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RESEARCH PAPER

China-Pakistan Economic Corridor: A Rational Choice Theory Perspective

[1]Tayyaba Zainab Ali*, and [2]Dr. Muhammad Usman Askari

1. MPhil IR Scholar, Department of Political Science and International Relations, University of Central Punjab, Lahore, Punjab, Pakistan
2. Associate Professor, Department of Political Science and International Relations, University of the Central Punjab, Lahore, Punjab, Pakistan

***Corresponding Author:** L1F21MPIR0013@ucp.edu.pk

ABSTRACT

China and Pakistan have a long history of bilateral diplomatic, economic, and military relations. China's economic assistance to Pakistan has a background of decades. CPEC is a project of the BRI initiative. The core interests of both China and Pakistan are attached to CPEC. In this global village connectivity is the core concern of any state to become prosperous and advanced. The essential purpose of this study was to explore the cost-benefit relations arising from CPEC. This bilateral project is analyzed under the lens of rational choice theory, and how China and Pakistan, as rational actors, took CPEC initiatives with maximum benefits and minimum losses is studied under this theoretical lens. This study was conducted using qualitative research methodology with primary and secondary source data. Three approaches of qualitative research methodology were incorporated to find answers to the research questions. Newspapers, official statements, think tanks, official websites, government documents, journal articles, research papers, books, and previous studies were used as data sources. Document analysis by Scott was used for data analysis and to measure the originality and authenticity of the collected data. This study raises awareness of the adverse effects of CPEC on the natural environment of Pakistan. This study analyzes the current scenario of CPEC and its potential impacts on the natural environment and determines the threats associated with CPEC developments on environmental attributes. CO2 and GHG emissions harm the environment and negatively impact public health. The fundamental aim of the CPEC is to mitigate the energy crisis despite all these harms, and Pakistan still faces an energy shortage.

Keywords: BRI, Economy, Energy, Infrastructure, Rational Choice

Introduction

Development is one of the key components for the growth of any country. With the passage of time, trends of development and advancement evolved. In this modern era of networking, technological advancements and connectivity around the world are keys to unlocking the developments for every country. CPEC is a developmental project under the BRI initiatives. BRI is a Chinese project of global connectivity and CPEC enhances the regional connectivity of Pakistan to enforce the trade. World trade is shifting from west to east and South Asia become the hub of trade that's why China's foreign policy revolves around South Asian countries. Xi the Chinese president wants to gain a position as a global economic leader. Enhancing the economy is the core of Chinese foreign policy. The China-Pakistan Economic Corridor is a rational choice for China and Pakistan. Pakistan as a developing state wants technological advancements, and regional connectivity for better export, and work opportunities within the state.

In this article, different phases of CPEC are discussed. The first phase (2014-2020) focused on energy and infrastructural projects. Some of the energy projects are coal-based and trying to mitigate the energy crisis in Pakistan at the domestic and industrial levels.

While infrastructure developmental projects and road networking enhance connectivity within a state and beyond the borders. The development and advancement of Gwadar port city is one of the major concerns of the China-Pakistan Economic corridor. Just started the 2nd phase (2021-2025) includes the economic cooperation zones, trade markets, global chain marketing, industrial developments, Gwadar oil city, technological advancements in agriculture, poverty alleviation, and socio-economic development. Projects of the 2nd phase of the China-Pakistan Economic Corridor are under construction. In the last phase (2026-2030) the focus will remain on the results of 1st and 2nd phases and with the help of previous phases a stage of sustainable development will be set in Pakistan.

Literature Review

China-Pakistan bilateral relations started in 1950 and have grown in significance for both states. China and Pakistan have military, economic, and diplomatic relations, so China is known as an all-weather friend of Pakistan. Even though both states have different cultures, religions, political systems, and economic systems they both pursue friendly relationships and share common geoeconomic interests. China and Pakistan have shared economic ties since the 1960s but now expanding cooperation and enhancing extensive economic ties, trade, and investment. One major reason for the China-Pakistan friendly relationship is Pakistan's geographical and geopolitical location in South Asia. A constant factor of Indo-Pakistan rivalry plays a vital role in the friendly relations between Pakistan and China. Both states aligned by using their rational choices. (Shah, et. al. 2020; Shaffer, 2018).

Both states exchange regular visits to enhance diplomatic relations. China and Pakistan both are close strategic allies. China gave Pakistan technical, military, and economic aid to make it prosperous. During Zulfiqar Ali Bhutto's period, both countries resolved all their boundary disputes in the Sino-Pakistan Agreement of 1963. In 1970 when the cultural revolution was at its peak in China, the whole world boycotted China and called back its ambassadors but at that time only two states were with China, one of them was Pakistan. That ensured the long-term friendly relationship between China and Pakistan. A strategic alliance between China and Pakistan was formed in 1972. After that economic cooperation started in 1979. China became the third largest trading partner of Pakistan. From the beginning, Pakistan enjoyed Chinese assistance and investment in developmental projects. In the past Karakoram highway was the biggest investment of China. After that CPEC is a mega developmental project. It opens up thousands of job opportunities for the local people of Pakistan. CPEC is working as a catalyst in the strategic relationship between China and Pakistan. (Mukhtar, 2018)

Figure 1 Visual illustration of Chian-Pakistan flags

China always wants to enhance its economic roots in the whole world. The economic zones and trade shifted from western to eastern regions. Now South Asia is the hub of world trade. Its rich geographical location, connectivity between Europe and the East, and large natural reservoirs made it a money-making source. These changing dynamics in South Asia brought China closer to under-developing states. CPEC is the cornerstone of China's foreign policy to strengthen its position in South Asia and to lead the world economy. This is also the alternative route of the Strait of Malaca because of the US dominancy. China-Pakistan Economic Corridor is also a part of the Belt & Road Initiative project. (Driga & Drigas, 2019)

Although China and Pakistan have been good friends for a very long time, China offers CPEC to Pakistan not for being a good friend but according to rational thinking, now there are two main reasons behind this. China wants economic supremacy. Second, the South Asian region is the area of rivalry between regional powers India Pakistan, the world's great powers United States, and China. It is due to the presence of a variety of factors, revenue, geoeconomic, and geopolitical interests of great powers. With the help of BRI and CPEC China strengthened its position in South Asia. Through the construction of these infrastructural projects, China will get direct access to the Indian Ocean. Chinese access to Gwadar port makes it only 400 km away from the Strait of Hormoz which is very beneficiary for Chinese imports. (Teo, et al., 2019)

Every single state act as a rational actor in the international structure. State interests are the key factors behind every decision and choice. When Pakistan allied with China, the main reason was the Western tilt toward India on the Kashmir Issue in the wars of 1965 and 1971. It brought feelings of distrust and disloyalty. After that Pakistan felt that China was more honest and beneficial so Pakistan deviated from its foreign policy from the United States to China. China became the central focus of Pakistan's foreign policy. It shows that states design their foreign relations and foreign policies according to their personal preference. Now Pakistan chooses CPEC for its benefit and development. According to the pragmatic future strategy of any state, three key factors help in making choices.

- Pursuing National Interests
- Focusing on Regional Dynamics
- Promotion of Economy

Pakistan as a rational actor chooses CPEC with maximum benefit with minimum loss. This is the era of globalization; every state is interdependent and engaged in international cooperation and bilateral or trilateral economic relations. The socioeconomic condition of Pakistan allows it to join this bilateral project for its benefit and prosperity. CPEC is known as a game changer for Pakistan. It boosts up following things within a state. (Abbas, Liu, Wasti, Munir, & Abbas, 2019)

- Employment opportunities
- Infrastructural development
- Energy development
- Rise of the Tourism Industry
- Removal of Poverty
- Booster in Pakistan's GDP Growth rate
- Projected GDP Rankings
- Feasibility in Trade
- Hub of Socioeconomic Activity
- Agricultural Development
- CPEC is a source of economic collaboration
- Development of FATA, KPK, and Baluchistan

The Vision of CPEC

CPEC (中巴经济走廊) is a multi-billion-dollar mega project of China. Due to Pakistan's geographic and geopolitical location in South Asia, CPEC is considered a game changer for Pakistan. The vision of CPEC is to make Pakistan a developed and economically prosperous state. China and Pakistan both choose CPEC as rational actors. China's interests are bound with Central Asia and South Asia. These regions are the heart of world trade. Chin's trade root is the Strait of Malacca which is under the influence of the United States. China wants economic superiority over the world. China's interests are embodied in these two major projects in Asian countries. (Ali, 2020)

China-Pakistan Economic Corridor (pinyin: Zhōng bā jīngjì zǒuláng) is the rational choice for Pakistan. It will fill Pakistan's energy needs at the industrial and domestic levels. It will prove helpful in reducing the energy crisis in Pakistan. Pakistan will become a prosperous and developed state by 2030. Lives in Pakistan will be improved and advanced through the help of CPEC. Medication will be on time and within reach of every single person due to the huge road network of CPEC. Regional connectivity increased with the advancement of the road network and infrastructural development. The trade of Pakistan will be increased with the help of regional connectivity. A lot of doors of opportunities will be open for Pakistani citizens. Thousands of jobs will be introduced under the umbrella of the Pakistan Economic Corridor. CPEC will incorporate transport systems including railways, road construction, seaways, air, and even data communications. It will advance industrial zones, industrial parks, and functional zones. (Asif, et al., 2021)

Figure 2 Functional Diagram of Visionary Projects of CPEC

Pakistan is an agricultural state and CPEC will help to advance the agricultural departments of Pakistan. It includes citizens' medication, making poverty less severe than before, clean water supply, Access to education, and vocational training. The infrastructural development of CPEC will enhance tourism. Tourism can generate a lot of revenue.

Methodology

Qualitative research is being used to solve the research puzzle related to the impacts of the China-Pakistan Economic Corridor on the natural environment of Pakistan. Further, three approaches of qualitative research methodology are incorporated to investigate research problems. Exploratory, Descriptive, and Historical approaches are integrated to deeply know about the CPEC. As a research design documentary analysis is very suitable for qualitative research. This study aims to develop the general objectives to understand the reasons, circumstances, elements, and dynamics to critically analyze the rational choice of China and Pakistan under the area of investigation. It includes deductive reasoning to organize the study and to investigate the whole situation. Using both exploratory and deductive approaches can provide a more comprehensive and nuanced understanding of the research topic.

Documentary research provides related data under the area of investigation. Documents are considered as the bear witnesses of past events and provide full proof of historical insight to the participant but on the condition that the document should be 100% accurate and valid. It helps the participants of the research to understand any event's historical roots and work according to the given direction. Secondly, the given knowledge and information have some strong questions that need to be answered in present circumstances. These questions are part of running research and provide the best possible answers and solutions. Further, it can also generate new questions too. Documents give additional data for the research purpose. Documents are a rich source of data collection. The document should be relevant to the purpose and problem of the research paper. Irrelevant data can damage the accuracy and lower its value. A devoted researcher can measure the accuracy and relevance of the document in his area of investigation. It is also necessary to find out whether the data collected from a document, fits in the conceptual framework of a research paper or not. It is very important to find out the authenticity, accuracy, credibility, and representativeness of the documents before fitting them into the research.

China-Pakistan Economic Corridor: A Plan

CPEC is a major part of BRI a Chinese project in this region. China invested almost 62 million dollars in CPEC to resolve the energy crisis and to make infrastructural development in Pakistan. The agreement of CPEC was settled down during the Zardari Era. It is a good initiative toward progress and prosperity. It gives regional connectivity through its heavy infrastructural advancements. CPEC opens up new economic zones for the government of Pakistan and citizens of Pakistan as well. Many energy and coal projects are started under CPEC to reduce Pakistan's energy crisis both at the industrial and domestic levels. It was not a simple road construction project of China in Pakistan but all these coal-based power plants, small industries, and trades happening under the umbrella of CPEC. (Shehryar Khan & Guijian Liu 2019)

China's major aim to start this 3000 km road and sea-based infrastructural project is to reduce and secure its energy imports. Through Gwadar port, the oil trading roots of China reduced from 12000 km to 2395 km. With the help of BRI and CPEC China almost saves 2 billion dollars per year. China sees the CPEC as a betterment and re-establishment of the Silk Roads. It is the biggest foreign investment ever in Pakistan to bring economic prosperity. CPEC opens up many economic zones in Pakistan which generates a lot of revenues energy projects, and power plants in different areas of Pakistan. As climate change and global warming become global problems rapidly occur in Pakistan (Rahim, et. al. 2018) Developmental projects of CPEC are known as the key factor behind the degradation of the natural environment and increased climate change in Pakistan. China due to its energy-based project also called the world's biggest polluter. Due to this China started to shift coal energies into renewable energy resources. They argued to go toward a greener CPEC soon. (Mahmood & Askari, 2022)

Phases of CPEC

CPEC is designed to create regional connectivity and a gateway to the prosperity of nations. It has three phases. The first phase (2014-2020) aims to remove the energy crisis and make infrastructural developments in addition to advancing Gwadar Port City. The first phase of the China-Pakistan Economic Corridor is witness to remarkable economic developments, infrastructural developments, and developments in the energy sector. 2nd phase of CPEC started from 2021-2025. It includes trade market asses, industrial developments, agricultural developments, poverty alleviation, marketing, international business chains, and blue economy. The third phase of China-Pakistan will be started from 2026-2030. It will be the last phase of this developmental project. Its major focus will be on the gains from the previous two phases and will go toward sustainable development. (Akhtar, Yaqub, Iqbal, Sheikh, & Saba, 2017)

1st Phase of China-Pakistan Economic Corridor

There are following CPEC projects working in Pakistan and divided into six main categories with respect to the phases. First, the projects related to the first phase of CPEC are discussed

- Energy projects.
- Transport / Infrastructural developments.
- Gwadar port.
- Industrial cooperation / Special Economic Zones
- Social and Economic development projects.

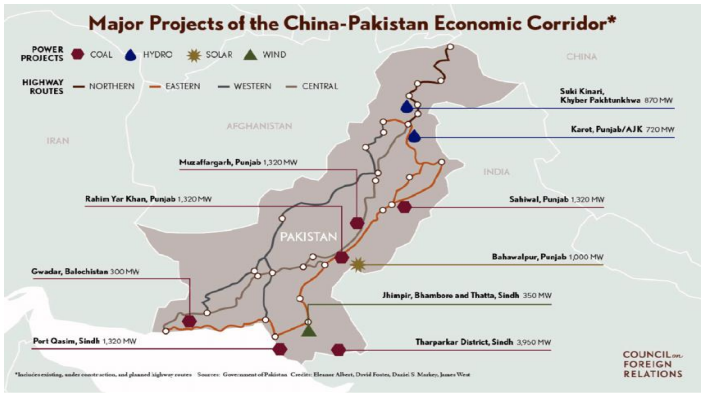
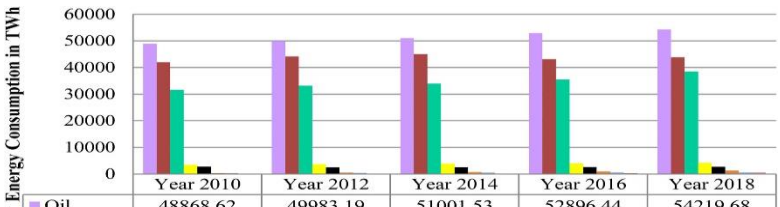


Figure 3 Roadmap of CPEC projects

Energy projects

CPEC's official website shows almost fourteen energy and coal-based projects are completed.



	Year 2010	Year 2012	Year 2014	Year 2016	Year 2018
Oil	48868.62	49983.19	51001.53	52896.44	54219.68
Coal	41985.08	44161.27	44940.53	43147.85	43869.48
Gas	31567	33175.25	33926.4	35501.87	38488.57
Hydro	3432.95	3666.77	3883.14	4017.74	4193.1
Nuclear	2767.51	2472.45	2540.75	2615.24	2701.43
Wind	341.61	523.81	712.03	956.87	1269.95
Other Res	378.85	430.85	502.16	556.62	625.81
Solar	33.68	100.76	197.91	328.38	584.63

Figure 4 Statistics of resources wise energy consumption

Sahiwal Coal-fired Power Plant: It has almost 1320 MW capacity. Imported coal is used as the primary input of the Sahiwal coal power plant. A Chinese company Huanan Shandong Rui Group sponsored this project located in Punjab Province. It is an independent power producer that completed almost 1912 million dollars. it was supervised by the Ministry of Energy (power Davion), Private Power and Infrastructure Board (PPIB) / and Punjab Power Development Board (PPDB). When this project was under construction it created 3770 total jobs and now almost 1033 employees work in this power plant. (Rashid et, al, 2021)

Coal-Fired Power Plant at Port Qasim Karachi: It has almost 1320 MW capacity. Imported coal and supercritical technology are used as the primary input of the Port Qasim

coal-fired power plant. It is an independent power producer that completed almost 1912 million dollars. it was supervised by the Ministry of Energy (Power Davion), and the Private Power and Infrastructure Board (PPIB). When this project was under construction it created 4000 total jobs in Sindh province and now almost 1270 employees work in this power plant. This project is sponsored by Port Qasim Electric Power Company (private limited). (Duan, Khurshid, Calin, & Nazir, 2021)

China Hub Coal Power Project, Hub Baluchistan: It is the biggest power project located in the Baluchistan province. Imported coal and supercritical technology are used as the primary input of this project. It is an independent power producer that completed almost 1912 million dollars. It has almost 1320 MW capacity. It was supervised by the Ministry of Energy (Power Davion), and the Private Power and Infrastructure Board (PPIB). When this project was under construction it created 4200 total jobs in the host community and almost 1722 employees still work in this power plant. This project is sponsored by China Power Hub Generation Company (Private Limited).

Engro Thar Coal Power Project: 660 MW capacity is installed in this mega project of Sindh province. Local coal and supercritical technology are used as the primary input of this project. It is an independent power producer that completed almost 99.5.4 million dollars. It was supervised by the Ministry of Energy (Power Davion), and the Private Power and Infrastructure Board (PPIB). When this project was under construction it created 3000 total jobs in the host community and almost 1800 employees still work in this power plant. This project is sponsored by Engro Power Generation Thar Limited, China Machinery Engineering Corporation (CMCE), HBL, and Liberty.

Quaid-e-Azam Solar Park Bahawalpur: It has almost 400/600 MW capacity. Solar energy and Solar PV technology are used as the primary input of Quaid e Azam Solar Park. It is an independent power producer that completed almost 520/781 million dollars. It was supervised under the Ministry of Energy (power Davion), Punjab Power Development Board (PPDB) / Alternative Energy Development (AEDB). When this project was under construction it created 1200 total jobs in Sindh province and now almost 220 employees work in this power plant. This project is sponsored by Zonergy. It is located in District Bahawalpur South Punjab. (Han, et al., 2022)

Hydro China Dawood Wind Farm, Garo, Thatta: It has almost 59 MW capacity. Wind energy was the primary input, and Wind Turbine technology was used to establish Hydro China Dawood Wind Farm. It is an independent power producer that completed 112 million dollars. It was supervised by the Ministry of Energy (power Davion), and Alternative Energy Development (AEDB). When this project was under construction it created 500 total jobs in the host community of Sindh and now almost 21 employees work in this power plant. This project is sponsored by Hydro China Dawood Power Pvt Limited (HDPPL). It is located in Bhanbore, Gharo, District Thatta.

UEP Wind Farm, Jhimpir, Thatta: 100 MW capacity is installed in this wind farm. It took wind energy as the primary input and Wind Turbine technology was used to establish UEP Wind Farm. It is an independent power producer that completed 250 million dollars. It was supervised by the Ministry of Energy (power Davion), and Alternative Energy Development (AEDB). When this project was under construction it created 900 jobs in Sindh and now almost 54 employees work of which 39 jobs are given to local people of Jhimpir Thatta District. This project is sponsored by UEP Wind Power Pvt. Limited UEPL. (Moin & Qadri, 2020)

Sachal Wind Farm, Jhimpir, Thatta: 50 MW capacity is installed in this wind farm. It took wind energy as the primary input and Wind Turbine technology was used to establish Sachal Wind Farm. It is an independent power producer that completed 134 million dollars. It was supervised by the Ministry of Energy (power Davion), and Alternative

Energy Development (AEDB). When this project was under construction it created 450 jobs in Sindh and now almost 25 employees work of which 19 jobs are given to local people of Jhimpir Thatta District. This project is sponsored by Sachal Energy Development Pvt, Limited (SEDPL).

Three Gorges Second and Third Wind Power Project: 100 MW capacity is installed in this wind farm. It took wind energy as the primary input and Wind Turbine technology was used to establish this third Wind Farm. It is an independent power producer that completed 150 million dollars. It was supervised by the Ministry of Energy (power Davion), and Alternative Energy Development (AEDB). When this project was under construction it created 950 jobs in Sindh and now almost 180 employees work of which 159 jobs are given to the local people of Jhimpir Thatta District. This project is sponsored by Three Gorges Second Wind Farm Pakistan Ltd, (TGSWFP)

Matière to Lahore ±660 KV HVDC Transmission Line Project: 4000 MW Evocation capacity is installed in this project. ±660 KW Bipole HCDC with Converter / Grounding Electrode Stations special technology is used to establish it. This mega project is located in Sindh and Punjab. It is an independent transmission company that completed 1658 million dollars. It was supervised by the Ministry of Energy (power Davion), and the National Transmission and Dispatch Company (NTDC). When this project was under construction it created 2212 jobs collectively in Sindh and Punjab. This project is sponsored by China Electric Power Equipment and Technology Co Ltd. (CET) / State Grid Station of China (SGCC). Project Description: 4000 MW ±660 kV HVDC Line Metro-Lahore, 878km Two (2) 40 km Electrode Lines and associated stations. Associated 500kV HVAC T/Lines at both Converter Stations. (Duan, Khurshid, Calin, & Nazir, 2021)

Karot Hydro Power Project, AJK Punjab: It is of 720 MW capacity. Hydel technology is used to establish it and the primary input of the Karot Hydro Power Project is hydel too. It was operationalized over the Jhelum River at the dual boundary of Pindi, Punjab & and District Kotli. It is an independent power producer that completed almost 1720 million dollars. It was supervised by the Ministry of Energy (Power Davion), and the Private Power, and Infrastructure Board (PPIB). When this project was under construction it created 4870 total jobs. This project is sponsored by Karot Power Company Limited. (KPCL) / CSAIL / CTGI / CTG (China Three Gorges).

HUBCO Thar Coal Power Project (Thar Energy): It is of 330 MW capacity with sub-critical technology. Thar coal is used as the primary input of the Thar coal power project. It is an independent power producer (IPP) that completed almost 497 million dollars. It was supervised by the Ministry of Energy (Power Davion), and the Private Power and Infrastructure Board (PPIB). When this project was under construction it created 805 total jobs in Sindh province. HUBCO, FFC, and China Machinery Engineering Corporation (CMEC) sponsored this project in Thar Block II.

SSRL Thar Coal Block -I 7.8 mtpa and Power Plant (Shanghai Electric): It has a 1320 MW capacity with sub-critical technology. Thar coal is used as the primary input of the Thar coal power project. It is an independent power producer (IPP) that completed almost 1912 million dollars. It was supervised by the Ministry of Energy (Power Davion), and the Private Power and Infrastructure Board (PPIB). When this project was under construction it created 2000 total jobs in Sindh province. Shanghai Electric Power Limited / CCTEG SSRL sponsored this project in Thar Block I. (Raza, Osams, & Hena, 2018)

HUBCO ThalNoval Thar Coal Power Plant: It is of 330 MW capacity with sub-critical technology. Thar coal is used as the primary input of the Thar coal power project. It is an independent power producer (IPP) that completed almost 497 million dollars. It was supervised by the Ministry of Energy (Power Davion), and the Private Power and Infrastructure Board (PPIB). When this project was under construction it created 305 total

jobs in Sindh province. HUBCO, FFC, and China Machinery Engineering Corporation (CMEC) sponsored this project in Thar Block II. (Javed & Ismail, 2021)

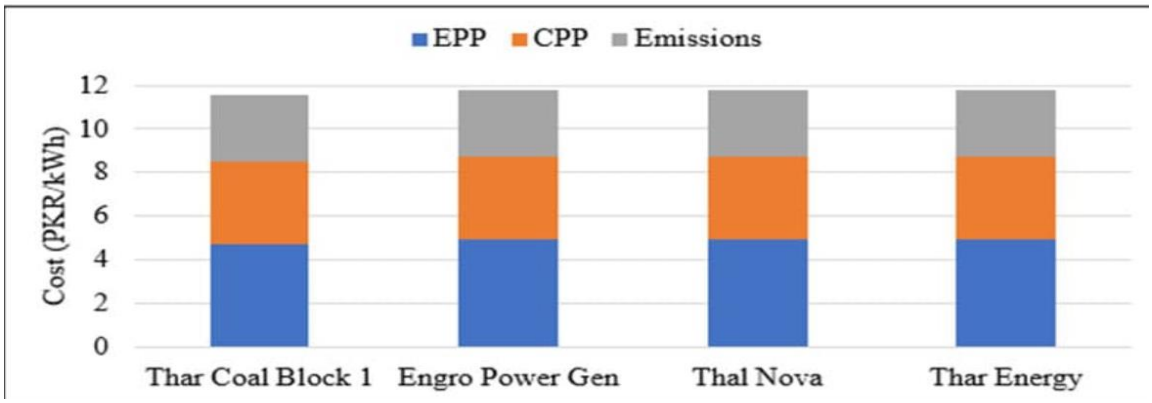


Figure 5 Energy projects in Sindh

Some CPEC projects are not completed yet. Here are the following projects which are under construction.

Suki Kinari Hydro Power Project, KP: It has of 870 MW capacity. Hydel technology is used to establish it and the primary input of the Suki Kinari Hydro Power Project is hydel too. It was operationalized over the river Kunhar (a tributary of River Jhelum) District Mansehra. It is an independent power producer that completed almost 2000 million dollars. It is supervised by the Ministry of Energy (Power Davion) and, the Private Power, and Infrastructure Board (PPIB). Almost 4250 workers gave their efforts for the completion of this project. Suki Kinari Hydro Pvt Ltd / China Gezhouba Group Company Ltd sponsored this group.

Coal-Fired Power Project at Gwadar: 300 MW capacity is installed in this coal power project at Gwadar Baluchistan province. Imported coal and supercritical technology are used as the primary input of this project. It is an independent power producer that completed almost 542 million dollars. It is supervised by the Ministry of Energy (power Davion), and Gwadar Port Authority (GPA) / Gwadar Development Authority (GDA). Almost 1000 workers give their efforts for the completion of this project. This project is sponsored by China Communications Construction Company (CCCC). (Moin & Qadri, 2020)

Figure 6 A Look at Coal-based Projects

There following CPEC power projects have not started but are under consideration.

- Kohala Hydropower Project, AJK
- Azad Pattan Hydropower Project, AJK / Punjab
- Thar Mine Mouth Oracle Power Plant & Surface mine
- Cacho Wind Power Project
- Western Energy Pvt Ltd. Wind Power Project

KKH Phase II (Hevellian - Thakot Section): This road was constructed in Khyber Pakhtunkhwa, starting from Havelian to Thakot. Its total length is 120 km, and the construction of a 40 km 4-lane Motorway, and 80 km class II Highway. This road type is Expressway or Access Controlled Highway (Class II). The expected expenditure on this road project is about 1315 million dollars executed by M/s China Communications Construction Company Ltd and Financed by Government Concessional Loan (GCL). This project created 5500 total jobs of which 4835 jobs are availed by local people. This project is under the responsibilities of the National Highway Authority, the Ministry of Communication, and the Government of Pakistan. (WANG, 2018)

Peshawar-Karachi Motorway (Multan-Sukkur Section): This road was constructed in the provinces of Punjab and Sindh, starting from Multan to Sukkur. Its total length is 392 km, road type is 06 Lane Controlled Motorway. Karachi-Peshawar Motorway construction is a 06 Lane access control motorway. It has a toll facility, starting from Karachi through Motorway M-9 to Hyderabad. It is near to left bank of the river Indus. The expected expenditure on this road project is about 2889 million dollars executed by M/s China State Construction Engineering Corporation and Financed by Government Concessional Loan (GCL). This project created 28000 total jobs of which 25620 jobs are availed by local people. This project is under the responsibilities of the National Highway Authority, the Ministry of Communication, and the Government of Pakistan. **Orange Line Metro Train – Lahore:** Its total length is 27.12 Km (Cut and Cover Section = 1.72 KM and Elevated 25.4 KM. 1626 million dollars is the estimated cost of this project. (Ali, Rehman, Lala, & Sabir, 2021)

Cross Border Optical Fiber Cable (Khunjrab – Rawalpindi): An area of around 820 km is covered by optical fiber cables. It helps to advance the telecom and ICT industry of Pakistan, encourages tourism, and develops connectivity within northern areas of Pakistan which further advances the trade within the state. It will give the 3G / 4D and communication facilities an alternative fiber route. This road network is located in Gilgit Baltistan, Khaybar Pakhtunkhwa, and Punjab Province. 44 million dollars is the estimated cost of this road project. It created almost 1100 job opportunities. (Mochinaga, 2020)

Pilot Project of Digital Terrestrial Multimedia Broadcast (DTMB): Station (DTMB) was established in Murree. Its estimated cost is 4 million dollars. The terrestrial network of the PTV channel is also upgraded with the Digital TV Transmission network. The quality and level of DTMB are adopted by Cuba, China, Hong Kong, and Macao.

Hakla - D. I. Khan Motorway: Its total length is 297 km have a new 4-lane motorway but upgraded into 6 lanes soon. 122,181 million dollars in the total cost of this project, including Construction = 110,208 million, Land, Property compensation, shifting, and utility = 11973 million. It is sponsored by the National Highway Authority / M/o Communications. It provides 6700 job opportunities. (Ali, Rehman, Lala, & Sabir, 2021)

Under Construction projects:

- Un Zhob – Quetta (Kuchlak) (N-50)
- Khuzdar- Basima Road (N-30)
- Hoshab – Awaran Road Section (M-8)

- KKH Alternate Route Shandur – Chitral Road
- Nokundi- Mashkhel Road **In-Pipeline Projects:**
- Mirpur – Muzaffarabad – Mansehra Road
- Karachi Circular Railway
- Mashkhel – Pangur Road
- Quetta Mass Transit
- Greater Peshawar Region Mass Transit

Gwadar Projects Under CPEC

There are four Completed Projects:

Development of Port and Free Zones: The objective of this project is to build a backup port industry for Gwadar Port. The free zone of Gwadar port is around 2,281 acres and it is reserved for the advancement of industries like access, roads, internal roads, water, gas, power, custom facilities, security, offices, and warehouses. 300 million dollars is the estimated cost of the project that is sponsored by the Gwadar Port Authority. It generates 240 local jobs and 120 0ther. Supervising Agency: Ministry of Maritime Affairs, Government of Pakistan. Proposing Agency: Gwadar Port Authority.

Gwadar Smart Port City Master Plan: Only 4 million dollars is the estimated cost of this project located in Gwadar District, Baluchistan province. It generates 73 jobs for the host community and 90 other job opportunities that include engineers and architects. It generates a vision of strategic development for Gwadar City. Upgrading the existing Master Plan of Gwadar City and integrating it with the Master Plan of Gwadar Port. For the socio-economic development of Makran coast in general and Gwadar city in specific, it would help to create a sustainable strategic development plan. It will develop and advance Gwadar City as a special economic zone and ensure near-term economic growth. (Iftikhar, et al., 2019)

Figure 7 View of Gwadar Port City

Pak-China Technical and Vocational Institute at Gwadar: The estimated cost of this project is 10 million dollars. It generates 135 local jobs and 249 other job opportunities that include engineers and architects. Chinese Government Grant mainly financed this project and Gwadar Port Authority sponsored it. A major objective of this project is to create and advance state-of-the-art, vocational, and technical training institutes in Gwadar. Specifically, it is for the betterment of the local people of Gwadar and for their encouragement about the management of the deep-sea ports, industrial and commercial businesses, and the process of urbanization that will play a key role in all long-term

developmental initiatives. It motivates the population of Gwadar to participate in the growth of Port City. (Zheng & Bohier, 2021)

Gwadar Eastbay Expressway: Eastbay Express is the main route in Gwadar city from where all the traffic of the port will flow. The primacy of this project is to provide connectivity to the port and its free zones with the network of National Highways for easy and cheap import and export. The 06meter Expressway along with the provision 30meter wide railways corridor will connect the port with Makran Coastal Highway. 179 million dollars is the total expenditure of this project that is financed by Government Interest-Free loans. It generated 1700 local jobs and 2000 jobs other than host communities. This project was sponsored by the contracting company based on EPC or any financial framework Agreement under CPEC. This project is under the responsibility of the Proposing Agency, Gwadar Port Authority, the Ministry of Maritime Affairs, and the Government of Pakistan. (Wasim & Siddiqi, 2018)

Under Construction Projects

- New Gwadar International Airport
- Necessary Facilities for Fresh Water Treatment, Water supply, and distribution
- Pak-China Friendship Hospital
- 1.2 MGD Desalination Plant
- 5 MGD Water Desalination Plant Gwadar In-Pipeline Projects

2nd Phase of China-Pakistan Economic Corridor

Under Construction Projects:

- Rashakai Special Economic Zone
- Dhabaji Special Economic Zone
- Allama Iqbal Industrial City
- Bostan Special Economic Zone

In-Pipeline Projects

- ICT Model Industrial Zone
- Industrial Park on Pakistan Steel Mil Land
- Mirpur Industrial Zone
- Mohmand Marble City
- Moqppndass Special Economic Zone

Completed Projects:

- Vaccine Storage and transportation equipment:
- Poverty Alleviation Training
- Emergency relief supplies for enhancing NDMA, disaster preparedness capacity
- Pakistan Vocational and Technical Education capacity build-up projects
- Pakistan Vocational Schools equipment upgrading and renovation Projects

Under Construction Projects

- China-Pakistan Joint Agricultural Technology Laboratory
- Provision of Agricultural Equipment and Tools. Smart Classrooms for Higher Education
- Maintenance and Renovation of 50 Schools in newly merged districts.

- Solar Powered Lighting equipment
- Overseas Students Scholarships
- Medical equipment and materials
- Gwadar Hospital project
- Brightness Journey in Pakistan
- Drinking Water Equipment
- Gwadar Desalination Plant
- Gwadar Vocational and Technical Project In-pipeline Projects
- China-Pakistan Joint Agricultural Demonstration
- Bacterial Grass Technology Training and promotion projects
- Pakistan Agricultural Vocational training
- Provision of Teaching equipment for Primary and Secondary Schools
- Burn Centers
- China-Pakistan joint Telemedicine network
- Medical emergency center in Baluchistan
- Rural poverty reduction joint research project
- Cooperative project with Pak-Austria Fachhochule: Institute of Applied Science and Technology
- The Punjab-Tianjin University of Technology Project.

3rd Phase of CPEC

The third phase of China-Pakistan will be started from 2026-2030. It will be the last phase of this developmental project. Its major focus will be on the gains from the previous two phases and will go toward sustainable development. It will be the most important phase of CPEC. The government and policy-makers started to think about the environmental loss and try to mitigate it by implementing a Greener CPEC. May CPEC will move toward green technology in its 3rd phase. (Shabbir, Xiangming, & Naz, 2022)

In November 2020 a joint meeting was called in Islamabad via video links. Chinese and Pakistan experts were there and set the projects of 3rd phase. China was asked to send a grant and its experts for these projects. These projects are almost related to the 1st and 2nd phases. The third phase of CPEC will be worked in the areas of agriculture, education, health, poverty elevation, and vocational training. Railway tracks and gas pipelines are also under 3rd phase. The fast-track and preferred projects under this phase will be the setup of smart classrooms, scholarships for overseas Pakistani students, Pakistan vocational schools, and equipment, especially in Baluchistan. Clean drinking water projects and filtrations in AJK & KPK. As Pakistan is an agrarian state agriculture plays the role of backbone of the economy of Pakistan. Because of this advancement of the agriculture sector will be the core of CPEC in its 3rd phase. Providing equipment, tools, and demonstrations in the agriculture department will be preferred in the upcoming duration. The project of the Burn Centre in every province is also highlighted. (Ali, 2020)

Results and Discussion

- CPEC aims to mitigate the energy crisis in Pakistan. As it started many coal-based energy projects in different areas of Pakistan. Because of this, its environment is concerned with energy.
- CPEC projects are not able to fulfill the energy needs of Pakistan but it badly affects the natural environment of host communities.
- A massive tree cutting due to new constructions and road networking of CPEC is another major environmental concern. Road networking increases vehicle trafficking. All these phenomena are interlinked and lead to huge CO2 emissions.

- Coal is the major cause of Co2 emissions that harm the environment and level up different kinds of negative impacts regarding public health, biodiversity, water pollution, and air pollution.
- Although Climate change is a global phenomenon, not only occur in Pakistan. But CPEC has the potential to address climate change and environmental harms in Pakistan. Over the past few years, we have all bear witness to the rapidly increasing environmental damages and changes in our country like floods, droughts, increased temperature, heat waves, and viral diseases. CPEC developmental projects based on Coal energy have direct adverse effects on Pakistan's water, air, health, and biodiversity.
- Smog is the major result of CPEC coal-based power projects in the Punjab and Sindh provinces. We are witnessing smog that appears in the last 4 or 5 years. Before that, we didn't aware of it. Smog is a combination of fog, smoke, and severe air pollution. It has a major contribution to environmental degradation and climate change by releasing greenhouse gasses into the air. Smog reduces air quality by reducing atmospheric pollutants such as nitrogen, sulfur, and volatile organic compounds. These pollutants can have determinable effects on both human health and the natural environment. It creates lung diseases and leads to fatal road accidents due to zero visibility on roads. It also has adverse effects on agriculture. The deposition of pollutants on crops can interfere with their metabolic process, reduces crops yield, and lower the nutritional quality of harvested crops. It also affects the water bodies, plant life, and wildlife as well.
- Coal-based processing has adverse effects on the natural environment in the form of Greenhouse gas emissions and global warming. Coal holds a large number of Sulphur compounds that are released during coal combustion and pollute air, water, and land. Other agricultural activities such as livestock, grains, and vegetables are also affected.
- After suffering a huge burden of health problems China also switched off these energy resources and run its projects on renewable energy resources but in Pakistan CPEC still works on coal-based energy. If we do a comparative analysis of China and Pakistan, China is the world's first country that rapidly converts nonreusable energy into reusable energy. Despite this, Chinese projects in Pakistan are still coal-based.

Conclusion

Undoubtedly, the China–Pakistan Economic Corridor is a visionary project for Pakistan, and it has a strong stance on the economy of Pakistan. It enhances bilateral relations between China and Pakistan. CPEC brings regional connectivity and mitigates the energy crisis. While the China-Pakistan Economic Corridor promises economic benefits, its environmental impact on the natural environment cannot be ignored. Some energy projects of the CPEC are coal-based. Almost 18 billion tons of imported coal is used yearly, but it cannot mitigate the energy crisis and increased CO2 emissions. The researcher examines CPEC through the lens of rational choice theory. Usually, the stance for the development and betterment of states is discussed under the rational choice theory. CPEC is a rational choice for Pakistan and China. Policymakers as rational actors take the best action with economic benefit and environmental loss.

Recommendations

- The socio-economic structure and frameworks of the country must be aligned with the green and climate-friendly transition.
- The international institutional capacity to enable effective monitoring and enforcement of environmental laws and regulations must be strengthened.
- China must formulate environmental policies related to the foreign investments in energy projects of CPEC. Lessons learned on coal development in China and

successful models of green development can be incorporated into the development policies of the Belt and Road Initiative (BRI). Capacity building with research institutions to implement environmental assessments is also needed for better environmental planning and conservation purposes.

- China itself uses renewable energy resources for developmental projects. It must implant the same renewable energy resources for CPEC projects in Pakistan

The natural environment needs to be sheltered from unregulated expansion; we have to protect human well-being before it is too late.

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