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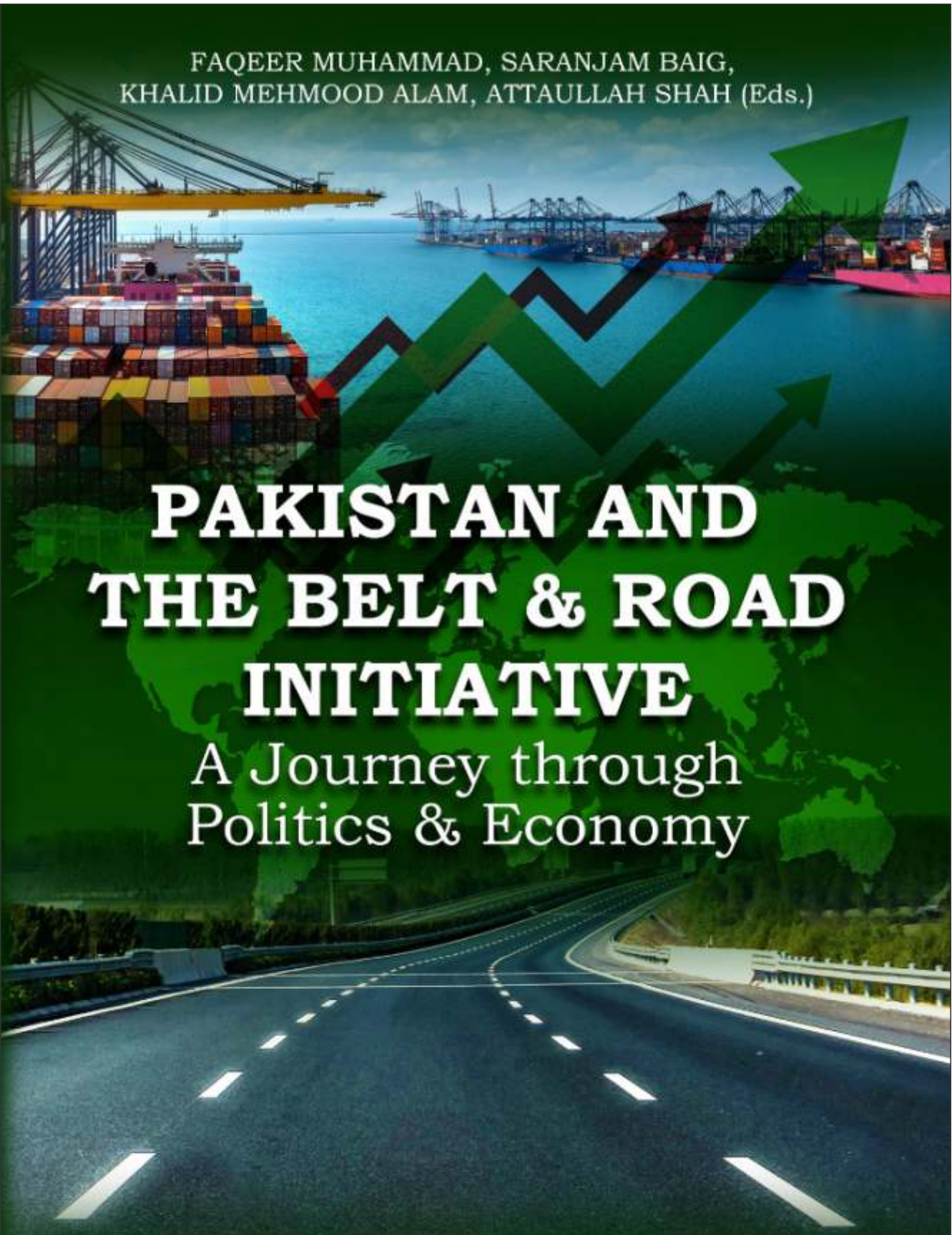

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Enhancing Food Security and Sustainable Development in Pakistan: Agricultural Advancements under CPEC

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Abstract

The growth of Pakistan's agriculture industry, food security, and progress of China-Pakistan Economic Corridor (CPEC) are intricately linked, driving progress towards achieving Sustainable Development Goals (SDGs). As agriculture growth enhances food availability and self-sufficiency by reducing hunger and malnutrition (SDG 2), alleviates poverty (SDG 1), and improves health and well-being (SDG 3). CPEC's infrastructure upgrades and facilitates agricultural trade, market access, and economic growth, creating jobs and increasing incomes (SDG 8), while promoting decent work and economic development (SDG 9). This chapter is an attempt to analyze the interconnected progress that contributes to achieving SDGs, ensuring a more food-secure, economically stable, and sustainable future for Pakistan by attempting to analyze the fact that, how value chains, market access, and farming methods may all be improved by CPEC investment. It also assesses the effects of these advancements on the environment and society through stakeholder analysis to identify national and international players that can work together to maximize the benefits of CPEC on agriculture as strategic utilization of CPEC can assist Pakistan in achieving SDG targets and goals related to food security.

Introduction

The agriculture sector/industry in Pakistan could experience significant effects from the China-Pakistan Economic Corridor (CPEC) infrastructure project. This study evaluates CPEC's potential benefits and drawbacks for Pakistan's agricultural industry and food security while considering the SDGs. Additionally, in tackling poverty and hunger, two primary SDG objectives, the study emphasizes the significance of Pakistan's agriculture industry. It looks at how value chains, market access, and farming methods may all be

improved by the CPEC investments. It also assesses the effects of these advancements on the environment and society. Also, stakeholder analysis is used in this study to identify national and international players that can work together to maximize the benefits of CPEC on agriculture. Strategically utilizing CPEC can assist Pakistan in achieving SDG targets and goals related to food security while providing insightful information to investors, development professionals, policymakers, and practitioners.

The Sustainable Development Goals (SDG 2) aim to eradicate hunger, ensure food security, improve nutrition, and promote sustainable agriculture worldwide by 2030. This goal is particularly crucial for Pakistan, a country grappling with food security issues, despite its abundant agricultural resources, and the China-Pakistan Economic Corridor (CPEC), an ambitious economic initiative provides the opportunity to address the bottlenecks.(Imran et al., 2022). The nation's capacity to provide food for all its residents has been put under strain by factors such as rapid population increase, the effects of climate change, water shortages, and antiquated farming techniques. In order to address these problems and improve Pakistan's food security, nutrition, and general well-being, SDG 2 must be achieved (Bibi & Raza, 2023).

The CPEC is revolutionary for Pakistan's economic growth. It includes many infrastructure projects, such as industrial zones, railroads, highways, and energy production. Although connectivity and trade are the main objectives of CPEC, SDG 2 would be significantly impacted. The CPEC has the power to transform Pakistan's farming industry completely. Modernized transportation, better logistics, and more connections may all help deliver agricultural products quickly from farms to markets (Anwar et al., 2022).

Moreover, CPEC investments in agriculture and technology have the potential to boost value chains, empower smallholder farmers, and increase agricultural yields. Reducing poverty is strongly related to SDG 2. People may escape poverty and have better access to food and nutrition because of the economic benefits of CPEC, which include employment opportunities and more significant economic activity. However, there are difficulties. The successful implementation of CPEC projects necessitates careful consideration of the possible environmental and social ramifications and alignment with sustainable development goals.

In summary, SDG 2 is closely related to the China-Pakistan Economic Corridor (CPEC). Enhancing economic circumstances, agriculture, and poverty might significantly alleviate Pakistan's food security issues. For CPEC to fully fulfill its potential and provide food security and a brighter future for

Pakistan, all stakeholders must work together to ensure that the project complies with sustainable development principles and advances the accomplishment of SDG (Anwar et al., 2022).

CPEC and Agriculture Sector of Pakistan

Overview of the CPEC

CPEC, a major multi-billion-dollar initiative, aims to connect Pakistan's Gwadar Port to China's western region, holding immense geopolitical and historical importance. Commencing in 2013 through a pact between China and Pakistan, it stands as a critical project within China's Belt and Road Initiative (BRI), focusing on enhancing global infrastructure and trade links (Bibi & Raza, 2023). The CPEC network encompasses vital developments like roads, railways, pipelines, and energy facilities, promising substantial improvements in Pakistan's energy and transportation sectors and fostering economic growth (Alam et al., 2023). By shortening the distance, the corridor provides China with a more convenient route to the Arabian Sea, bypassing the complexities of the South China Sea routes. Moreover, CPEC's significance lies in its transformative potential for Pakistan's economy, job creation, and regional connectivity enhancement (Bibi & Raza, 2023). However, it has also sparked worries about the geopolitical ramifications, sovereignty challenges, and debt sustainability. All the same, CPEC continues to be a representation of the deepening geopolitical and economic relations between China and Pakistan, with far-reaching consequences for both nations as well as the wider area (Alam et al., 2023).

Agricultural Sector in Pakistan

The Pakistani economy relies significantly on its agricultural sector, which engages a substantial segment of the labor force and plays a significant role in GDP. Nonetheless, it faces multiple hurdles, with the most urgent one being severe water scarcity intensified by the impacts of climate change and inefficient irrigation techniques. This is an essential risk to the agricultural sector, as irrigation from the Indus River system is crucial (Syed et al., 2022). Furthermore, soil erosion and fertility loss are significant contributors to decreased agricultural output, highlighting the ongoing issue of land degradation. Traditional and antiquated farming methods are still widely used, which prevents productivity gains, while contemporary agricultural technology is still not widely used. Inadequate storage facilities, inadequate market accessibility, and inadequate transportation infrastructure impede the effective distribution of agricultural products (Ashraf et al., 2022).

Despite these obstacles, noteworthy prospects are approaching. Pakistan may focus on high-value export crops like fruits and vegetables instead of growing traditional mainstays like rice and wheat. Another path to expansion is modernization, where productivity gains may be achieved via precision agriculture, contemporary agricultural methods, and technological advancements. Investments in irrigation systems and water management can allay concerns about water shortages. Pakistan's proximity to regional markets like the Middle East and Central Asia offers more export revenue (Abbas, 2022). Enhancing value addition through agribusiness and food processing may boost the sector's economic contribution and raise farmers' incomes.

In conclusion, Pakistan's agriculture sector is at a critical moment, juggling prospects and problems. Its stability and growth depend on overcoming water constraints, adopting contemporary technology, and supporting sustainable behaviors. Pakistan's economic growth and agricultural development may be fueled by utilizing its potential for regional commerce and expanding market access (Ashraf et al., 2022).

CPEC and Agriculture

Shafi et al. (2023) suggest that Pakistan's agricultural environment is changing due to the China-Pakistan Economic Corridor (CPEC), which presents both possibilities and problems. Better transportation infrastructure, which makes it possible for agricultural products to be moved to markets efficiently, is one clear way CPEC has benefited agriculture. Improving farmers' access to customers and lowering post-harvest losses might promote economic growth (Barrech et al., 2023). Furthermore, CPEC-related projects that address irrigation and water management concerns may resolve Pakistan's ongoing water shortage issue. This is important since sustainable farming methods depend heavily on water. Exports and farmer incomes might rise due to the China-Pakistan Economic Corridor's (CPEC) enhanced connectivity, which fortifies international economic ties and creates new markets for Pakistani agricultural goods, especially in China (Shahzad et al., 2023).

On the other hand, there are issues regarding how CPEC may affect agriculture. Procuring agricultural land due to extensive infrastructure development may uproot rural communities and harm food security. Environmental effects, including soil erosion and water resource loss, are potential problems that require cautious control (Barrech et al., 2023). Furthermore, the government's ability to fund agricultural development initiatives may be constrained by the debt taken on to finance CPEC projects. Moreover, the enhanced commerce

enabled by the CPEC may subject Pakistani farmers to rivalry with Chinese agricultural goods, influencing regional market dynamics (Shafi et al., 2023).

However, initiatives for policies and efficient administration are essential for handling these challenges. To fully realize the promise of the CPEC to support a solid and sustainable agriculture sector in Pakistan, it will be necessary to strike a balance between the advantages of increased market access and infrastructure and the issues of social fairness and environmental sustainability (Shahzad et al., 2023).

Technological Advancements

Modern farming methods might be introduced into Pakistan with the potential for technological improvements and agricultural innovation brought about by the CPEC. Precision agriculture, biotechnology, and agricultural gear are just a few of the innovations China has achieved in these fields, and through the CPEC, Pakistan will have access to these innovations. With the cooperation and information sharing made possible by CPEC, Pakistani farmers could transform their farming practices and acquire the equipment and know-how needed to do so (Bano et al., 2022). The future of agriculture seems quite promising. Increased yields and less resource waste may be achieved by implementing contemporary agricultural methods like precision farming powered by data and technology. Developing high-yielding, disease-resistant crop varieties by biotechnology can increase agricultural production and food security. With the CPEC, Pakistan's agricultural output may rise significantly by integrating data-driven decision-making with modern technology (Anwar et al., 2022). Automation may reduce labor-intensive employment, and data-driven decision-making can enhance crop management and resource allocation, increasing crop quality and yield (Bano et al., 2022).

However, there are obstacles to this vision's practical realization. It is critical to prioritize skill development, affordability, and resource accessibility, particularly for rural populations and smallholder farmers. Achieving the transformation of Pakistan's agricultural industry will depend on ensuring these players have the resources and skills to fully use technological breakthroughs (Gul et al., 2022). According to many experts, Pakistan has the opportunity to modernize its agriculture, increase productivity, address food security issues, and support economic development through the role of CPEC in promoting technology transfer and agricultural innovation. (Anwar et al., 2022).

Economic Impacts of CPEC in Pakistan

The CPEC significantly impacts the earnings and means of subsistence of Pakistani farmers, resulting in notable social and economic transformations in farming areas. In terms of the economy, the agricultural sector has benefited from CPEC. Farmers now have access to broader markets, lower post-harvest losses, and more competitive pricing for their goods because of the improved roads and connections in the transportation infrastructure (Gul et al., 2022). In addition, farmers' earnings have grown due to greater agricultural output brought about by the adoption of contemporary farming techniques and technology made possible by CPEC (Anwar et al., 2022). Furthermore, it is notable that the livelihoods have become more varied. People in rural villages now have new sources of income because of the CPEC's opportunities for employment, especially in industries like construction, transportation, and services. For many households, the increased financial stability brought about by this diversification has also lessened their economic vulnerability (Bano et al., 2022).

In addition to its economic benefits, CPEC has raised rural residents' quality of living. Improved energy accessibility, better roads, and clean water are a few examples of infrastructural development that has raised living standards overall and increased agricultural productivity in certain regions (Barrech et al., 2023). Despite this, it is essential to acknowledge that disparities and inequalities exist. Specific farmers and communities may profit more than others because of unequal access to CPEC-related opportunities, resources, and knowledge. For policymakers and stakeholders, resolving these discrepancies and guaranteeing a fair sharing of the benefits of CPEC continue to be significant challenges (Shafi et al., 2023). CPEC is changing how people who work in agriculture make a living, improving living standards, diversifying sources of income, and generating economic advantages. However, it also brings attention to implementing the project with equity and inclusion (Gul et al., 2022).

CPEC and Food Security in Pakistan

Economic Impact of CPEC on Food Security

According to research, the cost and affordability of food for Pakistan's general populace are directly impacted by the massive economic effects of the CPEC. The massive infrastructure development of CPEC, which includes energy projects, is one of its most important economic features (Baig et al., 2023). Moving food from fields to markets may become more affordable due to this infrastructure development's potential to lower transportation costs.

Enhancing the energy supply can help lower production costs in the agricultural sector. This might lead to people being able to purchase food at a lower cost because lower manufacturing and transportation expenses can help keep prices stable (Cao et al., 2022). In addition, it is anticipated that CPEC would propel Pakistan's economy as a whole, raising household incomes and standards of life. People typically have more money available to them as the economy expands, which may help them buy food. Another critical factor is the job prospects created by CPEC-related projects. Creating jobs in transportation, building, and related industries immediately raises earnings, increasing the population's purchasing power and facilitating better access to food (Shafi et al., 2023).

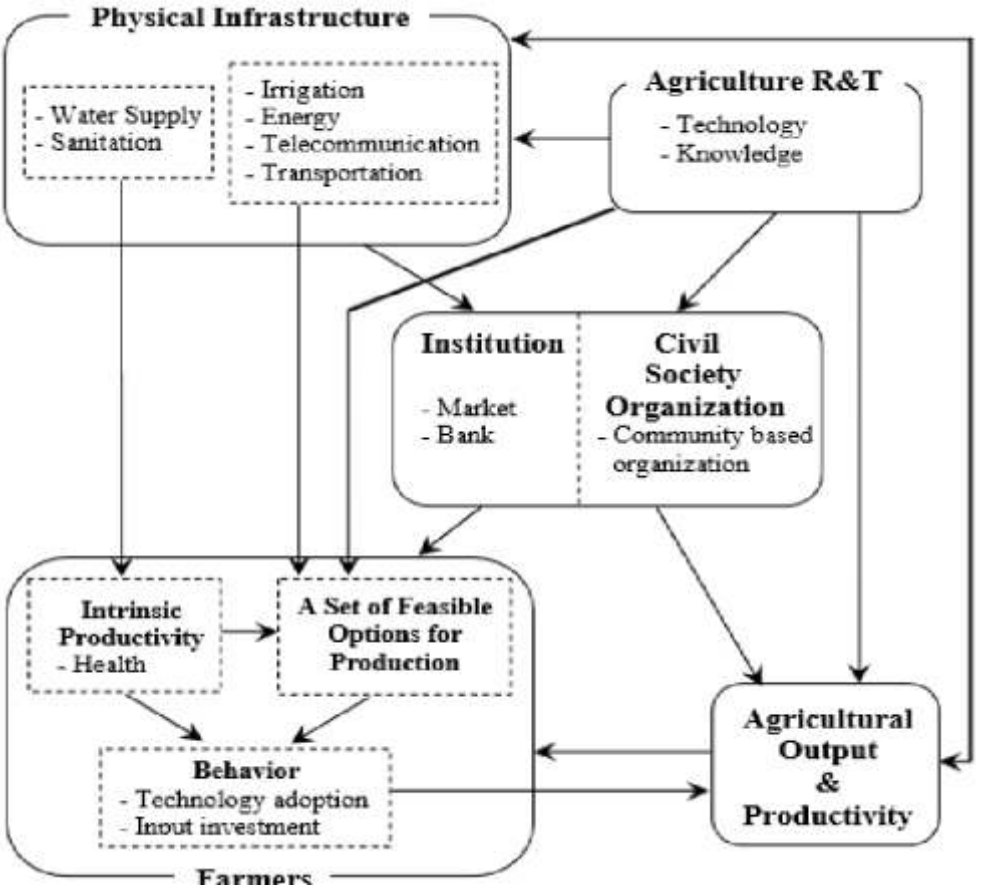

Figure 1: Flow Chart of Agricultural Output Versus Productivity

However, it is critical to recognize the possibility of economic disparity. Although the economic advantages of CPEC appear suitable, questions about how these gains will be distributed relatively still need to be answered. There is a chance that wealth will not be spread equally, which might result in

differences in access to food supplies and income (Cao et al., 2022). Because of this, officials must guarantee that everyone benefits from CPEC. Pakistan may also be able to export agricultural goods more effectively because of the CPEC's enhanced transportation infrastructure. This can affect food affordability in local and foreign markets, boosting the agriculture industry and giving farmers additional options (Ali et al., 2022).

In conclusion, the economic components of the CPEC may significantly impact the general Pakistani population's access to and cost of food. Employment creation, economic expansion, and infrastructural development may make food more widely available and reasonably priced. To make the changes more inclusive and long-lasting, it is imperative to address income inequality and guarantee a fair distribution of these advantages (Shafi et al., 2023).

Infrastructure Development

Ali et al. (2022). Stated that CPEC is an umbrella term for several infrastructure projects that have the potential to significantly impact Pakistan's food supply chain, especially in terms of storage and transportation. A key element of CPEC is the vast infrastructure development in transportation, including railroads and highways. These improvements are anticipated to lower transportation costs, improve logistical effectiveness, and expedite the distribution of food goods from manufacturing facilities to retail outlets. The result is a food supply chain that is more effective, affordable, and trustworthy, which not only eases customer financial strain but also guarantees the timely availability of fresh produce (Shafi et al., 2023). The construction of the Gwadar Port in Baluchistan, which can drastically alter food import and export, is another essential component of the CPEC. The deep-sea port's enhanced capabilities will lead to more affordable and adequate food transportation and receiving. This might assist Pakistani consumers by lowering food prices and increasing the variety of food options accessible, improving food accessibility (Cao et al., 2022).

Additionally, cold storage facilities are part of the CPEC, and these investments are essential for maintaining perishable foods, including fruits, vegetables, and dairy goods. A more reliable and readily available food supply may be achieved by extending the shelf life of products and reducing food waste through improved cold storage facilities (Shah, 2023). By making markets more accessible, road network expansion—particularly in rural areas—is critical in strengthening the food supply chain. Farmers may more efficiently deliver their goods to towns and cities, growing their consumer base

and improving the chain's overall performance. Moreover, this helps make food more accessible and affordable for rural and underdeveloped areas (Cao et al., 2022).

The economic growth and job creation connected with CPEC projects can further stimulate the food supply chain due to increased wages and employment possibilities. Nonetheless, it is imperative to tackle possible inequalities in the availability of these enhanced amenities and guarantee a just allocation of advantages throughout the nation. Furthermore, to optimize these infrastructure projects' beneficial effects on Pakistan's food supply chain, they must be managed effectively and sustainably (Shah, 2023).

CPEC and Agricultural Productivity

CPEC has drastically altered Pakistan's agricultural environment, potentially impacting food security significantly. Positively, the construction of roads and railroads due to CPEC has lowered transportation costs and increased the effectiveness of food transit from fields to markets (Shafi et al., 2023). In addition to lowering post-harvest losses, this improvement in market accessibility has allowed people to purchase a wider variety of food goods at more reasonable costs. Furthermore, using cutting-edge farming methods and technology made possible by CPEC, such as biotechnology and precision agriculture, can transform agricultural productivity and raise yields and food production (Saqib et al., 2023). By lowering reliance on a narrow range of staples, crop diversification—especially with an emphasis on high-value fruits and vegetables for export has improved the variety of products available and given farmers additional avenues for revenue. This has improved food security. However, there are also issues, such as wealth inequality, which might limit vulnerable populations' access to CPEC benefits and, in turn, their food security. Furthermore, as sustainable land and water usage are essential for long-term food security, the fast modernization of agriculture presents environmental problems (Imran et al., 2022).

The fair distribution of economic gains, environmental sustainability, and the involvement of smallholder farmers and disadvantaged people in the development process must be prioritized in policy efforts for CPEC to catalyze better food security in Pakistan. To maximize CPEC's potential for improving food security and guaranteeing that a more extensive range of people benefit from the economic and agricultural changes this large-scale project brings, it will be imperative to address these obstacles (Saqib et al., 2023).

Trade Relations with China and Food Imports

Pakistan's food security is significantly impacted by the CPEC, which presents both trade opportunities and concerns. CPEC positively expands Pakistan's potential for commerce, particularly regarding agricultural goods. Agricultural products movement is streamlined, and the upgraded transportation infrastructure, including the Gwadar Port building significantly increases export potential. This makes it possible for Pakistani food products, especially perishables like fruits and vegetables, to enter foreign markets more successfully and affordably, opening up new business prospects (Zhan, 2022). Additionally, by diversifying exports, CPEC lessens the reliance on conventional goods like textiles and grains. This diversification increases the agricultural sector's resilience and can improve food security by increasing the variety of available exportable products (Bozsik et al., 2022). Moreover, Pakistan's food security may be improved by the increased regional commerce made possible by the CPEC, especially with nearby nations like China, the Middle East, and Central Asia. It increases access to a wider variety of food sources by expanding the country's market reach and reducing reliance on a small number of trading partners (Liang et al., 2022).

However, this expanded trade is not without its difficulties. Food security may be impacted by the CPEC-facilitated flood of Chinese agricultural goods, which might challenge indigenous farmers' ability to compete. It could also influence local prices and market dynamics (Bozsik et al., 2022). To maintain food security, the supply chain's infrastructure development rate, including food distribution and storage facilities, must also keep up with the increased trade opportunities. Lastly, economic disparities may prevent some groups of people from accessing various wholesome foods. Improving overall food security requires ensuring that the advantages of increasing agricultural exports under CPEC are spread fairly (Imran et al., 2022).

In conclusion, the CPEC has the potential to change the agricultural trade environment in Pakistan, posing both possibilities and problems for food security. Authorities must tackle these obstacles while concentrating on inclusive and sustainable approaches to guarantee that the advantages of CPEC lead to improved food security for every demographic (Liang et al., 2022).

Governmental Policies and Food Security

Food security in the context of the CPEC primarily depends on government laws and regulations. Even though CPEC has many chances for enhanced commerce and economic expansion, it also presents risks that might impact

the country's food supply (Imran et al., 2022). A balance between encouraging trade and safeguarding domestic agriculture is crucial for the government regarding trade policies. To stop the massive flood of Chinese agricultural products and keep the domestic market strong entails imposing taxes, quotas, and standards (Shafi et al., 2023).

Investment policies related to infrastructure are equally significant. To guarantee effective supply chains, government investment and assistance are essential for CPEC's focus on infrastructure development, including transportation and storage facilities. Ensuring timely access to food goods and limiting food loss depend heavily on a well-regulated infrastructure (Zhan, 2022). Another essential component is addressing economic inequality. The government should enact laws that guarantee the benefits are shared relatively as CPEC propels economic growth. Social safety nets, income redistribution programs, and assistance for smallholder farmers can help reduce inequality and increase access to food resources, increasing food security (Ali et al., 2022).

Moreover, rules about the environment are also crucial. Concerns of sustainable land and water use are raised by the CPEC's fast upgrading of agriculture. To safeguard the natural resources necessary for long-term food security, government laws must establish and enforce guidelines for pesticide usage, land management, and water conservation (Bano et al., 2022). Strict enforcement of food safety and quality standards is also necessary to protect customers and foster trust in the food supply. Strict guidelines are necessary for food safety, labeling, and quality requirements (Shahzad et al., 2023). Lastly, resilience planning is essential to handle possible supply chain weaknesses brought on by interruptions connected to CPEC or natural calamities. Plans for creating strategic food reserves and backup plans should be part of government policy to reduce risks and preserve food security (Ali et al., 2022).

Challenges and Barriers

Despite Pakistan's economic gains from the CPEC, the nation's food security and agriculture sectors face serious challenges.

CPEC and Infrastructure Challenges

For Pakistan's economy to flourish, the CPEC is an essential project. However, difficulties associated with infrastructure development, including incomplete project schedules, poor connectivity, and logistical roadblocks, impede the smooth execution of CPEC projects. These roadblocks impede the corridor's

overall development and, in turn, jeopardize Pakistan's financial stability (Imran et al., 2022).

Food Security Concerns

Pakistan confronts several obstacles in maintaining food security because of scarce water supplies, shifting weather patterns, and antiquated farming methods. Farmers find it challenging to produce enough food to fulfill the population's expanding demands since unpredictable weather patterns impact agricultural production. This problem causes food insecurity for millions of Pakistanis, worsened by inefficient food distribution systems and post-harvest losses (Shafi et al., 2023).

Agricultural Constraints

Pakistan's economy is based mainly on agriculture, yet it faces several challenges. A lack of modern irrigation infrastructure, outdated farming methods, and restricted technological access hinder agricultural production. , who sometimes lack the necessary resources and skills. Further impeding large-scale agricultural growth are the prevalence of land fragmentation and the lack of efficient land consolidation strategies (Imran et al., 2022).

Economic Impacts on Pakistan

Pakistan's economy is significantly impacted by the issues with CPEC, food security, and agriculture. Inadequate development of CPEC projects restricts employment possibilities and overall economic development by impeding industrial expansion and economic diversification. Furthermore, malnutrition brought on by food poverty impacts worker productivity and health. The limitations imposed by agriculture cause rural economies to stagnate, prolonging poverty and inequality (Zhan, 2022).

Policy Reforms and International Cooperation

Combining significant policy changes with international collaboration is essential to address these issues. Pakistan has to commit to modernizing its agricultural industry by giving farmers access to cutting-edge equipment, premium seeds, and effective irrigation systems. Improving agricultural output and lessening the effects of climate change require investing in higher-level agricultural research and adopting sustainable farming practices. In addition, the effective implementation of CPEC projects may be ensured by reinforcing the legal framework, encouraging private sector participation, and

promoting international partnerships. This will assist infrastructure development and seamless connectivity (Shafi et al., 2023).

In conclusion, Pakistan's sustained growth depends on resolving the issues and obstacles surrounding CPEC, food security, and agriculture. Through strategic policy reforms, technology investments, and international cooperation, Pakistan can optimize its agricultural potential, augment food security, and leverage the CPEC's advantages. This will ultimately result in the country's economic growth and raise the standard of living for its populace (Zhan, 2022).

Stakeholder Analysis

These stakeholders' active participation and coordination are crucial in CPEC, food security, agriculture, and Pakistan to guarantee that CPEC projects favorably impact food security, sustainable agriculture, and Pakistan's overall growth. 60% of Pakistanis live in food insecure conditions, which are made worse by inadequate research, weak supply chains, inadequate planning, and a lack of industry best practices. With $46 billion initial investments, the (CPEC) presents promise for a better future (Ali et al., 2022).

Government of Pakistan's Role in CPEC

The execution of CPEC projects is significantly dependent on the involvement of the Pakistani government. It must guarantee that CPEC aligns with the nation's agricultural growth and food security objectives. This entails developing legislation that makes it easier for agricultural goods to be transported efficiently, enhancing infrastructure, and encouraging sustainable farming methods ().

Chinese Investments and CPEC

China is a significant investor and shareholder in the CPEC. Chinese investments may directly affect Pakistan's agricultural industry by advancing farming methods and fostering agribusiness growth. Cooperation between the two nations is essential to guaranteeing that Pakistan's agriculture and food security will profit from CPEC (Zhan, 2022).

Pakistani Farmers and Agriculture

Pakistan's agriculture economy is centered on its farmers. To improve food security, their adoption of cutting-edge, sustainable agricultural techniques is essential. To fully benefit from CPEC-related advancements, they require

assistance with training, technological access, and effective irrigation techniques (Shahzad et al., 2023).

International Organizations and Food Security

International organizations like the World Bank and the UN must ensure food security and sustainable development in Pakistan. They may offer Pakistan financial support, technical aid, and knowledge to help it meet SDG 2 and fully realize the promise of CPEC (Ali et al., 2022).

Private Sector and Agribusiness

Businesses in the private sector, especially agro-sector ones, are crucial. They can invest in cold storage facilities, food processing, and value chains—all crucial elements of food security. Partnerships between the public and commercial sectors can boost agricultural productivity and increase food security (Imran et al., 2022).

Academia and Research Institutions

Research groups and academic institutions can help create novel agricultural techniques, tools, and regulations that improve agricultural sustainability and food security. Research results must be implemented with farmers and government authorities (Shahzad et al., 2023).

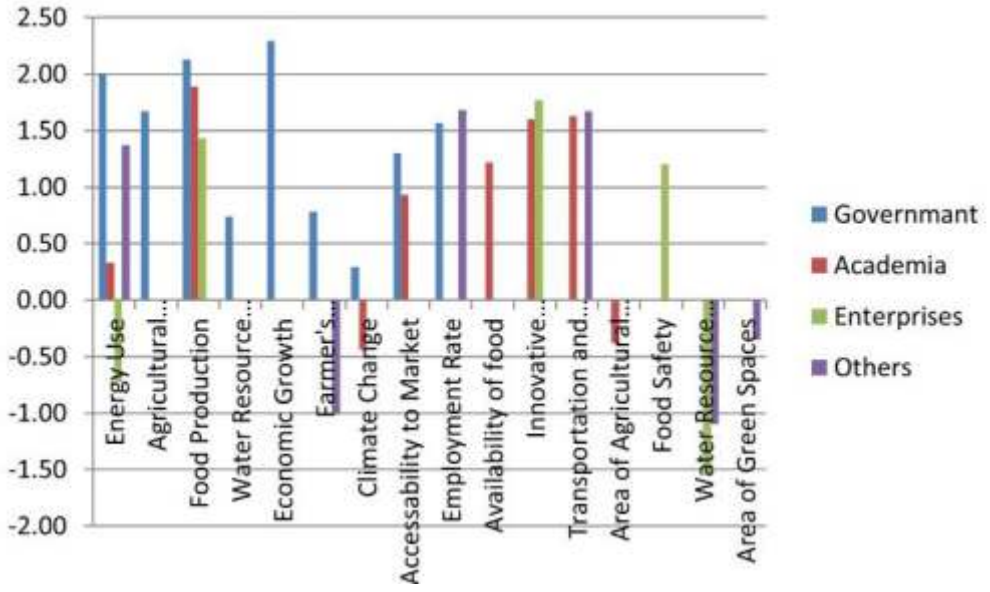

Figure 2: Stakeholder's Viewpoint about CPEC Development

Figure 2 illustrates the stakeholder viewpoints regarding topics such as water use. Government and business concerns coincide as they expect better results from resource management, such as stronger laws and more efficient water use for agriculture due to CPEC developments (Baig et al., 2023).

Table 1: Growth of the Agricultural Sector in Pakistan

Sector	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22 P
Agriculture	**2.22**	**3.88**	**0.94**	**3.91**	**3.48**	**4.40**
1. Crops (i+ii+iii)	1.37	4.61	-4.38	6.32	5.96	6.58
i) Important Crops	2.68	4.27	-8.59	5.24	5.83	7.24
ii) Other Crops	-1.24	4.65	3.62	9.21	8.27	5.44
iii) Cotton Ginning	5.24	8.27	-11.23	-4.06	-13.08	9.19
2. Livestock	2.89	3.59	3.65	2.80	2.38	3.26
3. Forestry	-2.92	2.24	7.22	3.36	-0.45	6.13
4. Fishing	1.22	1.57	0.78	0.63	0.73	0.35

According to Table 1, China's investments in Pakistani joint ventures and agricultural projects led to a significant 4.4% rise, above the 3.5% forecast in 2022 (Zulfiqar, 2023).

Conclusion and Recommendations

This research shows a close relationship between the CPEC, food security, Pakistan's agriculture industry, and the Sustainable Development Goals (SDGs). The research highlights how vital Pakistan's agriculture sector is to reaching SDG goals. It evaluates how CPEC investments may improve farming practices, market access, value chains, and their environmental and societal effects. In order to find essential participants who can work together to optimize the advantages of CPEC for agriculture, a stakeholder analysis is utilized. Pakistan's agriculture industry also stands to gain a great deal from the innovative CPEC infrastructure project. Above all, it offers a chance to modernize the logistics and transportation system, allowing farmers to deliver their goods to markets effectively. One of the main concerns in Pakistan's agriculture sector is post-harvest losses, which may be decreased with improved transportation. Additionally, by expanding Pakistani agricultural goods' access to new domestic and international markets, the CPEC can improve farmers' income and living standards.

Furthermore, modernization and innovation in agricultural methods can be stimulated by CPEC investments in agriculture, leading to higher crop yields

and productivity. Pakistan may help achieve SDG objectives for climate change mitigation and environmental protection by encouraging sustainable farming practices. Even while CPEC has a lot of potential benefits, it is essential to recognize and deal with the difficulties and adverse effects as well.

Therefore, Pakistan should ensure that all facets of the populace, especially small-scale farmers, profit from CPEC agricultural investments. Necessary first measures include implementing land tenure changes and developing fair benefit-sharing arrangements. Similarly, CPEC investments promote the adoption of climate-resilient and sustainable agriculture methods. Encourage this field's research and development to increase agricultural yields while protecting the environment. Pakistan should prioritize building roads, storage facilities, and irrigation systems in rural areas to improve farmers' access to markets and lower losses after harvest.

Moreover, trade agreements and international collaborations should be strengthened to increase the market for Pakistani agricultural goods. As a result, farmers will earn more money, and food security will increase. Also, establish a strict monitoring and assessment system to ensure that CPEC agricultural investments support Pakistan's SDGs and advance the industry. Additionally, Pakistan should promote sustainable livestock farming methods, such as improved feed production, effective waste management, and animal health supervision. Livestock farming is vital to rural economies and may increase food security since it generates meat, milk, and other dairy products.

In order to expand upon the results of this investigation and enhance policy recommendations, future research may investigate certain domains. Firstly, perform comprehensive analyses to assess the socioeconomic impacts of CPEC's agricultural investments on nearby areas, emphasizing the creation of jobs, income distribution, and poverty alleviation. Similarly, future researchers should examine how CPEC-driven agricultural growth affects the environment, mainly how it affects biodiversity, water resources, and land. Additionally, it provides thorough measures to evaluate food security in the context of agricultural development led by CPEC. Examine variables affecting nutrition and dietary variety, such as availability, access, usage, and stability.

Further research should examine how well government structures and policies match Pakistan's agriculture and SDG goals with CPEC funding. Examine how institutions, regulatory frameworks, and decision-making procedures contribute to achieving desired results. Lastly, the intricate relationships between CPEC, agriculture, and the Sustainable Development Goals in Pakistan may be better understood by policymakers, academics, and

development practitioners by concentrating on these study topics. This information will support the development of sustainable agriculture, support evidence-based policy choices, and advance the country's transition to a more prosperous and just future.

Suggested Citation

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