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Analyzing Impact of Pakistan Economic Corridor on Import and Export in Pakistan and China

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Abstract— *China and Pakistan, among other countries, have a pressing need for a quicker, safer, and more cost-effective commerce route heading to the west, which encompasses Europe and the Middle East. This study's main goal is to determine whether the China-Pakistan Economic Corridor (CPEC) is a viable, long-term option for future market penetration and company growth. With an emphasis on shipping costs and transit times, it examines how the China-Pakistan commerce is affected by the China-Pakistan Economic Corridor (CPEC). The report also contrasts the effectiveness of the proposed CPEC route with that of the existing trade route. For this analysis, a qualitative and descriptive research style was used. The results show that significant cost reductions can result from following the suggested CPEC path. The cost of shipping between Gwadar, Pakistan, and Kashgar, China, might drop by 69% for Oman, 49% for Jeddah and Kuwait, and 38% for European ports. Additionally, transit times for ports in Europe, Jeddah, Kuwait, and Oman might be shortened by 10–11 days, 11–13 days, and 15–18 days, respectively.*

Keywords— ***China Pakistan Economic Corridor (CPEC), Pakistan Economic Corridor. Import/Export, Project.***

I. BACKGROUND

Pakistan is strategically located in a geographic threshold zone that is vital to global trade. As we all know, China relies on Middle Eastern countries to meet its energy requirements. With this in mind, it has committed to investing 46 billion dollars in the CPEC project, which will eventually help it lower transportation costs and delivery times.

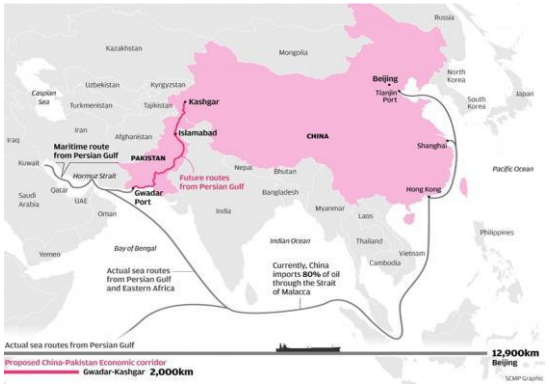


Figure 1.1: China-Pakistan Economic Corridor

(Source: https://www.dawn.com/news/1177116)

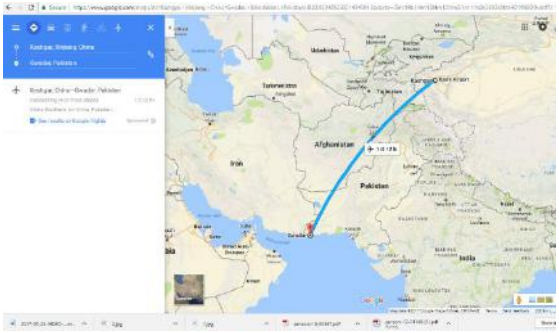


Figure 1.2: Google Maps

(Source: https://www.google.com/maps/)

- China Pakistan Economic Corridor (CPEC)

Four components of this project are:

1	Gwadar (Port city & Gwadar region's socio economic development)
2	Energy (Coal, Hydel, Wind, Solar, Liquid Natural Gas, Transmission)
3	Transportation Infrastructure (Road, Rail, Aviation)
4	Investment & Industrial Cooperation (Gwadar Free Zone & other industrial parks)

CPEC should be viewed more than network of roads, highways & rail linkages but a comprehensive package & integration of many projects that will meet Pakistan's and China's energy and other requirements. It is being dubbed a "Game Changer" in both China and Pakistan. China's total investment is approximately $46 billion. The following table shows the breakdown of the CPEC project portfolio investment.

Sr. No.	Sector	No. of Projects	Estimated Cost (Million $)
01	Energy	21	33,793
02	Transport Infrastructure	4	9,784
03	Gwadar	8	792.62

Table 1.1: Project Portfolio Investment

(Source: Board of Investment, Pakistan)

- **Projects under CPEC**

In this section of the research work gives the details of each individual project coming under CPEC i.e.

1. Energy Projects
2. Transport Infrastructure Sector Projects
3. Gwadar Port related Projects
4. Other Projects

Energy Projects

Energy is a critical component for Pakistan's economic growth. Pakistan has battled electrical shortages for the past decade, with little improvement evident thus far. Long periods of load shedding are causing the demise of numerous enterprises. Because of the increased demand for electricity, energy projects are crucial to CPEC initiatives.

Total energy produced under these energy priority projects will be 10,400 MW with a total investment of US$ 15,506 Million. Apart from that there will be actively promoted projects which will provide 6,645 MW of energy with an investment of US$18, 287. Hence in the long run, 17,045 MW energy will be produced with a total cost of US$33,793 Million.

Sr. No	Projects	MW	Cost (US$ M)
1	Port Qasim Electric Company Coal Fired, 2X660, Sindh	1320	1,980
2	Sahiwal 2x660MW Coal-fired Power Plant, Punjab	1320	1,600
3	Engro thar 2x330MW Coal-fired, Thar, Sindh	660	1,000
	Surface mine in Block II of Thar Coal field,3.8 mtpa, Thar Sindh		860
4	Gawadar Coal Power Project, Gwadar	300	360
5	Muzaffargarh Coal Power Project, Punjab	1320	1,600
6	Rahimyar Khan Coal Power Project, Punjab	1320	1,600
7	SSRL Thar Coal Block 6.5mpta &CPIH Mine Mouth Power Plant, Thar, Sindh	1320	1,300
8	Quaid-e-Azam 1000MW Solar Park, Bahawalpur, Punjab	1000	1,350
9	Dawood 50MW wind Farm, Bhambore, Sindh	50	125
10	UEP 100MW wind Farm, Jhimpir, Sindh	100	250
11	Sachal 50MW Wind Farm, Jhimpir, Sindh	50	134
12	Sunnec 50MW wind Farm, Jhimpir, Sindh	50	125
13	Suki Kinari Hydropower Station, KPK	870	1,802
14	Karot Hydropower Station, AJK & Punjab	720	1,420
	Total (Priority)	**10400**	**15,506**

Table 1.2: CPEC Energy "Priority" Projects

(Source: China Pakistan Economic Corridor. (CPEC). 5th November, 2015. Board of Investment, Pakistan)

Transport Infrastructure Sector Projects

We will look at the transportation infrastructure sector projects under CPEC.

Sr. No	Projects	Length (km)	Cost (US$ M)
	Roads		
1	KKH Phase II (Raikot – Islamabad Section)	440	3,500
2	Peshawar-Karachi Motorway (Multan-Sukkur Section)	392	2,600
	Rail Sector Projects		
1	Expansion and reconstruction of existing Line ML-1	1736	3,650
2	Havelian Dry port (450 M. Twenty-Foot Equivalent Units)		40
	TOTAL		**9,790**

Table 1.3: CPEC Transport Infrastructure Projects

(Source: China Pakistan Economic Corridor. (CPEC). 5th November, 2015. Board of Investment, Pakistan)

The total cost involved will be US$ 9,790 Million.

Gwadar Port Projects

Before the CPEC is completed, Gwadar requires significant infrastructural enhancements to meet future demand. The Gwadar city's projects will be listed here.

1	Eastbay Expressway	140.00
2	Gwadar International Airport	230.00
3	Construction of Breakwaters	130.00
4	Dredging of berthing areas & channels	27.00
5	Infrastructure for Free Zone & EPZs port related industries	35.00
6	Necessary Facilities of Fresh Water Treatment and Supply	114.00
7	Hospital at Gwadar	100.00
8	Technical and Vocational Institute at Gwadar	10.00
	Total Gwadar Port Projects	**786.00**

Table 1.4: CPEC Gwadar Port Related Projects

(Source: China Pakistan Economic Corridor. (CPEC). 5th November, 2015. Board of Investment, Pakistan)

The total cost involved will be US$ 786 Million.

Other Projects

As previously stated, the CPEC comprehensive package consists of multiple projects rather than a single route.

Sr. No	Projects	Length (km)	Cost (US$ M)
1	Mass transit Lahore		1,600
2	Cross Border Optical Fiber Cable		
	Total		44
	Total Cost of CPEC Projects		**1,644**

Table 1.5: CPEC Other Projects

(Source: China Pakistan Economic Corridor. (CPEC). 5th November, 2015. Board of Investment, Pakistan)

The total cost involved will be US$ 1,644 Million.

- **CPEC Route**

CPEC has the potential to be a game-changing project for Asia. It includes massive infrastructure and transportation projects, including as 3,000 kilometers of pipelines, roads, and railroads that connect the port of Gwadar in southern Pakistan with the dry port of Kashgar in northern Xinjiang, China. The quickest route to the Arabian Sea and the Indian Ocean is via this corridor. China now uses the 5,153-kilometer route from Kashgar to Shanghai for the transportation of products.

On the other hand, it is only 2,800 kilometers from Kashgar to Gwadar, which is almost half the length of the current route. In order to restore historic trade routes linking Asia, Africa, and Europe, Chinese President Xi Jinping suggested the revived Silk Road in 2013, which includes this corridor (Inp, 2015). Beyond bilateral collaboration, CPEC is likely to benefit other nations as too, particularly Afghanistan, which will allow trade through Pakistan to adjacent regions.

Because of its strategic advantages, China, whose economy is expanding at the quickest rate in the world, wants to extend CPEC. Shanghai is 5,153 kilometers west of Kashgar, whereas Gwadar is only 2,800 kilometers away, making it a more practical option. The quickest path (2,600 kilometers) from Central Asian nations—Afghanistan, Kyrgyzstan, Kazakhstan, Tajikistan, Turkmenistan, and Uzbekistan—to Iran (4,500 kilometers) and Turkey (5,000 kilometers) is via Pakistan, which is a vital gateway to Central Asia due to its strategic location.

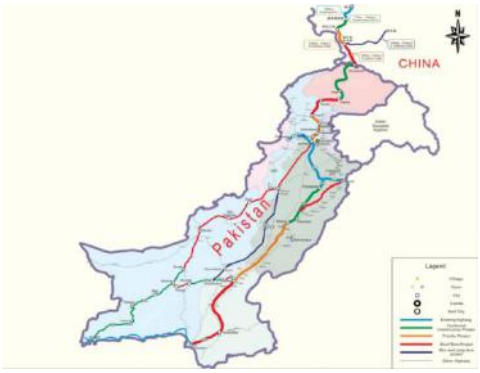


Figure 1.3: Highway Network of CPEC

(Source: http://cpec.gov.pk/)

CPEC Gwadar and Kashgar rail network is vital to transportation and is regarded as the economy's backbone. A railway map is shown below. The green and white lines depict the anticipated future construction of a 1,059-kilometer railway line connecting Havelian & Kashi.

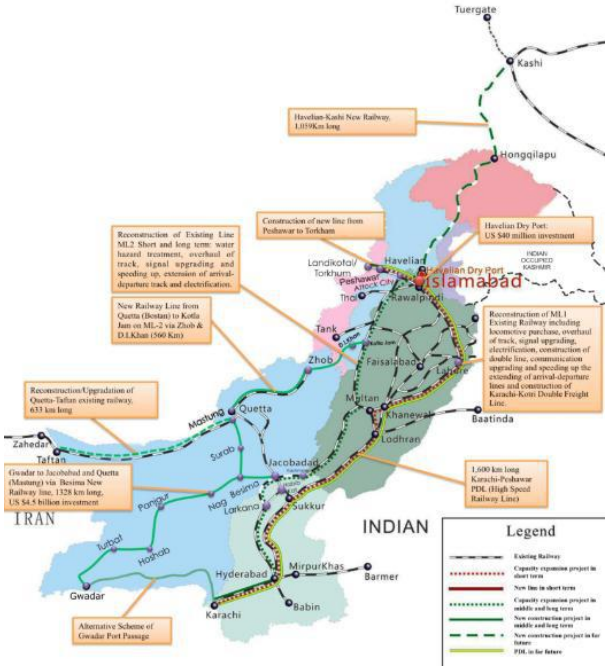


Figure 1.4: Railway Network of CPEC

(Source: http://cpec.gov.pk/)

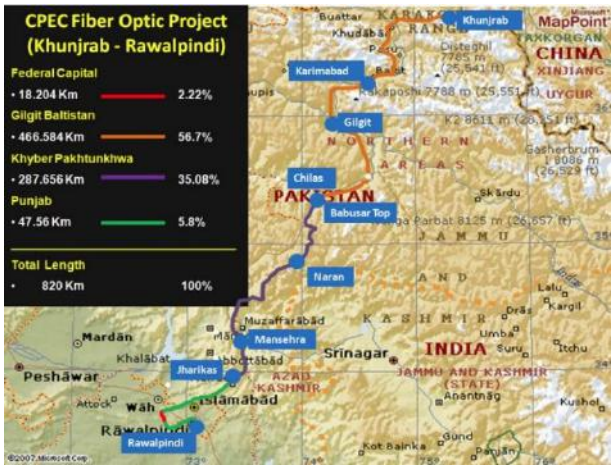


Figure 1.5: Fiber Optic Project of CPEC

(Source: http://cpec.gov.pk/)

Gwadar to Khunjerab is 2,688 kilometers long, including mountainous areas. For the CPEC project, two to six lanes are envisioned, with each lane measuring around 3.65 meters wide. The projected speed for CPEC route will be b/w 70 & 120 km/hr. The road map for CPEC is displayed below.

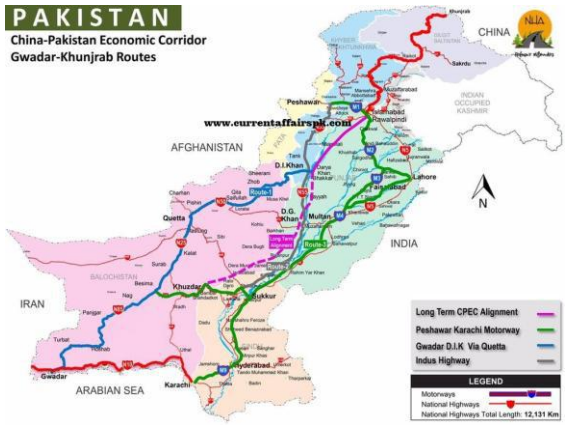


Figure 1.6: CPEC Routes

(Source: http://www.currentaffairspk.com/detail-of-cpec-china-pakistan-economic-corridor-routes-fiber-optics/)

The economic corridor three routes are;

The Western Route

Starts from Gwadar and passes through different cities of Baluchistan including Torbat, Panjgur, Nag, Basimeh, Sorab, Qalat, Quetta, Qila Saifullah and Zob, reached Dera Ismail Khan and continued to Islamabad.

The Central Highway

Starts from Gwadar and passes through several cities in the provinces of Punjab, Sindh and Balochistan before reaching Dera Ismail Khan. Basima, Khuzdar, Sukkur, Rajanpur, Liah, Muzaffargarh and Bakar are among the towns.

Eastern Route

Gwadar, Basime, Khazdar, Sukkur, Rahim Yar Khan, Bahawalpur, Multan, Lahore/Faisalabad and Islamabad are all located on the Eastern Route.

- ### General Impact of CPEC

China & Pakistan's economies would be significantly impacted by this CPEC investment. Due to severe energy shortages in Pakistan, the majority of the investment is in the energy industry. More than 15,000 MW of power will be produced by planned and proposed energy projects, which might stimulate business and draw in private investment. For the past ten years, Pakistan has seen little investment from the private sector.

The expected investment will also have an impact on the stock market. There is every probability that the revenues and the share prices will increase for various industrial units. This will lead to the increase in productivity of the manufacturers. China benefits equally from this project. CPEC will reduce distance b/w China's Kashgar, located in Xinjiang province, 5,153 kilometers from Beijing, and Persian Gulf, which is currently 13,000 kilometers away. Delivery time will be shortened from 45 days to 10 days for distances up to 2,500 km. China will be able to import commodities like oil in ten days and save money on freight thanks to the new channel. CPEC will significantly cut down China's current commercial routes to Middle East, Africa, and Europe.

- ### Overview

Delivering completed goods to clients is the focus of logistics. It involves a number of tasks, such as order processing, storage, and transportation. This activity falls under the "supply chain management" network, which is built on the integration of several industries, such as information, material handling, warehousing, transportation & inventory, and packaging. This activity plans the troops, supplies, equipment, and mobility, among other things. Two primary components of logistics are:

- Transport (vehicles i.e. trucks, vans, rail, ships, airplanes)
- Infrastructure (roads, highways, sea ways, air ways)

Both aspects of logistics are referred to as the backbone, lifeline, or critical levers of trade in this communications-driven era and aid in cutting down

on delivery times and shipping costs.

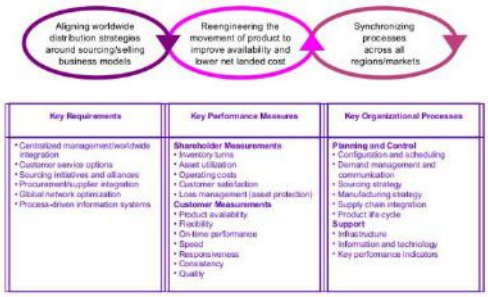


Figure 1.7: Global Logistics Strategy

(Source: Coopers & Lybrand Consulting)

One of the most important logistics activities, if we examine any global logistics strategy, is transportation. Choosing the appropriate means of transportation is essential. In order to choose a mode, organizations attempt to assess many aspects of transportation. Out of all the variables that are available, cost and travel time are regarded as the two main or primary qualities. Norbis and Meixell (2008).

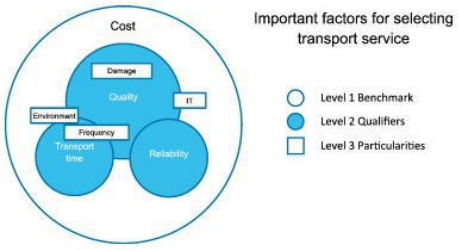


Figure 1.8: Important factors for selecting transport service

(Source: Research in Transportation Business & Management Volume 23, June 2017, Pages 35–45)

Objectives

The primary goal of the study is to determine how transit time and shipping costs affect trade. The study suggests an optimal path that is both economical and time-efficient. China is searching for a more efficient and cost-effective commerce route to reach the nations of Europe and the Middle East. Verifying whether CPEC is feasible and sustainable substitute for the current routes is the goal of this research project. Without a doubt, CPEC can offer a quicker route between China and the Middle East and Europe.

Research Question

a) Is there a -ve/+ve effect on imports & exports in terms of transportation costs & delivery (transit) time?

b) Which route (currently/CPEC, including road & sea components) is better in shipping costs and shipping / delivery time?

II. THEORETICAL FRAMEWORK & LITERATURE REVIEW

- Supply Chain & Logistics

Supply chain is made up of manufacturers, suppliers, distributors, retailers, and wholesalers who are all connected by some form of transportation. The provision of goods and services to final consumers is the main objective of a supply chain network. The effective integration and connectivity of all business divisions and supply chain management network stakeholders influence network's performance (Sahin, 2002). The term "supply" can be used as a verb or as a noun when discussing "supply chain management." As a verb, this word means "to provide for," and as a noun, it implies "the act of filling a want or need (Merriam-Webster. 1973).

Keith Oliver, an executive at Booz Allen Hamilton, originally used the term "supply chain management" in 1982 (InformationWeek, 2003). The administration of the operations or activities that cooperate in a synchronized chain is referred to as supply chain management.

In recent years, companies have attempted to enhance their supply chain operations and have begun to recognize that the supply chain is the primary source of competitive advantage over rival businesses. Businesses are spending a lot of money developing specialized software to guarantee that supply chain operations run efficiently. Numerous software companies have marketed supply chain management (SCM) systems, including software and licensing, for billions of dollars. These expenses are in addition to the expenditures of installation and upkeep. In 2003, Kanaka-medala et al.

Service to end users/customers is the main goal of supply chain management. According to Christopher (1998), a supply chain is a collection of many businesses united by the goal of getting goods and services into the hands of consumers. As various procedures and activities are carried out, this process involves numerous upstream-downstream links.

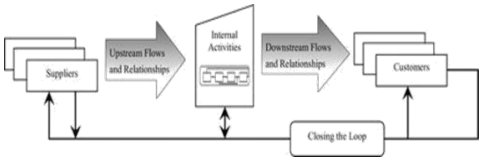


Figure 2.1: Supply Chain Network, Stages & Relationships

(Source: Christopher, 1998)

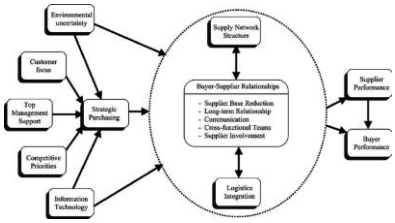


Figure 2.2: Framework of Supply Chain Management

(Source: Towards a Theory of Supply Chain Management by Injazz J Chen & Antony Paulraj, Apr 2004 - Journal of Operations Management)

The term logistics was coined in the 1960s and has been widely used ever since. However, they are constantly changing over time and are not static. (McGuinness, 1992). It is the combination of various activities that are involved in moving products. Information, storage, warehousing, warehousing, asset management and many other important functions are included in this process. It is an activity that links and combines several supply chain operations. It is significant activity that affects how well the supply chain operates. The development of organizational networks and infrastructure determine how efficiently logistics are carried out. Logistics centers, warehouses, stations, docks, and aircraft ports are examples of sites or activities that make up an infrastructure network. Other channels include railroads, highways, canals, flight paths, and pipelines.

The components, resources, supply and transport businesses, and target clients make up logistics corporations. (Zhang and others, 2011). Infrastructure determines logistics efficiency, as stated by Shan et al. (2011). Any company can now use logistics as a competitive advantage in the current globalized era. Bowersox and associates (2000).

By creating new logistics capabilities, businesses add value for their clients. (Esper and others, 2007; Mentzer and others, 2001). A strategic resource, logistics is used by many businesses to obtain a competitive edge. In 2004, Mentzer et al.

Transportation on the other hand has a critical role to play in the manipulation of logistics. As logistics has advanced through 1950s (nationalization and globalization).

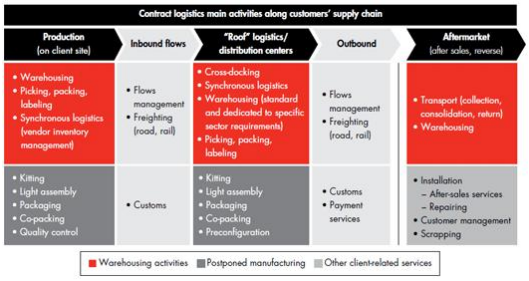


Figure 2.3: Challenges and winning Models in Logistics

(Source: Bain & Company. Challenges and winning models in logistics by François Ramoussi, François Montreuille and François Vidalaine. November 07, 2012)

- Supply Chain

It starts from supplier & ends at customer. It has different functionalities, activities & flows. It is divided into Upstream, Internal Organization & Downstream.

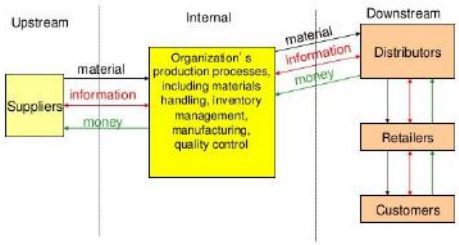


Figure 2.4: Simplified Supply Chain

(Source: https://www.slideshare.net/bosp1/lecture-iii-september-2014the-information-system-and-procurement)

The main roles in a supply chain and their connections are depicted in the above diagram. According to Joseph (2012), procurement and purchase are two of the main upstream operations. Other features fall into the following categories: inbound transportation, management/selection, supplier partnership & development, outsourcing, vendor auditing, and material movement. Obtaining the raw materials needed for production is the special focus of the upstream function.

Production and operational management functions are part of the internal organizational activities. R&D, quality, inventory, materials, and technology implementation and management are some of these activities.

The various activities that make up downstream flow include marketing, distribution, packaging,

warehousing, and outbound transportation. The downstream function transports the final products from the manufacturing plant or process to the final consumers. Information, demand, and funds are transferred from the final consumer (right) to the supplier (left) during this process.

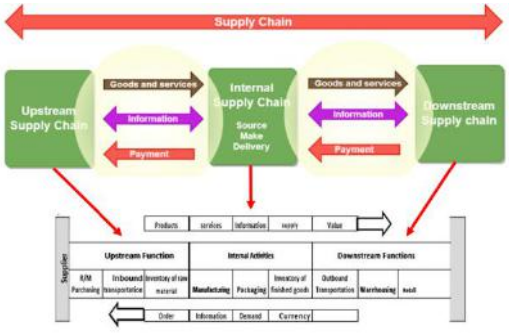


Figure 2.5: Flow of Supply Chain Network

(Source: This work is revised by Mr. M. Ahmer Aamer, Dated 1st June, 2017)

Choosing the best method of transportation is the most important task that needs to be completed in the transportation industry. This choice is influenced by numerous things. In order to prevent delays, organizations want the raw materials to arrive on time for production, and they also want the final products to reach end users or consumers as soon as possible. Only an efficient transportation system and the ensuing infrastructure will make this feasible. Reducing transit times and shipping costs can be greatly aided by improved road infrastructure or the maritime route.

It is important to remember that every action in the supply chain network affects the national economy. But out of all the supply chain activities, transportation has the biggest influence.

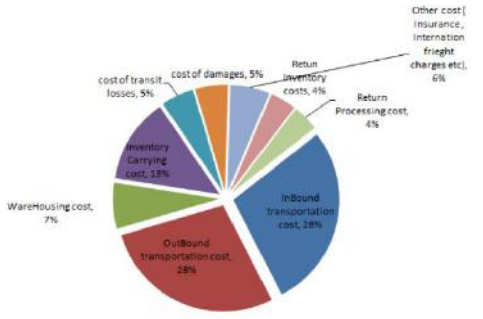


Figure 2.6: Breakup of Supply Chain Costs

(Source: "State of Retail E-Commerce in India", NGBM 2017.Break-up of typical supply chain costs)

- **Importance of Shipping Costs**

Transportation is an important economic activity in industrial systems. The money spent on logistics is 1/3 or 2/3 of the costs. According to (Chang, 1988), total transportation cost is forty-four percent of the total input costs and six point five percent of the total. Car rental is offered. Market products.

Furthermore, planning the containership route and timetable is a crucial component that is very challenging to alter in the near term (Ting Shih Chan, 2003). Managers are constantly looking for dependable and reasonably priced forms of transportation. Choosing a form of transportation involves numerous complex decisions and challenges. Finding the pertinent transportation performance characteristics is one of the many criteria that must be evaluated in order to choose the best carrier and the most practical mode. Rate negotiations, service standards, transit durations, shipping expenses, and carrier performance are some of these variables and determinants (Monczka et al., 2005). According to Russell and Taylor (2003), these are the most crucial considerations for any business because, in the industrial sector, transportation expenses are quite high and typically account for 20% of total production costs.

As a result, businesses are constantly looking for more cost-effective transportation choices. Companies do their best to reduce transportation expenses. If raw material transportation expenses are high, the finished goods' pricing will reflect this. Many businesses and organizations strive to reduce shipping costs, resulting in lower-cost end products. According to Pedersen (1998), a survey of transportation costs was undertaken in Norwegian enterprises, and the results revealed that transportation accounts for more than half of total logistics costs for items (Reimann1989).

China Pakistan Economic Corridor (CPEC)

- **Pakistan**

As route runs through Pakistan, it is critical to comprehend the country's topography, politics, and climate. Climatic circumstances have a significant impact on CPEC. Heavy snowfall, rain, or flooding may have an impact on the projected trading route.

Figure 3.1: Map of Pakistan

(Source: http://www.ezilon.com/maps/images/asia/Pakistan-physical-map.gif)

South Asia is home to Pakistan. Afghanistan, Iran, India, China, and the Arabian Sea are some of its neighbors. China to the north, India to the east, Iran and Afghanistan to the west, and the Arabian Sea to the south. Pakistan's location at the intersection of Asia makes it unique geographically. Pakistan's terrain is made up of mountain ranges, deserts, forests, and green spaces. Pakistan is made up of the Balochistan Plateau in the west, the mountains in the north and west, and the Indus Plain in the east. K2 (Mt. Godwin-Austen) is the highest point at 8,611 meters, while the Indian Ocean is the lowest at 0 meters. Some of the highest peaks in the world, such as K2 (28,250 feet, 8,611 meters) & Nanga Parbat (26,660 feet, 8,126 meters), are located in Pakistan's northern region. To south is Arabian Sea (2017, CIA Global Factbook). The landscape of Pakistan is incredibly varied. The high mountains are located in Pakistan's northern region, across the Sahara and Arabian Sea. There are numerous well-known mountain summits in Pakistan. Ahmad, Kazi S. (1951).

Climate information is critical, particularly for the locations through which the corridor passes. Pakistan's climate is predominantly hot. Pakistan is blessed with four seasons. During the winter, Pakistan has temperatures ranging from -10 to -20 in the north and +10 to +20 in the south. (CIA World Factbook, 2017). Pakistan's weather is naturally diverse. Extreme weather is unusual, yet it does occur on occasion.

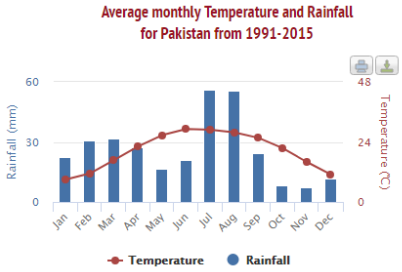


Figure 3.2: Average Monthly Temperature and Rainfall Pakistan (1991-2015)

(Source: Climate change knowledge portal, The World Bank Group)

Heavy snowfall and terrain sliding can have a negative impact on the CPEC in Pakistan's northern provinces. The Shahrah-e-Karakoram route, which connects Pakistan with China, becomes impassable during the winter and rainy season.

Figure 3.3: Shahrah-e-Karakoram landside blockade

(Source: http://dunyanews.tv/en/Pakistan/328851-Kohistan-KKH-blockade-continues-on-eighth-day-due)

Pakistan is blessed with 4 seasons.

Seasons	Average Temperature (Fahrenheit Degrees)
Winter	20 to -25
Spring	25 to 35
Summer	32 to 53
Autumn	18 to 5

Table 3.1: Average Temperatures (4 Seasons)

(Source: World Bank, 2017)

- **Effects of CPEC on Pakistan's Economy**

Pakistan had a population of 30 million and a GDP per capita of $100 in 1947 (Dr. Hafez A. Pasha, 2013).

Meanwhile, Pakistan's GDP has increased by 4. 71% in 2016 compared to the previous year, 2015. Pakistan's GDP growth from 1952 to 2016 was 4. 91%. The following charts show the economic situation in Pakistan.

Figure 3.4: Pakistan GDP Growth Rate

(Source: Pakistan Bureau of Statistics)

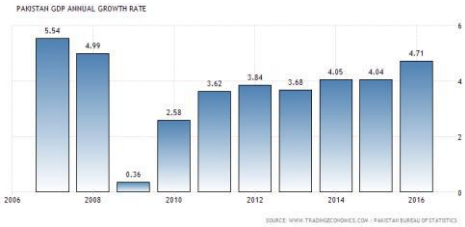


Figure 3.5: Pakistan GDP Annual Growth Rate

(Source: Pakistan Bureau of Statistics)

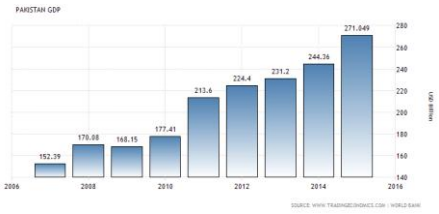


Figure 3.6: Pakistan GDP

(Source: Pakistan Bureau of Statistics)

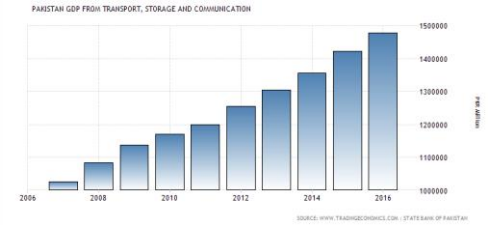
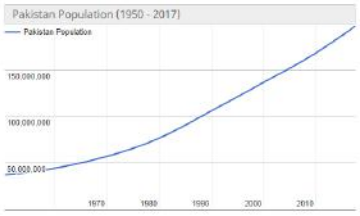


Figure 3.7: Pakistan GDP from Transport, Storage & Communications

(Source: Pakistan Bureau of Statistics)



Population of Pakistan (2017 and historical)

Year	Population	Yearly % Change
2017	196,744,376	2.03 %
2016	192,826,502	2.07 %
2015	188,924,874	2.13 %
2010	170,043,918	2.09 %

Figure 3.8: Population of Pakistan

(Source: http://www.worldometers.info/world-population/pakistan-population/)

Imports & export details of Pakistan are shown below;

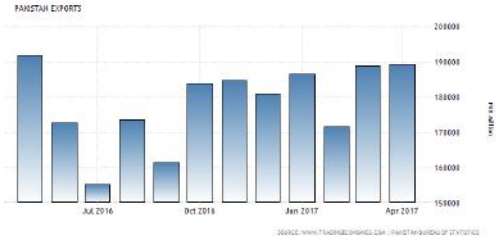


Figure 3.9: Exports Pakistan

(Source: Pakistan Bureau of Statistics)

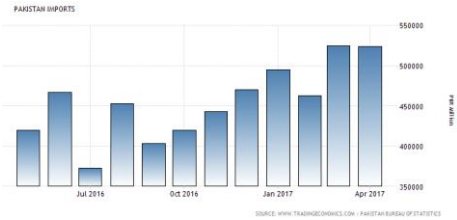


Figure 3.10: Imports Pakistan

(Source: Pakistan Bureau of Statistics)

CPEC is expected to produce over 700,000 new jobs in Pakistan, thus bringing our youthful people into the mainstream. It should be noted, however, that this initiative will save thousands of kilometers of transit between China and other countries.

The study also confirms that economic and social development relations between China and Pakistan have entered a new phase in recent years, and the two countries have established "multiple wheels" to promote in double bonds. CPEC begins in Kashgar, Xinjiang, China, and travels via the Khunjrab Pass and other nodal sites to Karachi and Gwadar, two

southern Pakistani coastal cities. in the cement sector. economic ties between Pakistan and China.

III. METHODOLOGY

Travel time and expenses are the main topics of this investigation. Companies and organizations weigh the pros and downsides of several car models before choosing one. The two most crucial elements are delivery time and freight cost. In the context of the CPEC project, both of these factors are significant. A 50-foot container used to import and export commodities from the Middle East and Europe to Kashgar (West China) via Gwadar Port is the subject of this study, which attempts to ascertain the change or variation in transit time and transportation costs.

- Research Design & Data Collection

The research plan includes detailed information about available data and sources, the research approach used, data analysis methods and data interpretation to answer the research questions. Resources are secondary data obtained from various sources, including the Internet, articles, newspapers, and books. freight lines provide the essential data, which includes delivery time and current freight charges. Road and maritime travel are the suggested present and future routes. Road freight prices are computed using information gathered from the Internet and shipping, while ocean freight rates are obtained from different shipping companies. The shipping businesses and management provide the first piece of information (shipping cost) by email. The official shipping timetables of the French shipping company CMA CGM (Compagnie Maritime d'Affrètement Compagnie Générale Maritime) are used to calculate sea freight times (https://www. cma-cgm. com/). Google Maps is used to calculate the distances to highways.

Primary Data	Obtained from shipping companies such as CMA-CGM, MSC, China Shipping and Hapag Lloyd, and carriers such as AW Logistics and Combined Transport.
Secondary Data	Collected from the Internet (such as Google Maps), research studies, newspapers and books.

- Analysis of Data

The research used in this work is Qualitative and descriptive in nature for answering the research questions. Comparative analysis is done for existing and proposed routes. The variables used for the comparative research work include total distance, shipping costs & transit time. Statistical Test is based on mathematical analysis.

IV. LIMITATIONS

Shipping companies offered shipping charges for a 50-foot container (only for one month). Depending on various variables such as oil prices and product demand, prices may rise or fall. The current and proposed approach consists of two parts:

- Road Transportation
- Transportation by Sea

Research makes it easy to determine shipping costs and shipping times by sea. However, doing so is difficult for road transport. Road charges may vary as local carriers have different rates. The research has assessed the average costs of road transport to meet research needs.

The research methodology is based on the following Calculations/stages/parts;

A	Present transit time & shipping costs
B	Proposed route transit time & shipping costs
C	Comparison of both routes' shipping costs & transit time

Impact on China

- Present Transit Time & Shipping Costs

The researcher chooses the three Middle Eastern ports that China depends on to meet its urgent demands and the three European ports that import and sell the most to China in the first step or phase. Following port selection, this study examines the shipping costs and transit duration for a 50-foot container from these ports to Kashgar, Western China. The following is journey from chosen ports to Kashgar, West China:

- Sea

- Highway

For clarity, routes are divided as:

A	Distance between Kashgar (West China) and Port of Shanghai (China Road)
B	The sea distance from Shanghai to the ports of entry (China Sea)A

Figure 5.1: China Road and China Sea Present Routes

(Source: This work is revised by Mr. M. Ahmer Aamer by plotting on the map. Dated 10th May, 2017)

Products from Kashgar are being shipped to Shanghai Port via the China route if China wishes to export them to the designated nations. Once the products reach the port, they are loaded onto ships and transported by sea to the China Sea, which is their final destination (designated country). Additionally, things will alter if China decides to import goods from other nations. As we can see, a road has two parts: the road and the sea. It is possible to calculate the China Sea route's passage time and shipping expenses. Online resources (the ferry lines' precise timetable page) provided the delivery time information for this investigation. The shipping charge was sent by the shipper. The average cost per kilometer is multiplied by the total distance of the China road to determine the transportation cost for the China highway. By dividing the total road distance in China by the average truck speed, the study determines the road transport time. Road conditions, altitude, traffic, and driver rest are other elements to take into account. In order to calculate the current freight rates and transit time for 50-foot containers that are intended for import or export to China from certain ports of entry, China will combine the freight rates with the transit time by land and sea.

- **Proposed Route**

The study assesses transit time and transportation costs for the proposed new CPEC route. This approach also focuses on the sea and roads. The road connecting Kashgar and Gwadar is known as "Pakistan Road".

Figure 5.2: New Proposed Route

(Source: This work is revised by Mr. M. Ahmer Aamer by plotting on the map. Dated 12th May, 2017)

If China wants to transport products from the proposed new route, the cargo will reach Gwadar from Kashgar (Western China) via Pakistan route. It is then brought from Gwadar port by loading on a barge and sent to the final destination through Pakistani waters.

- **Chinese Exports**

The statistics shown below depicts this picture.

Figure 5.3: Chinese Exports

(Source: Trading Economics)

Shown below is the exports volume to various countries.

Country	Exports (%)
India	17.9
Japan	6.9
South Korea	14.3
Taiwan	9.9
ASEAN Countries	11.6
EU Countries	7.1
South Africa	12.8
Brazil	32.4
Russia	22
US	11
Australia	10.4
New Zealand	9.4

Table 5.1: Chinese Exports to different countries

(Source: Trading Economics)

- **Chinese Imports**

China stands 2nd in world imports. Shown below are the imports statistics.

Figure 5.4: Chinese Imports

(Source: Trading Economics)

Country	Exports (%)
Japan	45.5
ASEAN Countries	25
US	19.9
EU Countries	12.3
South Korea	11.1
Taiwan	12.1
Australia	69.8

Table 5.2: Chinese Imports to different countries

(Source: Trading Economics)

- **Present Route**

Researcher evaluated transportation cost/transit time for 50-foot container shipped from dry port of Kashgar (western China) to the destination ports. Today's transportation consists of roads and waterways. Cargo from Kashgar will arrive at Shanghai port via China route. It travels from Shanghai (port) to designated ports throughout the China Sea. As a result, this study estimates the transportation cost/delivery time from source port to destination by simply adding values of China Road & China Sea. Delivery times & delivery times are available from shipping companies. Shipping costs & delivery time will be determined later. To begin with, the research study evaluates the cost of China's road sections and their transportation times.

- **China Road Cost**

Overall distance of China Road is 5,153 kilometers. Average cost per kilometer is US$0.50, according to AW Logistics Company (AW Logistics, 2017). Cost of inland haulage (price for commercial transport of goods) differs amongst local transporters, hence an average cost is used to meet the requirements. China Road portion inland transport charges are computed by multiplying the China Road distance and the average per kilometer cost.

China Road Haulage Charges		
China Road Distance (Km)	Per Km Cost (US$)	Total (US$)
5,153	0.50	2,576.5

Table 5.3: Road Transport Cost (China Road Segment)

(Source: This work is revised by Mr. M. Ahmer Aamer. Dated 20th May, 2017)

- **China Road - Transit Time**

The average truck or rail speed divided by total distance of China Road section yields travel time. The average truck/rail speed is obtained from the local transporters, such as AW logistics & distance of China Road section is obtained from Google Maps (AW logistics, 2017). The truck's speed can reach 85 km/h in certain areas, although it falls to 25 km/h or less in mountainous areas. In light of this, an average speed of 55 km/h, or (85+25)/2, is chosen.

China Road Transit Time		
China Road Distance (Km)	Average (Truck/Rail) Speed (Km Per Hour	Total (Hours)
5,153	55	93.69

Table 5.4: Transit Time (China Road Segment)

(Source: This work is revised by Mr. M. Ahmer Aamer. Dated 20th May, 2017)

To obtain correct findings, each voyage at the China road segment is subjected to an average of 24 hours of transit time delays caused by the aforementioned causes. In the computation below, an average 12-hour delay is added to the China Road transit time. The 12 hours are based on our assumptions.

China Road Transit Time		
China Road Transit Time (Hours)	Average Delay's (Hours)	Total (Hours)
93.69	12	105.69 or 4.4 Days

Table 5.5: Total Transit Time (China Road Segment)

(Source: This work is revised by Mr. M. Ahmer Aamer. Dated 20th May, 2017)

- **Present Route Shipping Costs**

The port of origin in all the cases is Kashgar. The shipment will first reach through the China The road will lead to the Shanghai port, from whence it will be delivered to its final destination across the China Sea. To calculate current shipping expenses, we shall sum the shipping costs of the China Road and China Sea parts. China Road costs have already been computed above.

Present Route Shipping Cost = China Road Cost + China Sea Freight

Origin Port	Destination Ports	China Road Freight (Kashgar-Shanghai)	China Sea Freight (Shanghai-Destination Ports)	Total Freight
Kashgar	Hamburg	$1,900 - $2,200	$1,800 - $1,900	$3,700 - $4,100
	Le Havre	$1,900 - $2,200	$1,800 - $1,900	$3,700 - $4,100
	Rotterdam	$1,900 - $2,200	$1,800 - $1,900	$3,700 - $4,100
	Jeddah	$1,900 - $2,200	$1,300 - $1,500	$3,200 - $3,700
	Kuwait	$1,900 - $2,200	$1,300 - $1,500	$3,200 - $3,700
	Oman	$1,900 - $2,200	$1,200 - $1,300	$3,100 - $3,700

Table 5.6: Present Route Freight

(Source: This work is revised by Mr. M. Ahmer Aamer. Dated 22nd May, 2017)

- **Present Route Transit Time**

The current travel time for a 50-foot container is calculated by adding the transit time on the China Road and the transit time on the China Sea. Shipping times for China roads are determined, transit times to China seas are based on CMA Line's official shipping schedules.

Current Route Transit Time = China Route Transit Time + China Sea Transit Time

Origin Port	Destination Ports	China Road Transit Time (Kashgar-Shanghai)	China Sea Transit Time (Shanghai-Destination Ports)	Total (Transit Time)
Kashgar	Hamburg	4 – 6 Days	29 – 34 Days	33 – 40 Days
	Le Havre	4 – 6 Days	29 – 34 Days	33 – 40 Days
	Rotterdam	4 – 6 Days	29 – 34 Days	33 – 40 Days
	Jeddah	4 – 6 Days	14 – 19 Days	18 – 25 Days
	Kuwait	4 – 6 Days	14 – 19 Days	18 – 25 Days
	Oman	4 – 6 Days	11 – 14 Days	15 – 20 Days

Table 5.7: Present Route Transit Time

(Source: This work is revised by Mr. M. Ahmer Aamer. Dated 22nd May, 2017)

Marine transit times are derived from the CMA line's online schedules. The time spent in other ports throughout the travel will not be counted.

Impact on Pakistan

- **Proposed Route**

This cargo is going from Kashgar to Gwadar port via Pakistan route. After that they are transported from Gwadar port to other destination ports through Pakistani sea route. Shipping companies provide information on freight rates and transit times for Pakistan's maritime sector. Pakistan taxes and duties and transit time are calculated after collecting the necessary data.

- **Pakistan Road Cost**

According to Google map, the road width in Pakistan is 2800 km. According to Combined Freight International (2017), the average cost per kilometer is $0. 26. Prices vary for different carriers in the area, so the average price is used to meet requirements.

Pakistan Road Haulage Charges		
Pakistan Road Distance (Km)	Per Km Cost (US$)	Total (US$)
2,800	0.26	728

Table 6.1: Pakistan Road Cost

(Source: This work is revised by Mr. M. Ahmer Aamer. Dated 28th May, 2017)

- **Pakistan Road Transit Time**

The transport time of the road section of Pakistan is determined truck can reach speeds of up to 85 km/h in some sections, although it drops to 25 km/h or less in mountainous areas. Average speed of 55 km/h (25+85)/2 is used.

Pakistan Road Transit Time		
Pakistan Road Distance (Km)	Average (Truck/Rail) Speed (Km Per Hour	Total (Hours)
2,800	55	50.9

Table 6.2: Pakistan Road Segment Transit Time

(Source: This work is revised by Mr. M. Ahmer Aamer. Dated 28th May, 2017)

The road transport between Kashgar and Gwadar takes 50. 9 hours. However, other factors such as weather conditions, traffic congestion, strikes, law and order and drivers resting after long journeys must also be considered. The reasons mentioned above mean an average of 12 hours of delivery delay. These 12 hours are based on the assumptions we made earlier.

Pakistan Road Transit Time		
Pakistan Road Transit Time (Hours)	Average Delay's (Hours)	Total (Hours)
50.9	12	62.9 or 2.62 Days

Table 6.3: Pakistan Road Total Transit Time

(Source: This work is revised by Mr. M. Ahmer Aamer. Dated 28th May, 2017)

50-foot container will take 62.9 hours (2.62 days) to reach from Kashgar - Gwadar through Pakistan Road.

- **Shipping Cost**

The cargo will first go to Gwadar port via Pakistan route. In addition, it is shipped to other ports of destination by sea in Pakistan. To calculate the cost of transporting a 50-foot container through CPEC, we add the road costs of Pakistan's road sector and the sea transport of Pakistan's sea sector. Pakistan sea freight rates for Europe are obtained from CMA and MSC lines, sea freight rates for Middle East countries are obtained from CMA, MSC, China Shipping and Hapag Lloyd. Fees will be collected for the month of April 2017 and will be valid for one month. Prices change monthly. (CMA, MSC, Hapag Lloyd, China Shipping, 2017). To calculate shipping cost for 50 feet container, add Pakistan road and Pakistan sea shipping cost.

CPEC Proposed Route Shipping Cost = Pakistan Road Cost + Pakistan Sea Freight

Origin Port	Destination Ports	Pakistan Road Freight (Kashgar-Gawadar)	Pakistan Sea Freight (Gawadar-Destination Ports)	Total Freight
Kashgar	Hamburg	$700 - $800	$1,700 - $1,800	$2,400 - $2,600
	Le Havre	$700 - $800	$1,700 - $1,800	$2,400 - $2,600
	Rotterdam	$700 - $800	$1,700 - $1,800	$2,400 - $2,600
	Jeddah	$700 - $800	$800 - $900	$1,500 - $1,700
	Kuwait	$700 - $800	$800 - $900	$1,500 - $1,700
	Oman	$700 - $800	$250 - $350	$950 - $1,150

Table 6.4: CPEC Route Shipping Cost

(Source: This work is revised by Mr. M. Ahmer Aamer. Dated 28th May, 2017)

- **CPEC Proposed – Transit Time**

Pakistan road shipping time is pre-determined, but the Pakistan sea shipping time is based on the CMA live shipping schedule. By adding the Pakistan road transport time and the sea transport time in Pakistan, we can calculate total transit time through new CPEC route.

Origin Port	Destination Ports	Pakistan Road Transit Time (Kashgar-Gawadar)	Pakistan Sea Transit Time (Gawadar-Destination Ports)	Total (Transit Time)
Kashgar	Hamburg	2 – 4 Days	22 – 26 Days	24 – 30 Days
	Le Havre	2 – 4 Days	22 – 26 Days	24 – 30 Days
	Rotterdam	2 – 4 Days	22 – 26 Days	24 – 30 Days
	Jeddah	2 – 4 Days	6 – 9 Days	8 – 13 Days
	Kuwait	2 – 4 Days	3 – 5 Days	5 – 9 Days
	Oman	2 – 4 Days	4 – 7 Days	6 – 11 Days

Table 6.5: Transit Time (CPEC)

(Source: This work is revised by Mr. M. Ahmer Aamer. Dated 30th May, 2017)

Ocean loading times are taken from the online CMA Line Schedules. The transit time starts from the time the ships dock until their final destination. Time spent in various ports is not included.

V. FINDINGS

- **Impact on Imports & Exports**

Based on our analysis, the total traffic from the selected sites is in the billions. The analysis shows that the shipping cost for a 50-foot container imported from European countries will decrease. Also, the transit time from European countries is reduced. For countries in the Middle East, which China relies heavily on for energy, shipping costs will be reduced in addition to the delivery time. This addresses the primary research question in the study. The table below shows the overall impact of CPEC on savings.

Ports	Exports (Billion Dollars)	Imports (Billion Dollars)	Total Trading Volume (Billion Dollars)	10% Saving (Billion Dollars)
Germany	$92.5	$87.4	$179.9	$17.9
France	$50.4	$20.0	$70.4	$7.0
Netherland	$44.7	$10.3	$55.0	$5.5
Saudi Arabia	$19.8	$48.0	$67.8	$6.7
Kuwait	$3.8	$8.9	$12.7	$1.2
Oman	$1.2	$18.9	$20.1	$2.0
Total	$212.4	$193.5	$405.9	$40.5

Table 7.1: Impact of CPEC

(Source: This work is revised by Mr. M. Ahmer. Dated 2nd June, 2017)

The table above shows that the supply chain may save approximately US$40.5 billion on all exports/imports transported from the specified

destinations. The CPEC route will not only cut transportation expenses, but it will also shorten the distance from 10,000 to 11,000 kilometers, resulting in shorter trade transit times. The shorter route means faster delivery of the shipped goods.

- **Comparisons**

Shipping - Costs Comparison

The table indicates a favorable impact (green hue) in terms of transportation costs. China should be able to save at least $1,300 for each 50-foot container imported/exported from Europe. The new route shipping cost is approximately 36.0% cheaper than the current route shipping cost. According to research findings, China should pay about half of the current shipping costs for each 50-foot container (originating in Jeddah and Kuwait). In other words, China can cut shipping costs by up to 50% on all oil imports.

Origin Port	Destination Ports	Current Route Shipping Cost	CPEC Route Shipping Cost	Difference
Kashgar	Hamburg	$3,700 - $4,100	$2,400 - $2,600	$1,300 - $1,500
	Le Havre	$3,700 - $4,100	$2,400 - $2,600	$1,300 - $1,500
	Rotterdam	$3,700 - $4,100	$2,400 - $2,600	$1,300 - $1,500
	Jeddah	$3,200 - $3,700	$1,500 - $1,700	$1,700 - $2,000
	Kuwait	$3,200 - $3,700	$1,500 - $1,700	$1,700 - $2,000
	Oman	$3,100 - $3,700	$950 - $1,150	$2,150 - $2,550

Table 7.2: Shipping Costs Comparison (Present & Future CPEC route)

(Source: This work is revised by Mr. M. Ahmer Aamer. Dated 2nd June, 2017)

Transit Time Comparison

The green color indicates a positive impact on delivery time. The results show that China can save 9-10 days for all imports and exports to/from Europe. Likewise, China can reduce transit times to Middle Eastern countries because it depends on them for its energy needs.

Origin Port	Destination Ports	Present Route Transit Time	CPEC Route Transit Time	Difference
Kashgar	Hamburg	33 – 40 Days	24 – 30 Days	9 – 10 Days
	Le Havre	33 – 40 Days	24 – 30 Days	9 – 10 Days
	Rotterdam	33 – 40 Days	24 – 30 Days	9 – 10 Days
	Jeddah	18 – 25 Days	8 – 13 Days	10 – 12 Days
	Kuwait	18 – 25 Days	5 – 9 Days	13 – 17 Days
	Oman	15 – 20 Days	6 – 11 Days	9 – 9 Days

Table 7.3: Transit Time Comparison (Present & Future CPEC route)

(Source: This work is revised by Mr. M. Ahmer Aamer. Dated 2nd June, 2017)

- **Comparison of Distance**

Present Distance

Today's route is a combination of road and sea elements. The distance of the new route is calculated by adding the China route and the China Sea distances to the current route. Nautical distance is measured in nautical miles. However, we have converted it to kilometers. To convert nautical miles to kilometers, multiply the nautical distance by 1. 852.

Total Present Route Distance = China Road Distance + China Sea Distance

Origin Port	Destination Ports	China Road Part Distance (Kashgar to Shanghai)	China Sea Part Distance	Total Present Route Distance (Km)
Kashgar	Hamburg	5,153	10,778nm x 1.852 = 19,961km	25,114
	Le Havre	5,153	10,320nm x 1.852 = 19,113km	24,266
	Rotterdam	5,153	10,320nm x 1.852 = 19,113km	24,645
	Jeddah	5,153	6,558nm x 1.852 = 12,145km	17,298
	Kuwait	5,153	6,558nm x 1.852 = 11,227km	16,380
	Oman	5,153	5,389nm x 1.852 = 9,980km	15,133

Table 7.4: Present Route Distance

(Source: This work is revised by Mr. M. Ahmer Aamer. Dated 2nd June, 2017)

Route Distance

CPEC route distance = Pakistan Road Distance + Pakistan Sea Distance

Origin Port	Destination Ports	Pakistan Road Part Distance (Kashgar to Gawadar)	Pakistan Sea Part Distance	Total CPEC Route Distance (Km)
Kashgar	Hamburg	2,800	6,386nm x 1.852 = 11,827km	14,627
	Le Havre	2,800	5,928nm x 1.852 = 10,979km	13,779
	Rotterdam	2,800	6,133nm x 1.852 = 11,358km	14,158
	Jeddah	2,800	2,166nm x 1.852 = 4,011km	6,811
	Kuwait	2,800	1,087nm x 1.852 = 2,013km	4,813
	Oman	2,800	467nm x 1.852 = 865km	3,665

Table 7.5: CPEC Route Distance

(Source: This work is revised by Mr. M. Ahmer Aamer. Dated 2nd June, 2017)

Distance Comparisons

The research work demonstrates how much the distances increase or decrease as a result of the CPEC route by estimating the difference between the current and CPEC route lengths.

Origin Port	Destination Ports	Present Route Distance	CPEC Route Distance	Difference (Km)
Kashgar	Hamburg	25,114	14,627	10,487
	Le Havre	24,266	13,779	10,487
	Rotterdam	24,645	14,158	10,487
	Jeddah	17,298	6,811	10,487
	Kuwait	16,380	4,813	11,567
	Oman	15,133	3,665	11,468

Table 7.6: Current & CPEC Routes Distances Comparison

(Source: This work is revised by Mr. M. Ahmer Aamer. Dated 4th June, 2017)

VI. RECOMMENDATIONS

It is simple to conclude, after reading the research findings, that businesses should take the CPEC route because it is very cost-effective and time-efficient. Production plants must receive raw materials on schedule and provide completed goods to consumers or clients in a timely manner. Only the supply chain management network's increased speed, effectiveness, and dependability make this feasible. Transporting commodities or products is a supply chain network's primary role. A good delivery system ensures that raw materials are delivered on time and finished goods are delivered to users or customers on time. Transportation thus plays a critical part in the supply chain network. Transportation mechanisms transport raw materials to the manufacturing site before moving finished products to users/customers. An effective transportation infrastructure allows for speedy, affordable, and efficient delivery.

VII. CONCLUSIONS

This study's primary goal is to determine whether CPEC will have an impact on travel times and transportation expenses. This study focused on delivery time and transportation costs in an effort to assess importance of logistics in supply chain management. Any supply chain network's base or backbone is thought to be logistics. As a result, it serves as both an inbound and outward transit mechanism. The most important and valuable aspects of transportation are freight costs and transit times. Every business organization aims to cut logistical expenses and delivery time. Every corporate entity desires less expensive transportation services that deliver on schedule.

China is the biggest importer and consumer of products and services worldwide. These days, China sells goods worth billions of dollars. It thus advanced to the world's top level. The world's second-largest importer is China. China's main commercial partners are the destination nations chosen for this study. To meet its energy needs, China imports a lot of oil from eastern nations. Another quick, effective, secure, and dependable method is critically needed in China. This might reduce shipping expenses for China by billions of dollars. This study's primary goal is to ascertain how China's imports and exports are affected by the China-Pakistan Economic Corridor (CPEC).

Results show that avoiding these bottlenecks can save the supply chain billions of dollars in imports and exports. The CPEC route will undoubtedly reduce the distances and shorten the transportation time. Short routes automatically reduce shipping costs. According to the analysis, there is a positive effect on transportation costs for China's imports and exports. With the CPEC route, China can save a lot of money. Lowering the price of each import or export container lowers the overall price of Chinese goods. Lower transportation costs will lower the price of Chinese raw materials from other countries. As a result, cheaper raw materials are available for more expensive production. In addition to raw materials, electricity (oil) is also available at low cost. Also, Chinese buyers have to pay low shipping costs, which allows them to lower their purchase costs. Chinese products become more competitive in international/global markets by lowering prices and offering faster delivery dates. Research findings also show that China can save 9-10 days in total imports and exports to Europe. Also, China can reduce transit times on routes to Middle East countries. There is no doubt that CPEC will transform the region. This will help Pakistan and China but also other countries.

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