countries and, eventually settle there. Pakistan is facing a human capital crisis, and a viable solution must be identified, especially to support the continuing progress of CPEC.

Pakistan's Planning Commission released figures in 2017 which showed the employment of 30,000 Pakistani engineers for an array of projects, including the Port Qasim coal power plant, which employs 5,000 Pakistanis; with Sahiwal coal power plant, which employs 3,000 Pakistanis; the Karachi-to-Peshawar Motorway will employ 9,800 Pakistanis; transport-related projects with KKH Havelian, Orange Line Metro in Lahore, which Fiber Optic predicts it will employ around 13,000 people; and the Gwadar deep seaport project is expected to provide both direct and indirect jobs to 2,500. In addition, Chinese citizens account for 8,000 workers in the Early Harvest Projects. Overall, the Planning Commission predicts projects between 2015 and 2030 will employ some 700,000 to 800,000 skilled and unskilled workers. This would add approximately 2% to 2.5% in annual economic growth (*Express Tribune*, 2018).

## Impact Analysis of Human Capital

One dilemma facing Pakistan is the adverse relationship between a serious deficiency in qualified human capital and high levels of incoming talent. With more incoming talent, there is less local development of human capital potential, which leads to a vicious cycle that threatens both the economy and employment. For national development to excel, the quantity of qualified candidates must accelerate for national development breakthroughs to occur, especially while undertaking the CPEC multibillion-dollar project, and others that may appear in the longer term.

If we compare the regional economies of Singapore, Japan, and Hong Kong, a major component of their strategic development pivots on human resources that align with 21st century development requirements. For instance, Singapore's strategy for developing human capital is grounded on a multi-prong approach that includes (a) large-scale investments in educational infrastructure, (b) quality of teaching and high-performance educational outcomes in investment capital, and (c) integration of the nation's education curriculum to a systematic talent strategy for identifying the best performers and providing opportunities for their career development (Asghar, 2019). This is an excellent example of how a developing economy can use a conducive environment to advance human capital potential and development using education and development practices to its utmost potential.

There must be economic policies that incentivize national organizations and companies to hire local workers to serve in their city, village or province. This brings forward more opportunities and broadening expertise within the towns and provinces. The focus should be on attracting local employment and investment. This would offer the necessary boost to economic entrepreneurship and social creativity, helping to guarantee long-term economic development.

For a country to gain comparative advantage in human capital, both the public and private sectors must work in tandem and invest for public-private partnerships to thrive. If the private sector is investing heavily in skill development, such as information technology and computer systems and manufacturing, the government must also strive to invest in human development with skills largely unaffected by the rise of automation, such as effective communication (i.e. email, phone calls, etc.) and soft skills (*Financial Daily*, 2019).

Since China has made large-scale investments in Gwadar with a focus on infrastructure and energy, Pakistan must take advantage of this and teach human development in terms of oil, transport, infrastructure, etc. The New Silk Road investment is not exclusively monetary, but also involves human development and skills resources; however, it is up to the benefitting country to make abundant use of these resources.

# Chapter VI

## Summary and Conclusions

Pakistan's highest rate of growth was during the economically prosperous decade of the 1980s. During this time, the annual GDP measured 10.2%, while average growth at the time was 6.1%. The first era of economic growth came during the 1960s, while the most recent strong growth occurred during the 2000s, measuring an average rate of 7% to 7.5%. Will the forthcoming decade be the next prosperous era? Does Pakistan's economy meet the preconditions for prosperity? I believe the execution and operation of CPEC is a strong indicator.

The link between poverty and extremism in this region of the globe lies just below the surface and is a common phenomenon. Poverty is a threat to various nations and sometimes facilitates the emergence of differing radical ideologies, irrespective of faith or region. In Pakistan, economic deprivation has led to forms of terrorism. For example, annual economic growth in Balochistan is low, and insurgency and extremism are prevalent, showing up both before and then after the inception of CPEC. A terror attack in Khyber Pakhtunkhwa or Balochistan along the CPEC route would undoubtedly cause damage to the CPEC project. Militancy is rooted in the rise of extremist tendencies that form at the societal level (Tehsin, Khan & Sargana, 2017). This was the dilemma facing the Musharraf administration: reforms were good, but not good enough to restore the economic growth eaten away by terrorism and reprehensible government officials. Nevertheless, with greater economic prosperity, such behavior would decline, as people have a natural affinity toward wealth and economic freedom.

The justification for CPEC and its development strategy involves leveraging Pakistan's strategic status, both geographically and economically, to promote economic change. The stringent measures developed to control corruption and extremism are magnified as people are held accountable. Pakistan's self-interest and the scale of the project demands creativity, resourcefulness and diligence in all major sectors. In order to take advantage of this promising economic opportunity, Pakistan must plan CPEC interlinked with the overall national development strategy in order to ensure Pakistan's sustainable economic growth.

From government officials to leading CPEC officials, there are efforts to advance technology transfer. For example, CPEC project director Daud Butt noted the need for data and technology to transition the market to more exports. After a recent FTA meeting with China, he said new technology is being implemented whereby data can be exchanged. In return, investors would be more convinced to invest confidently in the market. The advancement of human capital is integral to Pakistan's transition to a better economy, but more importantly, the appropriate measures for technology transfer will add to the economic shift.

## Conclusions

The China-Pakistan Economic Corridor is igniting an unprecedented wave of economic activity meant to usher in transformative change among the regions it connects by improving the key sectors of energy, infrastructure, trade, and human capital. Energy is the core dimension of CPEC, while infrastructure acts as driver to propel the needed changes. Both integral components generate robust connectivity for China and Pakistan by hastening access to international markets through the largest deep-sea port called Gwadar Port. CPEC also serves as a key component of the One

Belt, One Road Initiative. For Pakistan, its primary interest in developing the corridor, is the economic development that CPEC facilitates. Progress on Sino-Pakistani cooperative projects hinges on developing Gwadar into an international commercial port and taking advantage of its geostrategic location.

Historically, economic corridors have proven to be beneficial for developing nations, bringing growing infrastructure and trade. The China Pakistan Economic Corridor project is comparable to the Suez and Panama Canal constructions. Those projects induced massive economic output for numerous regions, and the massive scale of CPEC has the ability to generate the same, or greater economic output than either the Panama or Suez Canal projects, undoubtedly proving to be a game-changer for Central and South Asia. Although results may not be instantaneous, the eventual harvest will be bountiful.

Every nation has a duty to provide basic facilities for its population, such as education, infrastructure, employment, transportation, and an improved standard of living. As administrations transition, the government of Pakistan is exerting strong efforts to better serve the population through initiating these economic endeavors than have previous government administrations. Furthermore, CPEC has the potential to raise the GDP from 5% to 7%, grow the employment rate, enable regional connectivity, and increase exports to generate massive revenue.

The importance of employment and investing in human development is of paramount importance. It is ill-advised to try to maintain such a massive project without indigenous capacity; the lack of local capital would significantly delay overall growth. At the same time, it would be unsustainable to import an entire labor force and many technical engineers from China. The potential for indigenous human capital is practically unlimited and should be further developed in order to manage the CPEC

and appreciate the final product. Pakistan should also focus on importing various materials for the progress of the project. Indigenous manufacturing to support CPEC projects would help expand the economy over the long and short term.

Energy is as an integral part of production; energy shortages severely limit production, which places a heavy strain on economic growth. Approximately 2% to 5% of GDP is lost annually due to energy shortages. Lack of resources, renewable energies, and deficits in the latest technologies and modern policies contribute to the growing energy travesty. Plans to end the energy crisis are layered and complex. Despite these hurdles facing the Pakistani economy, which may discourage foreign direct investment, China has invested heavily in an effort to raise a strong bilateral project for the economic corridor. Therefore, ensuring the sustainable development of the country through the various projects launched under the banner of CPEC is very significant.

CPEC will generate more power but solving the energy crisis demands a multi-prong approach that takes population, energy needs, and early harvest production results into account to solve the 5,000 to 7,000 MW discrepancy. As of 2019, there continue to be reports of several hours of electricity outages in many regions. Consequently, to control or reduce the demand for electricity, the use of new technologies of renewable energy must be given priority.

Consumers of energy must acknowledge the true cost. Industrial and commercial industries must realize that relying on cheap gas and electricity is not a viable option. Incentivizing initial projects could allow each industry to learn and gradually find a sustainable model. If successful, Pakistan can reduce oil imports from the Middle East (primarily Saudi Arabia), and focus on indigenous energy or on importing from neighbors (such as Iran).

Some international players, like India, worry that CPEC will expand its influence over Pakistan—India's main strategic competitor—in its own backyard. Likewise, Washington is concerned due to deepening strains in trade relations with President Trump's tariffs on Chinese goods and the suffocating sanctions on Iran. By catering to the energy market, China is susceptible to the risks faced by seaborne energy imports, including piracy and bottlenecking in the Straits of Malacca and the South China Sea, hampering its ability to meet mounting energy demands from hefty local industries. Hence, Islamabad and Beijing must adopt regional energy cooperation models and trade regionally with Central Asia in order to satisfy increasing energy demands.

To ensure ultimate success, both the administration and people of Pakistan should not allow CPEC to become a victim to the political squabbling and governmental lethargy that appeared in previous administrations. Development of CPEC projects generates momentum to activate the country's economic growth potential. Despite the sizeable number of people who view CPEC with cynicism and political controversy, it has been welcomed with much enthusiasm by those who are optimistic. Plans for the CPEC are lofty, yet feasible. Improvements in infrastructure will allow greater regional connectivity and expansion of trade. Installing the foundations of energy production plants could ultimately solve the energy crisis. The creation of the deep-sea Gwadar Port will allow for increased trade and higher exports. Last, but not the least, local human capital will use CPEC projects to create as much potential as needed once the project is complete and foreign labor workers make their way to other developing nations.

The China-Pakistan Economic Corridor has the potential to change the outlook of both Pakistan and China. Early operational plants show development with the

completion of the Early Harvest Phase and Phase One of the economic corridor. It is critical that the momentum must not be lost, and that the people and government of Pakistan, in bilateral cooperation with China, can complete this major economic project and reap the abundant rewards.

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