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A Critical Analysis of Implementation of Economic & Industrial Development Strategies in Pakistan

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During 36th MCMC

National Institute of Management Peshawar

National School of Public Policy


بسم الله الرحمن الرحيم

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Khyber Journal of Public Policy

Volume: 2 Summer, 2023 Issue:2 (Special)

A Critical Analysis of Implementation of Economic & Industrial Development Strategies in Pakistan (This special issue consists of the proceedings of a 2-Day Public Seminar held on April 3-4, 2023, on " A Critical Analysis of Implementation of Economic & Industrial Development Strategies in Pakistan " conducted at the conclusion of the Public Policy Simulation Exercise during the 36th Mid Career Management Course.)

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Message of the Capt. (Retd) Usman Gul,

Director General National Institute of Management, Peshawar on the eve of Special Issue of the Khyber Journal of Public Policy:

I am pleased to introduce this special issue of the Khyber Journal of Public Policy, published by the National Institute of Public Administration (NIPA), Peshawar, a constituent unit of the National School of Public Policy. This edition covers vital topics in industrial policy-making and economic development, providing key insights into Pakistan's industrial landscape.

The journal examines a wide range of issues, including the evaluation of Special Economic Zones (SEZs) and their impact on industrialization in Khyber Pakhtunkhwa, the role of Technical and Vocational Education and Training (TVET) policies in employment and industry, and the contribution of SMEs to economic growth, particularly women-led enterprises. Additionally, it analyzes labor-related policies and their influence on industrial development and social protection.

The publication also addresses Pakistan's defense production potential, emerging industries, and energy policies, offering valuable perspectives on adapting to global trends like China's reverse innovation strategies. A critical evaluation of the textile and export sectors provides recommendations for enhancing these crucial industries.

This journal serves as an important platform for policymakers, academics, and industry professionals to engage in meaningful discussions on Pakistan's economic and industrial future. I hope the findings shared here inspire further dialogue and contribute to policy development in the years ahead.

Capt. (Retd) Usman Gul,
Director General
National Institute of
Management, Peshawar

Preface

of the Special Issue of Khyber Journal of Public Policy

The Khyber Journal of Public Policy is honored to present this insightful collection of articles focused on the crucial themes of industrial policy, development strategies, and the economic landscape of Pakistan. This edition, published by the National Institute of Public Administration (NIPA), Peshawar—an esteemed constituent of the National School of Public Policy—reflects a diverse range of perspectives on the critical factors that shape Pakistan's industrial and economic progress.

The papers in this volume span several key sectors, highlighting both challenges and opportunities for sustainable growth. From evaluating national industrial policies to assessing the specific impact of Special Economic Zones (SEZs) on industrialization in Khyber Pakhtunkhwa, the contributions underscore the complexities of policy-making at multiple levels of governance. Contributors such as Amanat Khan, Habibullah Arif, and Dr. Muqeem ul Islam offer an in-depth analysis of policy facilitation, while experts like Fayaz Ahmad Khan and Arif Hussain critically review the outcomes of SEZ policies in the region.

A particular focus of this journal is the intersection of education, skills development, and employment, with articles exploring the implications of current policies and practices in Technical and Vocational Education and Training (TVET) and their role in strengthening industry. The work of Hina Altaf, Behzad Adil, and their colleagues draws attention to how these policies influence employment outcomes and industrial growth, while the evaluation of Small and Medium Enterprises (SMEs) and women-led enterprises in Pakistan offers a fresh lens on economic inclusivity.

The challenges and opportunities faced by Pakistan's industrial sector are further explored through various lenses, including labor regulations, defense production, and the emergence of innovative industries. The comprehensive evaluation of Pakistan's textile sector by Shahid Iqbal and his co-authors provides vital recommendations for revitalizing this key industry, while the discussion on energy, oil, gas, and LNG policies by Sami Ullah and others reveals the essential role of energy security in fostering industrial development.

In light of the rapidly evolving global landscape, particularly the strategies employed by China, the journal also delves into the adoption of emerging technologies and innovative industries. The article by Muhammad Usman Tahir and Naeem Khan on the impact of China's industrial policies provides valuable insights into how Pakistan might adapt and leverage these strategies for its own economic growth.

Each contribution in this volume enriches the broader conversation about Pakistan's industrial future, offering practical recommendations and actionable insights for policymakers, industry leaders, and academics alike.

As we reflect on the successes and shortcomings of current policies, it is our hope that this journal will serve as a catalyst for meaningful dialogue and effective solutions in the ongoing effort to strengthen Pakistan's industrial base and foster inclusive economic development.

We extend our sincere gratitude to all the contributors and experts who have shared their valuable knowledge, and to the readers for their engagement with these critical topics. It is through collaboration and informed debate that we can chart a sustainable and prosperous path forward for Pakistan's industrial and economic development.

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Khyber Journal of Public Policy

Industrial Policy Making and Facilitation at National Level

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Abstract:

The industrial sector is crucial for economic development, with Pakistan's manufacturing sector contributing 12.79% to GDP in FY 2021-22. It drives growth through employment, exports, and meeting local demand. However, Pakistan lacks a national industrial policy for three decades, leading to challenges such as security issues, inadequate infrastructure, energy crises, financial constraints, and outdated manufacturing practices. Unlike regional peers like India and China, Pakistan has not adopted globally recognized best practices or smart manufacturing technologies. The study emphasizes the urgent need for a National Industrial Policy to address these challenges, boost exports, and create employment opportunities by leveraging Pakistan's strategic location. Recommendations include forming a collaborative framework involving the Prime Minister's task force, private sector, and government entities to develop and implement industrial policies effectively. Addressing issues like international competition, political instability, and inconsistent policies is key to driving sustainable industrial growth.

Key words:

Economic Growth, Industrial Policy, Manufacturing Sector, Smart Manufacturing, Policy Implementation

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Introduction

After independence, Pakistan inherited only 34 small industrial units out of 921 in the subcontinent. These were largely related to cotton textiles, cigarettes, sugar, rice husking, cotton ginning, and flour mills. All these contributed only seven percent (7%) to the GNP and employed a little over 26,000 people in the country (Saeed, 2010). The growth rate of Pakistan's industrial sector in the 1950s emerged from a non-existent base. During this period, the industrial sector's growth rate doubled in the early years, achieving more than 20% growth between 1950 and 1955 in large-scale manufacturing. By the 1960s, large-scale manufacturing experienced extraordinary performance (Saeed, 1995).

Industrialization is a process that accelerates economic growth and brings changes to economic segments through resource exploitation, utilization, distribution patterns, production functions, income generation, and social changes conducive to further growth and development (Khan, 2006).

Pakistan faces the challenge of boosting industrialization and improving the efficiency of its industrial and manufacturing sectors to enable rapid export growth. To address this, the Prime Minister's Task Force on Industrial Policy and Facilitation has been established at the national level.

Problem Statement

The industrial sector is a major contributor to Pakistan's GDP. Large-scale manufacturing is considered the backbone of an economy. However, Pakistan's industrial development has not been very impressive over the last two decades compared to other countries in South Asia. There is no single overarching national policy to steer the process of industrialization. This warrants an in-depth analysis of the industrial sector's performance to evaluate policy gaps and recommend the best policy options in light of regional best practices.

Scope

This study aims to analyze the industrial policy framework in the country and evaluate the performance of large- and small-scale manufacturing industries over the last three years. The study will also analyze international best practices in the region and devise a National Industrial Policy to boost the industrial sector.

Research Methodology

The current research paper aims to assess industrial policymaking in Pakistan by employing a qualitative design, which was deemed most appropriate. Through this approach, the research paper provides detailed insights into industrial policymaking by considering various factors, such as comparing global business practices in the implementation and formulation of industrial policies. Consequently, the qualitative design has offered detailed and valuable insights.

Secondary data was collected by studying relevant websites, articles, and journal data to analyze industrial policymaking in Pakistan. Data related to different aspects was gathered. For data analysis, analytical tools such as SWOT and GAP analyses were used.

Literature Review

One of the major causes of retarded industrialization in Pakistan is the absence of a comprehensive industrial policy for a long time. As a result, the functions of this necessary policy are being managed through other public sector policies, such as investment, trade, and monetary policies. The SMEDA Act of 1998 was introduced to regulate small and medium enterprises (SMEs) by the federal government, followed by Vision 2025 (Burki, 2008). An SME policy was formulated in 2007, which has since been amended and is currently pending cabinet approval.

The 18th Constitutional Amendment devolved Part-I of the Federal Legislative List, including the industrial sector, to the provinces, thereby transferring industrial affairs to the provincial governments (MOIP, 2021). Frequent changes in governments in Pakistan are a leading cause of policy uncertainty. Moreover, past governments have often followed ad-hoc industrial policies, primarily as reactions to crises (Kemal, 2008).

The conflict between federal and provincial governments regarding industrial policies has further created confusion in achieving desired outcomes in the industrial sector (Burki, 2008). The Pakistan Business Council (PBC) advocates a "Make-in-Pakistan" strategy to drive industrial growth. This strategy aims to leverage the domestic market of over 200 million consumers to develop scale and competitiveness, which could eventually address global demand (PBC, 2018).

Historical Perspective and Situational Analysis

During the 1960s, private sector-led industrialization was encouraged, while in the 1970s, the public sector was given the leading role through the nationalization of industries. In the 1980s and 1990s, the private sector was once again assigned a leading role. During the 1990s, Pakistan adopted liberal, market-oriented policies and declared the private sector as the engine of economic growth. Moreover, an attractive package of incentives was offered to attract FDI (Khan and Kim, 1999).

1950s and 1960s - Import Substitution Industrialization

Emphasis was placed on export promotion, and industrialization started gaining momentum. By the end of the 1960s, the private sector dominated sectors such as banking, insurance, basic consumer goods industries, and the export of cotton and jute products. Industrial production increased, but the unregulated private sector led to the concentration of wealth and the formation of monopolies (Amjad, 1976).

1970s - Nationalization of Industry

Through the Economic Reforms Order of 1972, the government took control of the management of ten major categories of industries. This move eroded the confidence of the private sector. Nationalization was further reinforced in 1975 when small-sized agro-processing units were also nationalized. The Ministry of Production controlled 75 industrial units through 8 holding corporations, which included chemicals, fertilizers, automobiles, cement, petroleum, and steel (Khan, 1999).

Privatization and Export-Led Industrialization

The Transfer of Managed Establishment Order, 1978 nullified the Economic Reforms Order of 1972. Further, the Industrial Property Order, 1979 declared that the government could not arbitrarily take over the industries. The number of industries requiring approval of the government was reduced; the private sector was allowed to participate in infrastructure development, power generation, highway construction, etc. Over 100 enterprises were privatized, (Kishwar, 2021).

1990s - Liberalization and Market Oriented Reforms

Pakistan became a member of the WTO in 1995. However, the results of the Uruguay Round were rather "discouraging" for Pakistan, primarily due to less-than-average tariff reductions on its main export products and the slow integration of textiles into the GATT. The high protection given to domestic

industries insulated Pakistan from foreign competition, generated a strong anti-export bias in resource allocation, and led to increased inefficiency, waste, and a decline in quality. Consequently, Pakistan's export structure remained overly concentrated on a small number of agriculture-based products, while in more sophisticated product areas, the country's export structure remained internationally uncompetitive (Kishwar, 2021).

2000s - Privatization, Diversification and Export Orientation

Pakistan fully opened its industries (with only a few exceptions) to FDI and granted national treatment to foreign investors in industries with respect to duties, tax exemptions, and concessions on imports of plant and machinery. Tax relief was provided for the first-year allowance for value-added, export, and high-tech industries, with priority given to engineering/capital goods, chemicals, and agri-based industries. Other major objectives included increasing the capacity utilization of indigenous industries. Textiles and clothing were supported through several assistance packages, including R&D grants and freight subsidies for exports.

2010 Onwards – An Era of De-Industrialization

The government could make efforts to promote industrialization, such as through the Pakistan Council of Scientific and Industrial Research, which assists in R&D on problems faced by the industrial sector, and tests raw materials and products. Industries in designated areas and export processing zones are granted exemptions from customs duties, surcharges, and sales taxes on imported machinery. Incentives for industries include the Export Development Fund, the duty drawback scheme, support for specific activities such as subsidies for obtaining standards certification, and export finance facilities. The overall industrial strategies aim to protect domestic manufacturing industries such as clothing, non-electric machinery, transport equipment, and processed agricultural products (KP Industry Policy, 2020).

Prime Minister's Incentives Package for Exporters (2017-2021)

It was a financial package of PKR 180 billion, aimed at increasing exports by US$3 billion by the end of the financial year 2017. The duty drawback rate for the garment sector was increased from 4% to 7%. Sales tax on textile machinery imports was removed, and customs duty on the import of cotton and man-made fiber (except polyester) was also eliminated. Additionally, the industry could import related machinery duty-free, subject to reduced energy tariffs and the removal of sales tax on packaging. However, much like earlier policies, this package did not meet its objectives due to non-release of funds, frequent upward revisions of energy tariffs, and a liquidity

crisis caused by delays in duty drawback refunds to exporters. Moreover, the Federal Budget of 2019 withdrew the zero-rating facility (Kishwar, 2021).

Situational Analysis

LSM are referred to those industries that are having huge infrastructure raw material high manpower requirements and large capital requirements. Major large scale manufacturing industries of Pakistan include cotton textile, automotive, cement, steel, tobacco, chemical, machinery and food processing. A few of them are discuss as under:

Textile Sector

This sector contributes nearly one-fourth of industrial value-added and provides employment to about 40 percent of the industrial labor force. Barring seasonal and cyclical fluctuations, textile products have maintained an average share of about 61.24 percent in national exports. The textile sector grew by 3.2 percent during July-March FY2022, compared to 8.0 percent in the same period last year. According to PBS, exports of the textile group increased by 25.4%, from 11.4 billion to 14.2 billion during July-March FY2022.

Automobile Industry

It is the sixth-largest sector, with an annual contribution of 2.8% to GDP. The automobile sector marked vigorous growth of 54.1 percent during July-March FY2022, compared to a 21.6 percent growth last year. Except for sluggishness in some areas, such as buses and two/three-wheelers, there has been robust growth across all automobile sectors during July-March FY2022. The auto sector constitutes about 15 percent of LSM, representing a significant portion of the country's industrial output. According to PBS, the automobile sector recorded a 54.1 percent upsurge during July-March FY2022. Despite robust growth during the first 9 months of FY2022, the higher numbers, to a great extent, fall short of installed capacities. This indicates a bright future for the automobile sector, which has been the best-performing sector among large-scale manufacturing.

Iron and Steel

Production jumped by 16.5 percent during the period under review, compared to a contraction of 8.6 percent in the same period last year. Billets/ingots, mainly used in the construction industry, grew by 32.8 percent, and H/CR Sheets/Strips/Coils/plates increased by 7.9 percent. Both reflect the growth momentum in the automobile and construction-allied sectors. Non-metallic Mineral Products inched up by 1.1 percent,

compared to an 18.5 percent increase last year (Pakistan Economic Survey, 2021-22).

Fertilizer Industry

Total fertilizer production during July-March FY2022 was 6,833 thousand tons, which was 2.9 percent higher compared to the corresponding period last year. Urea is the main fertilizer, accounting for 70 percent of total production. The installed production capacity of 6,307 thousand tons per annum is sufficient to meet local demand, subject to the availability of uninterrupted gas and RLNG supply. There are nine urea manufacturing plants, one DAP plant, three NP plants, four SSP plants, two CAN plants, one SOP plant, and two plants producing blended NPKs, with a total production capacity of 9,172 thousand tons per annum.

Cement Industry

Total cement dispatches stood at 5.04 million tons (mt), compared to 5.38 mt last year. Domestic consumption grew by 4.02 percent, reaching 4.75 mt, compared to 4.56 mt in March FY2021. The largest decline was observed in exports, which drastically decreased by 63.8 percent to 0.30 mt in March FY2022, compared to 0.82 mt during the same period last year. This was largely attributed to rising international freight rates, political and economic instability in Afghanistan, and a trade ban with India.

Performance of Industrial Sector of Pakistan during Last Three Years

Pakistan's economy is characterized by volatile growth pattern over the years. It has been struggling hard to achieve long-term, inclusive and sustainable economic growth. Presently, the economic landscape is changing for the better by showing some optimistic signs.

Industrial Sector Performance (FY 2019-20)

The rapid spread of COVID-19 since February 2020 has brought economic activities to a near halt, and FY 2019-20 witnessed a contraction in economic activities. The GDP growth rate for FY 2020 was estimated at negative 0.47 percent. The industrial sector posted a negative growth of 2.64 percent. However, construction activities increased by 8.06%, largely due to enhanced government general expenditure (PES, 2021).

Industrial Sector Performance (FY 2020-21)

The industrial sector has witnessed promising results with a growth of 3.57 percent. The value added in the mining and quarrying sector has declined by 6.5 percent. The large-scale manufacturing (LSM) sector showed an unprecedented healthy growth of 9.29 percent. Construction activity increased by 8.34%, mainly due to an increase in general government expenditures and private sector construction-related expenditures (NAC, 2021). All the sub-sectors have shown marked improvement over the past three years.

Industrial Sector During FY 2021-22

Industrial sector during FY 2022 with 9.2% of GDP dominates the overall manufacturing sector, accounting for 74.3% of the sectoral share followed by Small Scale Manufacturing, which accounts for 2.0% of total GDP and 15.9% sectoral share. The third components, slaughtering, accounts for 1.2% of GDP with 9.7% sectoral share.

Analysis of policy making history reveals that the uniform industrial polices encompassing all export-oriented sectors were missing. These were a domain specific policy formulated for various mafias. Therefore, instead of promoting certain sectors, policy intervention should aim to support new technologies and new activities which are cross cutting in nature and benefit the entire spectrum of production processes. Sectoral protection has caused businesses to move away from technology-based industries and into less technology-intensive industries like textiles and clothing which provided minimal value-addition. Therefore, Pakistan needs an industrial policy that encourages other industries with a global dynamic demand in order to achieve diversification in international trade.

Legal/Policy and Institutional Framework

Legal/Policy Framework

Textile Policy, 2020-25

In March 2020, the Textile Policy 2020-25 was prepared, aiming to increase exports to $28 billion by 2025. The policy addresses some key areas, including the energy shortage and the fixation of energy tariffs for the next five years, as well as the formation of Specialized Economic Zones. The policy acknowledges that no state-of-the-art infrastructure is available for Special Economic Zones, which shifts common infrastructure costs to the investors. The policy also envisions the construction of workers' residential colonies through the Prime Minister's Housing Scheme around the SEZs.

Auto Industry Development and Export Policy, 2021-26

This policy encompasses the localization of parts and components, the implementation of safety regulations, the promotion of new technologies, the export of auto parts and completely built-up units, consumer welfare, and the promotion of manufacturing specialized vehicles. Moreover, the "Make in Pakistan" notion in the new policy includes, among others, the Meri Gari Scheme, the New Product Policy, and the setting up of export targets. Pakistan approved an ambitious NEVP in 2020, with targets and incentives aimed at having electric vehicles capture 30% of all passenger vehicle and heavy-duty truck sales by 2030, and 90% by 2040. Under the new EV policy, the Pakistani government aims for an EV-to-charging-station ratio of 33 to one by 2025.

Pakistan Fertilizer Policy, 2001

The Government of Pakistan issued the Fertilizer Policy in 2001 which had the objective to attract investors in newly installed fertilizer plants to compete in the domestic market in Pakistan. Due to a gradual increase in the off-take of fertilizer in the recent past, the short-fall has further been increased. To cope with the problem, the Government has decided to further encourage the local manufacture of fertilizers in the country.

Institutional Framework

Ministry of Industries and Production

The role of Ministry of Industries and Production is that of a facilitator in creating an enabling environment for industrial development and promotion of entrepreneurship through policy intervention, setting up industrial parks and export processing zones for investors, skill development of human resource for industrial sector and socio-economic development of country with particular focus on SME development and promotion of traditional crafts of Pakistan.

Engineering Development Board (EDB)

EDB is the apex government body under Ministry of Industries and Production entrusted to strengthen engineering base in Pakistan. EDB focuses primarily on the development of engineering goods and services sector on modern lines enabling it to become technologically sound and globally integrated. The main objective of EDB is to develop a long-term vision for the development of the engineering sector and formulate and coordinate all government policies relating to the engineering sector.

Pakistan Industrial Development Corporation (PIDC)

PIDC was created in 1952 as a statutory body with the objective of setting up an industrial base in the country. The operational strategy was to set up projects on a continuous basis and transfer them to the private sector after successful operation, which encouraged and involved the private sector in national development. PIDC established 94 industrial units during the period from 1952 to 1982 in major sectors of the economy, such as mining, fertilizer, cement, automobile, chemicals, pharmaceuticals, cotton and textile, ginning, and sugar, etc. The role of PIDC was redefined in 2004-05 as an "industry facilitator" to help the private sector in promoting industrialization.

Export Processing Zones Authority (EPZA)

EPZA is a Pakistan Government venture established in 1980 for accelerating the pace of industrialization in the country and enhancing the volume of exports by creating an enabling environment for investors to initiate ambitious export-oriented projects in a network of export processing zones, being established in close cooperation or under joint venture arrangements with the private sector.

Special Economic Zone (SEZ)

The SEZ Act was promulgated on September 13, 2012, and later that year, the SEZ Rules were notified. The law allows SEZs to be set up by the federal or provincial governments themselves, or in collaboration with the private sector under different modes of public-private partnership, or exclusively through the private sector. The fiscal benefits under the SEZ law include a one-time exemption from customs duties and taxes for all capital goods imported into Pakistan for the development, operations, and maintenance of an SEZ (both for the developer and for the zone enterprise), as well as exemption from all taxes on income for a period of ten years. The provincial SEZ authorities, established under the law, are required to forward the applications received from developers to the Federal Board of Investment, which acts as the secretariat to the Board of Approval and the Approval Committee. So far, 22 SEZs have been approved by the competent authority.

Small Medium Enterprises (SME)

Worldwide, Small and Medium Enterprises (SMEs) are acknowledged by governments, especially in developing countries, where they contribute to economic growth and stability in the form of employment, new job creation, social cohesion, and development. Globally, small and medium enterprises account for 90 to 95% of businesses and generate between 60 and 70% of job

opportunities in most countries. Pakistan is among the developing nations whose economy is supported by different business sectors, both in terms of their share in GDP and labor force employment. In Pakistan, 90% of all businesses are SMEs, which contribute 40% of GDP and 30% of exports. SMEs also provide 78% of non-agricultural employment. The Small and Medium Enterprises Development Authority (SMEDA) was created under the SMEDA Ordinance of 2002. The main responsibility of SMEDA is the formulation of policies to promote and facilitate SMEs. The current policy framework is the SME Policy 2021. Additionally, SMEDA helps provide training and education to entrepreneurs.

National Vocational and Technical Training Commission (NAVTTC)

NAVTTC was established in 2005 to regulate and manage the TVET sector in Pakistan. NAVTTC, under the Ministry of Federal Education and Professional Training, is the apex body mandated to promote, facilitate, regulate, strategize, revamp, approve curricula, train, and provide policy direction for the country's entire Technical and Vocational Education and Training (TVET) system.

Apprenticeship is an established international best practice for "informal" and "traditional" learning of skills through on-the-job training, where trainees go to industry and are trained by industry experts/professionals. Under PMYSDP, NAVTTC is training youth in various large, medium, and small industries and enterprises in collaboration with provincial TEVTAs. Apprenticeship/industry-based training is contributing greatly to grooming the TVET sector into a more responsive system for bridging the skills gaps and addressing the skills mismatch between institutes and industries, in addition to reducing youth unemployment ratios in the country.

Best Practices of the Region

India's Industrial Policy

India's current industrial policy is centered around the "Make in India" initiative, which was launched in 2014. The objective of this policy is to transform India into a global manufacturing hub and increase the share of manufacturing in the country's GDP from 16% to 25% by 2025.

The key features of India's current industrial policy include: The government has taken several steps to simplify procedures and reduce the regulatory burden for businesses. This includes measures such as the implementation of a single-window clearance system and the introduction of online platforms for various regulatory processes. The government has

committed significant resources towards the development of infrastructure such as highways, railways, airports, and ports to support the growth of the manufacturing sector. India has made significant investments in research and development and technology infrastructure to promote the growth of high-tech industries and improve productivity in traditional industries. India has established SEZs to attract foreign investment and promote exports by providing a favorable regulatory and tax environment. The government has introduced various policies and schemes to support the growth of SMEs, such as access to credit and technology, and promoting entrepreneurship. The government has provided several incentives for foreign investment, such as tax exemptions and reduced tariffs on certain goods, to encourage multinational corporations to set up manufacturing facilities in India (Aggarwal, 2019).

China's Industrial Policy

China's current industrial policy is focused on advancing the country's economic development by promoting innovation, upgrading traditional industries, and fostering emerging industries. This policy is outlined in the Made in China 2025 initiative, which was announced in 2015.

The main goals of this initiative are to upgrade China's manufacturing capabilities, increase the use of advanced technology in production, and promote the development of key industries such as information technology, aerospace, biotechnology, and new energy vehicles.

To achieve these goals, the Chinese government has implemented a number of policies and measures, including:

- Providing financial support and incentives for research and development (R&D) activities, as well as for the adoption of advanced technologies.
- Encouraging mergers and acquisitions to consolidate and strengthen industries.
- Increasing investment in infrastructure and transportation to improve connectivity and logistics.
- Enhancing intellectual property protection to encourage innovation and prevent infringement.
- Promoting international cooperation and participation in global supply chains.
- Developing talent through education and training programs to support the growth of emerging industries.

Overall, China's industrial policy is aimed at transitioning the country from a low-cost manufacturing hub to a high-tech industrial powerhouse (Jia Barwick, 2019).

Application of Analytical Tools

SWOT Analysis of Pakistan's Industrial Sector

Strengths:

• **Abundant Natural Resources**: Pakistan has a wealth of natural resources, including minerals and energy resources, which can support industrial growth.

• **Strategic Location:** Pakistan's location at the crossroads of South Asia, Central Asia, and the Middle East makes it an important transit point for regional trade and commerce.

• **Growing Middle Class**: Pakistan's growing middle class presents a significant market for consumer goods and services, which can stimulate industrial growth.

• **Skilled Labor Force**: Pakistan has a relatively large and educated workforce, which can support industrial development in emerging industries.

Weaknesses:

• **Poor Infrastructure**: Pakistan's infrastructure is often inadequate or outdated, leading to higher production costs and lower competitiveness.

• **Low Levels of Innovation:** Pakistan's innovation capacity is limited due to a lack of investment in research and development, which could restrict the country's industrial growth.

• **Weak Governance**: Corruption, bureaucratic inefficiencies, and political instability can hinder the implementation of industrial policy and discourage foreign investment.

• **Energy Shortages:** Frequent power outages and energy shortages can disrupt industrial production and negatively impact competitiveness.

Opportunities:

• **Emerging Industries:** Emerging industries such as e-commerce, renewable energy, and biotechnology present new opportunities for industrial growth in Pakistan.

• **Regional Integration:** Greater regional integration through initiatives such as the China-Pakistan Economic Corridor (CPEC) can stimulate trade and commerce and support industrial development.

• **Investment in Infrastructure:** Increased investment in infrastructure, including energy and transportation, could support industrial growth by reducing production costs and improving connectivity.

• **Technology Transfer**: Greater focus on technology transfer and collaboration with more advanced economies could improve Pakistan's technological capabilities and support industrial growth.

Threats:

• **Political Instability:** Political instability and security concerns can discourage foreign investment and disrupt industrial production.

• **External Economic Shocks**: External economic shocks, such as fluctuations in global commodity prices or international trade disputes, can negatively impact Pakistan's industrial growth.

• **Environmental Concerns**: Environmental concerns such as climate change and air pollution can lead to stricter regulations and higher production costs for industries in Pakistan.

• **Global Competition**: Intense global competition can make it difficult for Pakistan to establish a competitive industrial base, particularly in advanced industries.

SWOT Analysis of EDB

Strength	Weaknesses
• Significant role in nurturing domestic automobile industry and attracting significant investment therein • Promoting growth in indigenization/localization of auto parts • Saving valuable foreign exchange • Certifications and skills development • Strict implementation of deletion programs in 1990s • Preparation of a WTO compliant Tariff Based System • Formulation of auto policies in 2007 and 2016 • Revival of trucks/busses manufacturing • Efficient management of auto sector regulations (SROs 655, 656, 693) • Monitoring that local parts are not imported at concessionary duty rates.	• Remains under-staffed • Operated without a full-time CEO for almost 3 years between 2012-15 and then in 2017 (adhocism) • Alleged involvement of staff in corruption and malpractices • Failure to establish national technology development fund and engineering training fund

Opportunities	Threats
• Export of engineering goods through product diversification and latest technology acquisition • Trading/export opportunities offered by EU-GSP for EU market • Large pool of domestic engineering talent • Generation of employment opportunities	• Kept under constant pressure to operate with limited resources • Political instability and lack of government patronage/attention • Never allowed to establish as an independent organization due to deep-rooted vested interests. • Absence of political will to accord priority to engineering sector

SWOT Analysis of Pakistan's SMEs

Strength	Weaknesses
• Flexible and informal entrepreneurial firm structure. • Strong family support (majority of small businesses in Pakistan are inherited). • Access to effective advertising tools. • High motivation in developing the business.	• Inability to adapt new technology and mismanagement of valuable resources. • Shortage of skilled human resources. • Scarcity of entrepreneurial education. • Financial constraints.
Opportunities	**Threats**
• Exchange of technology through international alliances and networks; (Pakistani SMEs are exporting surgical, sports and textile products, this can be supportive for upgradation of existing technology. • Opportunity of franchise and joint venture with other firms. • Government is building special industrial zones to help the	• Change in customer preferences (because of price war, paradigm shift in expectations, aspirations and the social habits of consumers. • Entry of multinational and more powerful competitor into the local market. • Inefficient infrastructure

businesses flourish. • SMEs can build their reputation through getting international quality certificates. Fear of losing control on overseas operations. Source: Prefeasibility Report of SMEDA.	as compares to international standardization. • Fear of losing control on overseas operations.

SWOT Analysis of Export Processing Zones

SWOT	
Strength	**Weaknesses**
• Strategic location • Number of investors • Globally recognized companies • Intellectual workforce • Low cast of doing business	• Lack of digital system for marketing • Less focus on entrepreneurial SME • No setting short term objectives • No management meeting • No annual inspection system of registering units.
Opportunities	**Threats**
• Solar energy technology • Digital financial and marketing system • Waste to energy technologies • Formation of total quality management division. • Research and development • Welcome to entrepreneurial firms • Virtual offices	• Increasing level of competition from Bangladesh and India. • Governmental changes in accordance with a changing economic environment

Issues and Challenges

Absence of National Industrial Policy: One of the major causes of retarded industrialization in Pakistan is the absence of an industrial policy for a long time. As a result, the functions of this desired policy are being managed through other public sector policies, such as investment, trade, monetary, SME policies, and Vision-2025. Due to the lack of a national policy, the government is unable to attract FDI for industries and steer the sector toward high growth (MOIP, 2021).

Political Instability & Uncertainty in Public Policy: There has always been uncertainty in public policies regarding tax exemptions, tax holidays, incentives, lending institution conditionality's, and revenue considerations due to the frequent change of governments in Pakistan, which is one of the leading causes of uncertain policies.

Regulatory Burden: Pakistan is an over-regulated country where the ease of doing business is not optimal. There are many problems in the regulation of industries, such as the multiplicity and frequency of inspections, harassment by public officials and inspectors, cumbersome, expensive, and time-consuming compliance procedures, and illegal demands by public authorities (DAWN, 2002).

Expensive and Inadequate Energy: Energy is a major input in most industries. Energy prices in Pakistan are among the highest in the region. Energy theft, transmission losses, and non-recovery of bills are also major issues for the industrial sector. Due to the energy crisis, industrial growth has remained inconsistent.

Tax Burden: The industrial sector faces multiple challenges, such as high taxes and a cumbersome and complicated e-filing system. The trust deficit between taxpayers and tax officials discourages the private sector from investing in these sectors. The tax rate on the manufacturing sector is much higher, at 37% of profit (PBS, 2021).

Lack of Capital: For labor-intensive industries like steel, iron, chemicals, automobiles, etc., the capital required is quite high. Similarly, industries such as textiles, carpets, sugar, paperboard, etc., require huge amounts of capital to establish and expand. Although financial institutions are well-established, high-interest rates limit the availability of credit to the private sector (Khiswar, 2021).

Market Imbalances: The market for industries faces several problems, such as low purchasing power, the production of substandard goods, higher

production costs, and a limited domestic market size. Due to the poor quality of goods produced, potential markets in the developed world are reluctant to purchase Pakistani manufactured goods (Kishawar, 2021).

Lack of Skilled Labor: Due to a lack of technical skills, the quality of goods produced is also subpar. The non-availability of skilled human resources discourages investors from engaging in the industrial sector (LCWU, 2012).

Lack of Credit/Finances: Due to the lack of credit and financing facilities, the industrial sector cannot acquire the latest machinery and equipment to cope with changing market demands.

Lack of Technology: The industrial sector in Pakistan lacks sophisticated modern technology to compete in the international market and maintain competitiveness.

Limited Access to Finance for SMEs: Although overall capital costs for private sector investors have reduced in recent years, SMEs in Punjab often face challenges accessing finance. Instead, they finance their operations based on retained earnings, leaving them unable to invest in growth and productivity improvements. Commercial banks have historically focused on lending to the government and large corporations, while SMEs are often side-lined as they are perceived as too risky. The situation has worsened recently, with the SME share of total private sector lending almost halved in the last decade.

Lack of Publicly Available and Updated Information: Most enterprises, especially new entrants, do not have access to a central source for securing market information, limiting their ability to assess feasibility for market entry. Despite the amount of data and studies created by the government and academic institutions, there is no central repository of critical trade, industrial, and economic statistics at a provincial or district level. Similarly, the government has limited data on the types of firms located in various areas.

Underdevelopment of Industrial Clusters: There is already significant industrial activity in Punjab, particularly in light manufacturing, garments, and basic agri-processing. However, the industrial sector is dominated by small firms, and the lack of larger, more sophisticated players inhibits the development of thriving industrial clusters. As a result, the potential benefits of agglomeration—such as shared know-how, value chain linkages, technology transfer, and a shared workforce—are not available to Punjab's businesses.

Law and Order Situation: The law-and-order situation in the country has always remained volatile. Due to insecurity and the deplorable law-and-order situation, both foreign and local investors are reluctant to invest in the industrial sector.

Gap Analysis

National Industrialization Policy and Policy Gaps

Industrialization is a process in which countries shift from an agriculture-based economy to an industrial one. The growth of an economy is dependent on the development of the industrial sector (Sarkar, 2012). The industrial sector in Pakistan is divided into four sub-sectors: Mining and Quarrying, Manufacturing, Electricity and Gas Generation, and Construction. For the purpose of this analysis, the focus will be on the manufacturing sector, which is also termed the backbone of the economy, particularly large-scale and small-scale manufacturing. However, the share of manufacturing in GDP has remained low in the last two decades due to various reasons such as lack of product diversification, tariff barriers, lack of credit, cost of doing business, political instability, law and order issues across the country, and lack of technology (PBC, 2018). The most important factor for this dismal performance has been the lack of a national industrial policy for the past three decades.

An industrial policy can be defined as government measures to shift the production focus toward sectors that have the potential to contribute more toward economic growth, which would not happen without such measures. A policy is not only a guiding document for the government and the private sector but also lays out the long-term objectives to be achieved (Saggi & Pack, 2006). Although various governments in the past have followed different fragmented industrial development policies, there has never been a single comprehensive policy focusing solely on industrial growth. The Ministry of Industries and Production (MoIP) of the Federal government is currently working on developing a National Industrial Policy with the assistance of ADB; however, the details of the policy have not been made public yet. It is heartening to see that the government has taken this initiative, but it is worth noting that successive governments neglected such an important policy for decades. After the 18th Amendment, the role of MoIP in industrial development was considerably reduced when provinces were empowered to deal with the subject of industries. However, international coordination and industrial policy formulation remain the mandate of the MoIP. The provincial governments of KPK in 2020 and Punjab in 2018 have formulated their industrial policies. Even those provinces have not been able to attract sufficient FDI and local investors.

Developing countries like Bangladesh have had very clear industrial policies, which helped them achieve robust economic growth. They have revised their policies every five years to meet the demands of changing times (Financial Times, 2021). On the other hand, the industrial policy development in Pakistan has had a chequered history. Industrial policies were not independent documents but were made part of the medium-term development plans or were in response to some crisis in the country. Since independence, five such so-called policies were put in place. The first policy was adopted in 1949, when India placed trade embargoes on Pakistan. The second industrial policy was embedded in the two five-year plans of Ayub Khan's era from 1960 to 1970. The third plan was adopted during the tenure of PM Zulfiqar A. Bhutto, who started the process of nationalization of industries. The fourth policy was adopted during the democratic governments from 1988 to 1999. The fifth policy was made during the rule of President Musharraf. Later on, various democratic governments mostly followed the policies of the past without any holistic policy for industrialization in the country (Burki, 2008). A National Industrial Policy was drafted during President Gen. Pervez Musharraf's period, but it was shelved by vested interests. The brief history of industrial policy-making in Pakistan shows that leaders who came to power had great influence on the policy, and as soon as the next government came into power, the policy was changed. Industrial development requires long-term planning to deliver results, which has never been practiced in Pakistan due to abrupt changes in regimes. This political imbroglio has kept our industrial sector backward compared to other Asian economies.

Policy-making in Pakistan is usually lopsided, as indicated in the case of industrial development. Ideally, the federal government should have formulated a national policy, based on which the provinces could develop their own policies. However, the provinces of Khyber Pakhtunkhwa and Punjab have already developed their own industrial policies before the finalization of the NIP. This policy gap has had an adverse impact, as is evident from the stagnant share of the industrial sector in the GDP of the country. The small-scale manufacturing sector has a very meagre share of around 2 percent in the national economy (PBS, 2021). Though it has great potential, the government is giving it less priority compared to larger industries. This is evident from the fact that SMEDA developed an SME policy in 2007, without having a national industrial policy. Moreover, the SME policy has been revised again with the assistance of USAID and is awaiting cabinet approval. Another interesting aspect is that almost all the major policies of the country are being developed with the assistance of international development partners. There is no harm in such a practice; however, it will not develop the capacity of departments to develop such policies on their own and will create dependency on foreign assistance.

GAP Analysis of Ministry of Industries and Production

S. No.	Desired State	Current State	Gap	Actions to Close the Gap
1	Policy Intervention	i. Auto Industry Development and Export Policy, 2021-26	Only selective entrants were given relief to launch products, e.g., small cars, new tractors, motorcycles (for export only)	Extension of policy incentives should be broad based across the whole sector in shape of National Industrial Policy.
		ii. SME Policy, 2021	Cannot be accessed as yet.	N. A.
		iii. Electric Vehicle Policy	Lack of financial resources (USD 40-50 billion) for putting up charging infrastructure.	Electric vehicles to be used on fixed routes with charging stations at beginning and end of route.
		iv. Fertilizer Policy, 2001	Although area under cultivation of crops has increased, yet there is no proportionate increase in yield of crops.	Import duties on raw material and machinery be reduced and power should be supplied at subsidized routes.
2	Setting up Industrial Parks/SEZs	22 Nos SEZs established.	Complicated institutional and implementation arrangements	Delegation of approval powers by BOI to provincial SEZAs.
3	Export Processing Zones	07 Nos EPZs established; 02 Nos upcoming.	• Ban on zero-rating facility on exports to Afghanistan and CARs via land route. • Imposition of sales tax on import for EPZs in finance bill. • Non-availability of off-shore account facility in close vicinity.	Affirmative action by Federal Government to remove the identified gaps and lacunae.

			• Non-availability of ANF inspection team within the Zone premises.	
4	Skill Development of Human Resource for Industrial Sector	PMYSDP Apprenticeship Training; 1500 plus youth trained in leading industries.	Very limited scope and capacity of technical and vocational training.	Enhancement/diversification of training scope and manpower coverage.
5	SME Development		SMEDA has been kept under-staffed since long (only 90 employees countrywide against sanctioned strength of 300) due to financial constraints and lack of political will to accord priority to SME development	Allocation of enhanced budget and hiring of staff against vacant posts.

Gap Analysis Auto Policy 2021-2026 (AIDEP)

Objectives	Current	Gap	Action Required
1. Localization of Parks	Target was set earn 1 billion dollar export	Incompetitiveness in international market	Discouraging import by increasing regulatory duty & tariff rate
2. Implementation of safety regulation	While export of 70 million dollar achieved so far	High imports of vehicles & parts	Quality enhancement
3. Promotion of new technologies			Effective role of EDB
4. Export of auto part & completely built up units			

Conclusion

The key findings of the paper are that currently there is no national industrial policy. Industrial policy is a key factor in industrial development and economic growth if it is well-planned, goal-oriented, and strictly implemented. LSM picked up momentum and showed an overall growth of 10.4% during the last financial year (2022). However, efforts are required to pave the way for fast-track industrial development, which is pivotal to achieving inclusive and sustainable economic growth. The government has devised sector-wise policies, such as those for sugar, textiles, and automobiles, which are allegedly framed to benefit the elite class or certain sections of society. Effective industrial policy implementation would translate into significant benefits for Pakistan, such as enhanced opportunities for employment in both large- and small-scale industries and increased revenue generation.

Recommendations

1. Preparation of a suitable industrial policy in consultation with all stakeholders.
2. Improving the technological base through innovation and R&D, and diffusing it, particularly to areas where the raw materials for crucial industries are produced.
3. Ensuring the uninterrupted and cost-effective supply of energy to the industrial sector to maintain market competitiveness.
4. Developing a mechanism to review the implementation of industrial policy with the involvement of high-level management and bureaucracy.
5. Integrating industrial policy into a national development vision is a crucial step. Social dialogue and debates should help in finding the development vision.
6. Enhancing the impact of industrial policy through the quick disposal of industries' concerns.
7. Implementing a rational process to define and carry out industrial policy, aligned with other policies using direct and close information channels. There should be confidence from investors and workers in the government—this may be a forum to solve issues. Dialogue and debates among each stakeholder, and their participation in policy-making, should be ensured.

8. Overall macroeconomic management, including a competitive exchange rate and access to affordable credit for the private sector, including SMEs and micro-SMEs.
9. Removing structural bottlenecks and improving supply chain logistics to make them more cost-effective and efficient.
10. Targeting human resource development through appropriate education and skill development policies.
11. Integrating markets through trade policy tools to achieve economies of scale and enhance competitiveness.
12. Installing level four machinery/technology instead of obsolete technologies.
13. Continuously enhancing the technical skills of the industrial workforce to keep pace with international technological advancements.

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Evaluation of SEZS policies and implementation and its impact on Industrialization in KP

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Abstract:

In the global shift from geopolitics to geo-economics, economic priorities are driving national policies for socio-economic advancement. The China-Pakistan Economic Corridor (CPEC), a flagship project under China's Belt and Road Initiative (BRI), has immense potential for regional connectivity and economic growth. While CPEC is a strategic framework for industrialization through Special Economic Zones (SEZs), challenges like political instability, inefficient SEZ management, and lack of cohesive federal-provincial policies hinder its success. This study examines the economic and strategic implications of SEZs in Pakistan, particularly in Khyber Pakhtunkhwa, highlighting the importance of infrastructure, legal frameworks, and policy reforms. Recommendations include streamlined governance, sustainable industrial policies, conflict resolution mechanisms, and targeted incentives to attract investments. By addressing these challenges, Pakistan can transform SEZs into hubs of industrial and socio-economic development, aligning with global economic patterns and achieving inclusive growth.

Key words:

China-Pakistan Economic Corridor, Special Economic Zones, Geo-economics, Industrial Policy, Pakistan.

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Introduction

In the current globalized world, international politics has shifted from geopolitics to geo-economics. National policies are driven by economic priorities to maximize socio-economic benefits for the welfare of the public and the state. From a human capital perspective, agricultural products, mines, and minerals, the Asia region, especially South Asia and Central Asia, are very important regions. China, a rising global economic power, is ambitious to extend its economic and trade activities not only in the region but also in the global market.

The geographical position of Pakistan is very important for China's economic expansion towards other economic hubs of the world. However, political uncertainties and chronic economic problems in Pakistan have eroded the prospects of Foreign Direct Investment. In this context, the initiation of the China-Pakistan Economic Corridor under the Chinese BRI project is supposed to be a game-changer for Pakistan in the regional political and economic arena.

The China-Pakistan Economic Corridor (CPEC) is a framework for regional connectivity through rail, road, air, and sea transportation between Pakistan and China. This corridor will provide a window to Afghanistan, the Central Asian Republics (CARs), and Iran to access international markets. Pakistan signed the CPEC Agreement with China in 2015. Under CPEC, there are a number of projects, including Special Economic Zones in Khyber Pakhtunkhwa.

The basic objective of Special Economic Zones is the promotion of industrialization (Reviving CPEC 2020 - Ahsan Iqbal). The project will be fruitful under the Win-Win model, wherein all the stakeholders and state actors involved in the project may collaborate. The potential areas for cooperation and development in CPEC include transport infrastructure, energy hubs, logistics hubs, trade and commerce, and the development of Special Economic Zones for industrialization and socio-economic development.

Problem Statement

The world is shifting from geopolitics to geo-economics in the globalized era to pursue national prosperity. Regional economic connectivity is the hallmark of modern-day national development. Special Economic Zones are one of the instruments for promoting industrialization. Pakistan's geographical location has the potential for economic interconnectivity with China, Afghanistan, the Central Asian Republics, the Gulf, and other regions. However, Pakistan has not benefited from its geographical potential

in the context of Special Economic Zones under the China-Pakistan Economic Corridor (CPEC), especially in Khyber Pakhtunkhwa, which is strategically located on the border of Afghanistan and China. Therefore, this paper aims to critically evaluate the Special Economic Zones in Khyber Pakhtunkhwa and their impact on industrialization in the province.

Scope

This study will critically evaluate the policies for the establishment of Special Economic Zones (SEZs) in Khyber Pakhtunkhwa under the China-Pakistan Economic Corridor (CPEC) and their impact on industrialization in the province. The analysis will be carried out from a comparative lens of successful models of SEZs in China, India, and Bangladesh, focusing on policy, legal, and institutional perspectives. Practical and tangible recommendations will be presented to improve the existing regime for SEZs.

Literature Review

This study critically engaged with the literature related to BRI, CPEC, and SEZs in Pakistan, as well as in China, India, and Bangladesh. A comprehensive analysis was conducted of relevant bodies such as KPEZDMC, the Joint Cooperation Committee (JCC), the Board of Approval (BOA), and Provincial SEZs and other economic zones in KP. The relevant legal framework for SEZs was also critically analyzed. This review provided a clear understanding of government policies and narratives. Nevertheless, the study also employed critical literature, such as *Don't Blame the Chinese* by Hoodbhoy (2023). Seminal works on CPEC by Dr. Ishrat ul Abad, Dr. Shahid Rashi, and Mr. Yassir Arafat were also reviewed to uncover the hidden politics and governmental laxity in materializing CPEC-related projects.

A Special Economic Zone (SEZ) is a geographically bounded area with central management that provides benefits based on its physical location within the zone. These zones have separate customs areas to take advantage of duty-free and related liberal laws [World Bank (2009)]. SEZs yield direct and indirect economic benefits, such as employment generation and foreign exchange earnings, as well as knowledge-based urban growth. Looking at global best practices, China has developed SEZs to deliver a wide range of services rather than focusing on a single function [Wong (1987)]. The inter-linkages between these entities have significantly contributed to Chinese progress in SEZs [World Bank (2009)].

Government support creates an enabling environment where planned and coordinated efforts by the private sector enhance resource utilization, leading to increased competitiveness at regional, national, and international levels [World Best Practices, 2020]. China, India, and Bangladesh have fully leveraged the private sector. In contrast, Pakistan has not prioritized the

growth of private enterprise development in SEZs [Zeng, 2008]. Political uncertainty in Pakistan has also contributed to the failure of SEZs. Thus, creating SEZs is a challenging task for governments, as numerous cases of failure exist in both developed and developing countries due to political or personal motives [Plummer and Sheppard (2006)]. Pakistan has initiated the development of industrial zones in various regions, but these efforts have not generated the expected results. The reasons for their poor performance include structural issues and a lack of private sector interest in participating in such zones.

Research Methodology

This study is based on a qualitative research methodology. Primary data was collected through interviews with experts in the field, including BOI, KPEZDMC, and CPEC. Secondary data was analyzed from official websites, research papers, policy journals, official statements, and newspapers. An off-the-record discussion was also held with a relevant officer in the KP government[7].

1. Mr. Sami Ullah Wazir, DG Environmental Protection Agency, KP (KP Climate Change Policy and details of accomplishments of EPA, along with HR details, were obtained).
2. Mr. Zeeshan Abdullah, Additional Secretary, Climate Change, Forestry, Environment, and Wildlife Department (A brief prepared by the department for COP28 was obtained).
3. Mr. Adnan Farid, Additional Secretary P&D, and Mr. Sher Azam, Senior Chief of the Environment Section were interviewed, and documents such as the Supporting Climate Change concept note, a brief about the Climate Change Cell, P&D, and details of projects executed for achieving NDCs were obtained.

Analysis

Situational Analysis of potential, preparedness, planning, policies and current status of Special Economic Zones (SEZs) planned under CPEC in Khyber Pakhtunkhwa

Economic potentials Economic Zones in Pakistan and KP

Pakistan's Under the CPEC Project, there are nine prioritized SEZs across the country, one of which is located in Khyber Pakhtunkhwa, namely the Rashakai Economic Zone[8]. Khyber Pakhtunkhwa has 14 existing Economic

[7] The officers expressed views on the condition of anonymity.

[8] After merger of FATA, Mohmand Marble City changed from Prioritized zone to SEZ.

Zones, including two Special Economic Zones: Rashakai and Hattar SEZ[9]. Out of these, only 10 Economic Zones are operational, including Peshawar, Jalozai, Chitral, Gadoon, Hattar, Ghazi, D.I. Khan, Bannu, Nowshera, and Mohmand Economic Zones. The development and management of modern Economic Zones are contributing to economic growth, job creation, skill enhancement, and poverty reduction, fostering a prosperous and progressive Khyber Pakhtunkhwa.

The priority sectors in Pakistan under CPEC include Tourism and Hospitality, Housing and Construction, Information Technology, Automobile, and Textile[10]. Khyber Pakhtunkhwa, with an area of 101,741 sq. km, strategic locations bordering Afghanistan and China, a population of over 35 million, and a GDP contribution of $38 billion, has significant socio-economic and industrial potential that can be harnessed through the SEZ regime. The key potential sectors in Khyber Pakhtunkhwa that can drive economic development are Textile, Energy, Steel, Plastic PVC, Minerals and Gems, Pharmaceuticals, Fruit and Agro-based products, Construction Materials, Marble and Granite, Engineering, and Food and Beverages.

Between 2020 and 2023, nine Economic Zones were established in Khyber Pakhtunkhwa, generating 11,650 direct employment opportunities and mobilizing PKR 131.7 billion[11].

Potential of KP-SEZ

Khyber Pakhtunkhwa (KP) has multiple natural resources, including hydropower generation, oil and gas, large deposits of metallic and non-metallic minerals, marble stones, agriculture, horticulture, livestock and dairy, forestry, and tourism. These resources offer significant potential for the establishment of industrial and manufacturing units at SEZs in the province. The existing SEZs in the province have the potential to attract foreign direct investment, create job opportunities for the local population, promote export-oriented industries, and facilitate the transfer of technology.

Rashakai Special Economic Zone

Rashakai SEZ is the first CPEC industrial cooperation SEZ, being developed in a joint venture between KPEZDMC and China Road and Bridge Company (CRBC), with CRBC holding a 91% share and KPEZDMC holding 9%. The zone is still under development and is not yet operational. The total area of the project is 100 acres, which have been leased to the JV partner, CRBC, for 30 years. The projected development cost is $128 million, with development occurring in three phases. The total leasable area is 778 acres, of which 702 acres are for industrial units and 76 acres are for commercial units.

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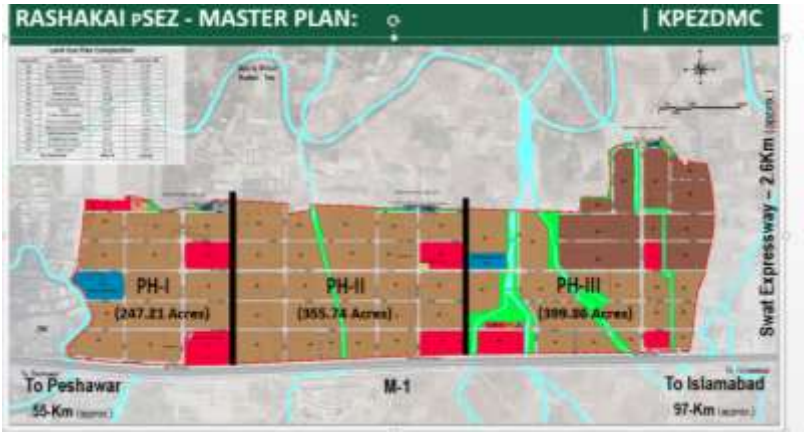
[10] https://invest.gov.pk/sez

[11] Industrial Communique KPEZDMC 2023.

The proposed strategic industrial cluster includes agriculture-based food processing units, automobile and mechanical equipment, marbles, minerals and chemicals, garments and textiles, sports goods, and electronics and electrical appliances. The projected employment generation is 200,000 direct and indirect jobs. The project has the potential to generate $4.0 billion, with a projected economic impact of $29 billion over 25 years.

The project is progressing at a slow pace due to several regulatory issues and overlapping authorities at the federal and provincial levels. Additionally, the project has not been aggressively promoted on international forums to attract foreign direct investment. The slow pace of development has been driven by political instability in the country and inconsistency in priorities.



Economic Impact of SEZ Rashakai

Pakistan is currently facing an economic crisis. Industrialization is the future of Pakistan's economy, and this project will serve as an engine of growth for the country's economy. As indicated by the objectives of the Rashakai Special Economic Zone, through FDI, trade and export, and cluster industrialization, it will bring socio-economic benefits to the country in general and to the province of Khyber Pakhtunkhwa in particular. The key economic impacts of the project are as follows:

- Attract foreign investment in industrialization,
- Increase the country's exports, which will eventually facilitate wealth creation,
- Generate direct, indirect, skilled, and unskilled employment for the local population,
- Promote small and medium enterprises and ancillary businesses for the local population,
- Promote technical education,
- Generate power at the SEZ and sell surplus power to the national

grid.
- Develop domestic industries with modern technology,
- Serve as a hub for regional connectivity and generate transit revenue.

Preparedness and Planning

Policies for SEZs: The study shows that the main requirements for the success of Special Economic Zones are improved infrastructure, a better business environment, and financial incentives in taxation (Lu and Yuan, 2010). The key policy objectives of SEZs are the attraction of foreign direct investment, domestic investment, industrialization, human resource development, and job creation. These encompass a number of policy parameters. However, there is no specific, simplified, decentralized SEZ policy document to smoothly align all ancillary policy frameworks, such as energy policy, investment policy, infrastructural policy, labor policy, land acquisition policy, security policy, tax and incentive policy, export policy, and industrial policy.

From a regulatory perspective, there is no single authority to oversee, plan, manage, and monitor the development and operationalization of Special Economic Zones in the province of Khyber Pakhtunkhwa and to leverage the human resources, natural, and geographical potentials in the province. There are several policy barriers under the domain of the federal and provincial governments for the development and operationalization of Special Economic Zones and industrialization in Khyber Pakhtunkhwa. The mixture of policy frameworks and the absence of a single policy for SEZs are reasons for delays in the operationalization of Rashakai SEZ and Mohmand Marble City in Khyber Pakhtunkhwa. The overlapping policy networks have created uncertainty for developers, co-developers, and enterprises, hindering the robust development of these SEZs.

The following policy initiatives at the provincial and federal levels have been taken for the promotion of Economic Zones:

Revision Khyber Pakhtunkhwa Industrial Policy 2020-30

The industrial sector is not on a growing trajectory, although the province of KP has great potential natural endowment. The key factors for low industrialization in KP are distance from the seaport, law and order situation, lack of requisite infrastructure, energy crisis, financial constraints, and ease of doing business. The revised industrial policy 2020-2030 was introduced for industrialization. The policy is structured on three pillars: revival & rehabilitation, growth, and competitiveness. Special Economic Zones (SEZs) are an important ingredient in the revised industrial policy. The policy includes the following key features:

- Developing critical infrastructure facilities through Public-Private Partnerships (PPP)
- Revival of sick industries
- Prioritizing and incentivizing industrial sectors

- Forming joint ventures with local investors
- Investing in utilizing indigenous natural resources
- Bringing new technology, investing in labor-intensive and export-oriented industries
- Developing skilled manpower for the development, management, and rehabilitation of small and large industrial estates
- Supporting SMEs, creating an investment-friendly environment, and providing facilitation
- Facilitating Ease of Doing Business (EoDB) for industries

Fig: IDEAL POLICY CIRCLE OF SEZs AND INDUSTRIAL ZONES

Absence of Long Term and Sustainable National Industrial Policy

Pakistan's weak industrial base is one of the factors contributing to slow economic growth. There is no single long-term and sustainable National Industrial Policy supporting the overall economic structure. Various industrial policies formulated from time to time in a piecemeal manner have not supported the overall export of the country and have not resulted in the development of small, medium, and large-scale industries, especially in the manufacturing sector. The Ministry of Industries and Production has made a number of policies, including the Auto Industry Development and Export Policy (AIDEP) 2021-26, SME Policy 2021, Electric Vehicle Policy, Mobile Device Manufacturing Policy 2020, Auto Development Policy 2016-21, Fertilizer Policy 2001, and the Auto Industry Development Program 2008. Despite their visions and missions, all these policies have not yet achieved competitiveness through a critical mass of production, contributing to GDP, attracting large investments, or developing technologies and human resources through a well-structured policy framework formulated in consultation with all stakeholders.

A comprehensive industrial policy based on four pillars—Revival, Growth, Sustainability, and Competitiveness—will be instrumental in reviving the economy and connecting SEZs with the economic structure of the country.

PM Youth Program

Pakistan initiated the Prime Minister Youth Program for subsidized financing with an 8.0% markup for youth entrepreneurs to establish small and medium enterprises in the country. The initiative supports small and medium enterprises in the country. Since 2013, under the scheme, 540,000 youth have been given loans totaling Rs. 73.55 billion; however, it has not yielded the desired results in promoting small and medium enterprises. The scheme faces many operational problems, including intricate banking procedures, lack of consultancy for the youth on the utilization of loans, poor monitoring of loans, and challenges in facilitating ease of doing business.

Ease of doing business

Ease of Doing Business is a regime aimed at improving the business climate in the country by facilitating various businesses. However, the ease of doing business is not interconnected through various organizations with a one-window operation among the Board of Investment, Securities and Exchange Commission of Pakistan, Ministry of Commerce, State Bank of Pakistan, and provincial trade authorities.

Taxation Exemption Policy

There are various sector-wise concessions available to entrepreneurs for locating businesses in SEZs. These include Electric Vehicles, Information Technology, Mobile Device Manufacturing, Pharmaceuticals, Food Processing, Textile, and Tourism:

- One-time customs duty exemption on the import of capital goods
- Income tax exemption for 10 years from the date of signing the development agreement (Zone Developers/Co-Developers)
- Income tax exemption for 10 years from the date of commencement of commercial operations (Zone Enterprises)
- No customs duty on the import of plant and machinery for manufacturing industries
- No sales tax on imports of industry-related goods and parts
- Exemption of withholding tax for locally assembled/manufactured electronic items (e.g., phones) on domestic sales
- R&D allowance of 3% for local manufacturers exporting mobile phones
- Pharma raw materials exempt from sales tax

- Zero percent duty on the import of multiple drugs
- Low customs duty on the import of plant and machinery

Land Acquisition Policy

The properties for SEZs are governed by the Special Economic Zones Rule 2013. The rules have the following policy initiatives:

- The SEZ authorities may acquire and hold movable and immovable property for the purpose of carrying out their functions under the Act but shall not sell, lease, mortgage, dispose of, or transfer it in any other manner.
- An SEZ shall use 70% of the area for the operation of zone enterprises.
- An SEZ authority may specify a standard for the efficient use of the land.
- Cancellation of the sub-lease of land for a zone enterprise if the enterprise persistently defaults in fulfilling the requirements of the Act.
- The land/plot is liable to be canceled if the industry is not operational for 24 months.

Rashakai Special Economic Zone

Spread over an area of 1,000 acres, Rashakai prioritized Special Economic Zone (SEZ) is a flagship project of the Government of Khyber Pakhtunkhwa under the industrial cooperation of the China-Pakistan Economic Corridor (CPEC) framework, serving as a CPEC Special Economic Zone. The 1,000-acre SEZ will be developed by CRBC in joint venture with KPEZDMC. The zone is expected to attract a total investment of USD 1.9 billion and generate 200,000 skilled and unskilled jobs.

The zone has the following industrial cluster capabilities:

- Processing and Manufacturing
- Home Appliances
- Pharmaceutical
- Home Building Materials
- Automobile and Parts
- Agriculture and Horticulture
- Wholesale Market/Specialty Mills

Key Feature

- Investors shall avail all benefits and concessions of Special Economic Zones, including:
    - One-time duty-free import on capital goods
    - Income tax exemption for 10 years

- Provision of developed land with amenities (roads, electricity, gas, efficient water treatment plant, and boundary wall)
- Presence of an Industrial Facilitation Office at the site
- Centralized Commercial Area
- 24/7 security through SSU and SSD
- Strategic location, 115 km from Torkham crossing and 779 km from Khunjerab
- Availability of skilled local labor ensured
- 210 MW uninterrupted electricity and 30 MMCFD uninterrupted gas supply
- Emergency services

Current Status

- The Zone is not operational currently.
- 11 industrial units, including one by Chinese Century Steel, have established their units.
- Non-installation of electricity and gas infrastructure.
- No attracted FDI or relocation of labor-intensive and high-tech industries from China.
- Sustainability in political priorities.

Mohmand Marble City

Mohmand Marble City (MMC), planned as an SEZ under CPEC, is located in Michni District, Mohmand, in the Khyber Pakhtunkhwa Province of Pakistan. However, the status of the SEZ changed with the passage of the 25th Constitutional Amendment.

There are many marble reserves in District Mohmand and the adjoining areas of Peshawar, Charsadda, Bajaur, and Khyber District.

Key features

- Geographical location in District Mohmand, 27 km away from Peshawar and adjoining areas.
- Huge reserves of marble in Mohmand and Bajaur.
- 350 acres of land.
- Provision of developed land with amenities for industries.
- Industrial Facilitation Office at the site.
- 24/7 security.
- A project for clustering marble industries in the surrounding areas.
- 11 units are operational, and 47 are under construction.

Economic Impact

- Expected to attract PKR 7 billion.
- 50,000 direct and indirect jobs.
- Potential for mineral processing.
- Granite and dimension stone processing.

- Food and agro-based businesses.

HATTAR SPECIAL ECONOMIC ZONE

Located in District Haripur, it is a flagship project of the KP Government, covering a total area of 438 acres of land.

Key features

- Developed infrastructure including roads, water, and 10 MW power feeders.
- Provision of developed land with amenities for industries.
- Industrial Facilitation Office on site
- 24/7 security.
- Project for clustering marble industries in the surrounding areas.
- 5 units are operational and 44 are under construction.

Economic Impact

- Expected to attract PKR 40 billion.
- PKR 7 billion has already been attracted from China, Canada, and KSA.
- 100,000 direct and indirect jobs.
- Potential for ceramic, steel, and engineering industries.

Comparative Analysis of Rashakai and Hattar

Rashakai Special Economic Zone	**Hattar Special Economic Zone**
Non-Operational Only 11 have units but due to absence of electricity not operational	Operations with 05 operational units and 44 under construction
A new project	Hattar was already an industrial estate
Absence of energy infrastructure	Availability of
Land acquisition in dollars and not feasible for SMEs	Plot acquisition is in PKR and is suitable for SMEs and LSMs.

Gap Analysis

The gap analysis from a policy, planning, preparedness, and development perspective has identified the following gaps in the Economic Zones and Special Economic Zones in Khyber Pakhtunkhwa:

- Complicated and prolonged procedures for the approval and

development of SEZs.

- Overlapping authorities at local, provincial, and federal levels, which hamper the provision of utilities at SEZs.
- The regulatory framework, especially the SEZ Act, subjects SEZs to the jurisdiction of provincial High Courts and civil courts for legal disputes within the operational area of the SEZ, and there is no specialized dispute resolution mechanism for SEZs.
- Political uncertainty in the country causes distrust among foreign firms in developing SEZs and reduces Foreign Direct Investment (FDI) in SEZs.
- Marketing of SEZs for domestic and foreign investment is not being followed aggressively to attract multinational firms to invest in these SEZs.
- High cost of doing business and a complicated land acquisition mechanism.
- The complicated land acquisition regime and high cost of land are not conducive for domestic investors and small and medium enterprises.
- There is no single, long-term, sustainable national industrial policy that supports networking across all sectors of the economy and provides support to SEZs. The industrial policies are short-term objectives that come to an end without results due to shifting political priorities in the country.

The Legal and Intuitional Framework for SEZ

Legal Regime

SEZ Act 2012: The SEZs Act was promulgated in 2012 to support the development of SEZs in Pakistan (Senate of Pakistan, 2023). The Act was later amended in 2016 and is now called the SEZs (Amendment) Act 2016. The amendments were aimed at encouraging SEZ development and making it more investor- and business-friendly. The Act encompasses SEZs and other Economic Zones. It also focuses on defining the roles and responsibilities of different governing bodies and authorities at the federal and provincial levels, as well as the incentives offered to SEZ developers and enterprises.

According to the SEZs (Amendment) Act 2016, an SEZ is defined as "a geographically defined and delimited area that has been notified and approved by the Board of Approval (BOA).

Legal Requirements for SEZs Development

According to the SEZs (Amendment) Act 2016, SEZs can be established in the following three manners (BOI, 2023):

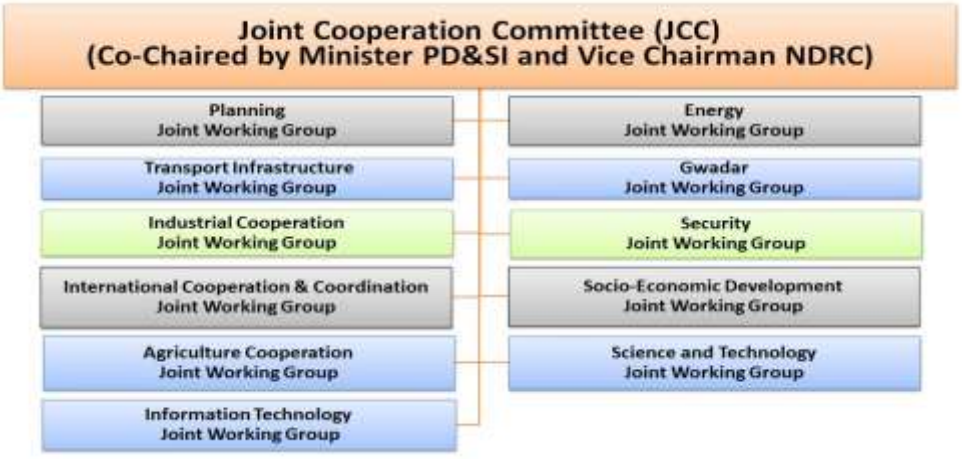
- By private parties exclusively, or;

- By the Federal or Provincial Government, themselves, or;
- By partnership with private parties through Public-Private Partnership (PPP).

According to the SEZs (Amendment) Act 2016, the BOA would approve the zone application submitted by each provincial SEZ authority through the Board of Investment (BOI). The BOA is also responsible for measuring the economic impact of SEZs. Other relevant and responsible agencies are also identified and mentioned in the Act, with a complete governing structure and responsibilities. A graphical framework for developing SEZs as per the SEZs (Amendment) Act 2016 is presented below[12]:

Institutional Framework

The institutional framework for SEZs in Pakistan is given below[13]:



[12] Available at https://www.finance.gov.pk/survey/chapters_21/Annex%20III%20SEZones.pdf.
[13] Available at https://invest.gov.pk/sites/default/files/2021-10/SEZ_RULES.pdf?gtranslate=en

Provincial SEZ Authority

According to the SEZ Act, an authority shall be established for each province, to be known as the SEZ Authority of that province. Each SEZ Authority shall consist of:

a. Chairperson, who shall be the Chief Minister of the concerned province or a person appointed by the Chief Minister.

b. Vice-Chairperson, who may be the Minister or the Advisor in charge of the investment department, and where no such department exists, any member of the provincial cabinet nominated by the Chief Minister of the concerned province.
c. Chief Executive Officer, who may be appointed by the Chief Minister of the concerned province and may also be the Secretary of the SEZ Authority.
d. Secretary of the provincial investment department, and where no such department exists, the executive head of the provincial investment promotion authority, by whatever name it exists.
e. Secretaries of the provincial industries, finance, commerce, investment, works and services, livestock, agriculture, and planning and development departments.
f. Two members to be appointed by the Chief Minister of the concerned province and two other members to be appointed by the BOA.
g. A member to be appointed by the concerned Chamber of Commerce and Industry where the SEZ is proposed. If there is no Chamber of Commerce, then a member of the Chamber of Commerce from the respective area shall be appointed.

Each SEZ Authority may acquire land in its respective province in accordance with the Land Acquisition Act, 1894 (I of 1894). Each SEZ Authority shall, subject to the approval of BOA, establish its rules and procedures.
Where the Chairperson is not present, the Vice-Chairperson shall chair the SEZ Authority's meeting.

GAP Analysis of Legal and Institutional set up for SEZ

- The SEZs Act deals with CPEC-related SEZs and other economic zones as well. The responsibilities divided between the federal and provincial governments have not been followed strictly.
- The Act envisages provincial SEZs to encourage domestic and

international investors for the promotion and establishment of industrial infrastructure focusing on export promotion, import substitution, transfer of technology, and employment generation. However, as far as KP-SEZA is concerned, there is no physical structure or presence of KP-SEZA in Khyber Pakhtunkhwa. It has been housed in KP-BOIT (Investment Promotion Agency of KP), and

- The CEO of KP-BOIT is charged with additional responsibilities as CEO of KP-SEZA.
- There are no active working groups (WGs) for CPEC SEZs at the provincial level.
- The KPSEZ Authority, notified in December 2012 under the SEZ Act, is literally nonfunctional.
- The most important problem is that Pakistan's special economic zones are not actually special. They get a few benefits but no exclusive legal treatment. For instance, the Dubai International Financial Center or Qatar Financial Center, two of the most successful SEZs in the Middle East, offer a special legal framework where investors are granted a blanket exemption from their respective countries' commercial and civil laws. Zone enterprises do not have to go to courts and wait for years; instead, they can resolve disputes in dedicated local tribunals, offering speedy and low-cost resolution. Without this approach, SEZs in Pakistan will never take off, and before a new law is enacted, a constitutional amendment would be needed.
- The institutional arrangements provided by the SEZ law are overly complicated, with undue powers enjoyed by the federal government, while the provincial governments have little power to fix an SEZ. The approval process involves multiple rounds, but once granted, these approvals don't mean much except for qualification for incentives. Ideally, the approval should encompass pre-approval for a set of activities and shouldn't require further approval by federal or provincial authorities for permits or licenses.
- Time limits for government agencies are provided in the law but without any consequences for not observing them. As a result, these are often violated with impunity. The law provides for the Board of Investment (BoI) to act as a one-stop shop, but the BoI doesn't practically function as a single window.

Labour laws

According to the Act, the same laws for labor and employment shall apply in SEZs as the existing laws in Pakistan.

A Comparative Analysis world's Best Practices in Asia for the SEZs

International Best Practices Model[14]:

The International Good Practices for SEZs Development

- A long-term national development strategy for SEZs
- A business-friendly legal and regulatory framework with strong and decentralized institutional linkages
- One-stop-shop services/one-window operation at the provincial level
- A prototype design for broader national reforms in existing SEZs
- A strategic location with sound infrastructure in and outside the SEZs to attract foreign direct investment and domestic investment
- Effective commercial viability and accessibility to local and international markets
- Environmentally sustainable operational plans with strong monitoring and evaluation systems for SEZs
- Carefully plan, design, and manage operations
- Provision of skills training for an effective workforce for industries
- Undertake continuous technological and industrial learning, innovation, and upgrading
- Strike a good balance between industrial development and social/urban development policies and initiatives

CASE STUDIES: World Best Practices - CHINA, INDIA & BANGLADESH

SEZs Best Practices in Bangladesh

- Adherence to the National Vision 2021, which aimed to transform Bangladesh into a middle-income country by 2021, free from economic disparity, built upon strong democratic foundations and

[14] Aradhna Aggarwal, International Best practices (2021)

well-governed institutions.

- Utilization of Geographical Location and Human Resources: Bangladesh has great potential for investment, including its strategic location between China and India, close proximity to Southeast Asia, a liberal FDI policy, a young workforce, ease of doing business, seafood, jute, and raw materials for garments.
- Utilization of Private Capital: To accelerate economic growth and diversification, Bangladesh established two new agencies in 2010, tasked with leading the development of economic zones and high-tech parks. The Bangladesh Economic Zones Authority (BEZA) was instituted on 9 November 2010, moving away from the EPZ model to SEZs.
- BEZA mainly relies on private capital and expertise to build, own, manage, and operate new zones serving both domestic and foreign markets.
- BEZA's mission is to establish 100 economic zones across the country between 2015 and 2030, with the goal of creating 10 million jobs and $40 billion in exports.
- Strong Linkages Between Economic Zones and Local Industries:
- The development program is supported by a multi-year technical assistance scheme from the Japan International Cooperation Agency.
- The total number of Special Economic Zones is 74, with 20 Private Economic Zones and a total land area of 35,000 hectares.
- Simplified Regulatory Framework: This includes the Bangladesh Economic Zones Authority (BEZA), established under the Bangladesh Economic Zones Act 2010, and working under the Prime Minister's office. It aims to establish economic zones in all potential areas in Bangladesh, including backward and underdeveloped regions, with a view to encouraging rapid economic development through increased industry, employment, production, and export.
- One-Stop Services Act Policy regarding the development, operation, management, and control of private economic zones.
- Implementation of Rules and Regulations.

SEZs in INDIA

- The Special Economic Zones (SEZs) Scheme in India was conceived in 1999 and announced in the year 2000. The basic idea was to establish zones where export production could take place free from all rules and regulations governing imports and exports, and to give them operational flexibility.
- A Special Economic Zone (SEZ) is a specifically delineated duty-free enclave, which shall be deemed to be a foreign territory for the purposes of trade operations, duties, and tariffs. At present, there are 425 approved SEZs, of which 378 have been notified. The total operational SEZs are 265.

- Regulatory Framework: The regulatory framework includes the Special Economic Zones Act 2005 and SEZs Rules, which codify the simplification of procedures for the development and operationalization of SEZs, with single-window clearance for all financial and infrastructural facilities from central and state governments.
- BOARD OF APPROVAL: SEZs are approved by the Board of Approval. The key incentives under the current regulatory regime include duty-free imports, 100% income tax exemption on export income for SEZ units, no licenses for imports, separate documentation for customs, and the provision of ready-to-use plots.
- The key achievements of the flexible regulatory regime have resulted in the operationalization of 264 SEZs, with 22.84 lakh jobs created for local people and foreign exchange earnings through exports from the operational SEZs.

SEZs in CHINA

- Chinese Special Economic Zones (SEZs) vary in scope and function. The Special Economic Zones include geographically specified areas, free-trade areas, industrial parks, technical innovation parks, and bonded zones that facilitate experimentation and innovation across a wide range of industries.
- Most SEZs in China are located in the coastal region or near major cities with a history or tradition of foreign trade or business, making them better linked to the international market. They also have good access to major infrastructure, such as ports, airports, and railways.
- China's SEZs began in the early 1980s when market-oriented reforms were introduced in selected SEZ areas, such as Shenzhen. These were followed in the mid-1980s by the establishment of open coastal cities, such as Zhangzhou, designed to stimulate economic growth by leveraging their geographical location and economic opening. Building on that experience, central and provincial authorities set up high-tech development zones in the late 1980s to capitalize on global capital, technology, and talent.
- The Chinese government, in the 1990s, created new zones, such as the China-Singapore Cooperation Park, and upgraded existing SEZs to take advantage of new opportunities. Since the beginning of the 21st century, a large number of regional zones have been established to stimulate and anchor regional development.
- Management models followed for the development and operationalization of SEZs are:
- Administrative management, with managerial functions performed by government-instituted administrative bodies;
- Administrative committees, with management by government-appointed committees; and

- Joint management by SEZ partners and government-instituted administrative bodies.

GAP ANALYSIS OF SEZs IN PAKSITAN, CHINA, BANGLADESH AND INDIA

KPIs of SEZs	COUNTRIES			
	PAKISTAN	**CHINA**	**BANGLADESH**	**INDIA**
Land Acquisition	Yes	Yes	Yes	Yes
Policy Frame Work	Not Focused	Focused	Focused	Focused
Regulatory Frame Work	Yes	Yes	Yes	Yes
Collaboration B/w Industries and Technical Institutions	No	Yes	Yes	Yes
Institutions for Skilled Work Force	Yes	Yes	Yes	Yes
Availability of Skilled work force	Nil	Yes	Yes	Yes
Energy Availability	Nil	Yes	Yes	Yes
Utilities	Nil	Yes	Yes	Yes
Laws	Yes	Yes	Yes	Yes
Incentives	Yes	Yes	Yes	Yes
One Stop Facilitation	No	Yes	Yes	Yes
Institutions	Partial	Yes	Yes	Yes
Infrastructures	Yes	Yes	Yes	Yes
Transport facilitation	No	Yes	Yes	Yes

ICT Adoption	Partial	Yes	Yes	Yes
Labor Market	Yes	Yes	Yes	Yes
Financial System	Nil	Yes	Yes	Yes
Property Right	Nil	Yes	Yes	Yes
Security	Very tight and not friendly	Yes	Yes	Yes
FDI	Yes	Yes	Yes	Yes
Tax Exemption	Partial	Yes	Yes	Yes
Ease of Doing Business	Yes / slow	Yes	Yes	Yes
Cost of Doing Business	High	Low	Low	Low

Lesson learnt from the World Best Practices

- The key lessons learned from China's best practices include developing SEZs with the private sector. The state's provision of good infrastructure, low costs, effective organization and management, policy support, and investment promotion are other useful strategies.
- Optimum utilization of geographical strengths, resources, markets, human resources, and capital is essential for successful SEZs, as learned from China. SEZs in Pakistan should also be located in areas with good transport, logistics, local industry, a high concentration of talent, innovative human resource policies, access to quality financial markets, investment facilities, and resources.
- A comprehensive national industrial policy, as adopted by China and India, is necessary to encourage the development of basic and key industries to promote industrialization, escalate value-added exports, and import substitution.
- Ease of doing business, long-term investment, subsidized power and gas tariffs, and rationalized import duties on raw materials to maximize the global value chain are good strategies to enhance national wealth through SEZs and industrialization.

- A robust link between SEZs and industries is a key factor in attracting FDI and promoting exports.
- Monitoring and evaluation, along with effective review by a high-powered board at national and provincial levels, will lead to the growth of industries and stimulate SEZs, as seen in the case of our three case studies.

SWOT and EETH Analyses

Energy Sector vis-a-vis Industrialization

Strengths

1. Institutional Structure: NEPRA was established in 1997 as a monitoring and supervisory institution for the energy sector.
2. The National Electricity Policy 2021 sets forth the supply of reliable, secure, efficient, and affordable electricity to the country with clear policy guidelines.
3. Pakistan is blessed with abundant natural energy resources, and the government's goal of making Pakistan a low-carbon economy by 2030 relies heavily on hydropower and low-carbon sources such as solar and wind.
4. The power generation mix policy for the sector aims to gradually reduce reliance on imported fuels and move towards optimal utilization of local resources such as coal, hydro, renewable sources, local gas, and nuclear.
5. Focus is on run-of-river hydropower projects where irrigation, flood control, and seasonal storage are not involved.
6. KPK has moved forward by providing off-grid solutions through mini and micro hydropower plants to reduce expenditures.
7. The process of strengthening the electricity distribution system is underway to maximize benefits.
8. The functions of system operators have shifted to IT-based automated systems.

Weaknesses

1. Heavy reliance on imported coal-fired power plants and IPPs drains valuable foreign exchange.
2. Pakistan ranks 110th among 135 countries for reliable electricity provision to its citizens.
3. According to the World Bank, disruptions in the power sector cost the economy the equivalent of 6% of GDP in 2019.
4. Inefficiencies persist throughout the system cycle, including fuel supply, power generation, transmission, distribution, end-user services, and theft.

5. Over 14% of gas is lost during transmission and distribution due to inadequate pipe maintenance and theft, causing gas shortages, idle plants, and gas outages.
6. Poor infrastructure, outdated policies, inadequate implementation, short-term decisions, and theft are the primary causes of power outages in Pakistan.
7. Failure to improve power infrastructure and shift to renewable energy sources.
8. Line losses and outdated transmission lines increase electricity costs.

Opportunities

1. The federal government should focus on utilizing the untapped potential of renewable energy sources such as hydel, solar, wind, and nuclear.
2. Public-private partnerships in hydropower, solar, and other energy forms can spur infrastructure growth, inclusive economic expansion, and job creation in the industry and service sectors.
3. Energy cooperation under CPEC can harness available natural resources.
4. Special focus on attracting foreign direct investments (FDIs).
5. Negotiations with regional and international institutions for further investment in Pakistan's power sector.
6. Small, cost-effective hydropower projects can be built in Northern Areas and KPK, leveraging geographic advantages.
7. Existing public-sector thermal plants should be reviewed and assessed for privatization, leasing, or other options for integration into the wholesale electricity market or retirement.

Threats

1. Differences between federal and provincial governments on royalty issues and interprovincial disputes over the NFC award.
2. Rising Circular Debt: Pakistan's energy sector recorded an all-time high of PKR 498 billion, with overall debt reaching PKR 2,476 billion.
3. Provincial alienation: Nearly 50% of Baluchistan is not connected to the national grid, increasing regional disparities and perceptions of marginalization.
4. Poor transmission networks and technical issues have crippled Pakistan's power sector.
5. Power theft and line losses negatively impact revenue generation.
6. Lack of prioritization for shifting to renewable energy sources like hydel, solar, and wind.

EETH ANALYSIS

Enhancement of Strengths

1. The institutional framework of the energy sector should be strengthened at the federal level.
2. The National Electricity Policy 2021 should be implemented in letter and spirit.
3. Concerted efforts should be made to adopt advanced technology to maximize the efficiency of renewable energy sources.
4. Renewable energy infrastructure development may be enhanced by encouraging private sector investment.
5. The federal government should prioritize building small run-of-the-river dams.
6. The KPK model should be adopted by other stakeholders.
7. Pakistan needs investment to upgrade the distribution system.
8. Digitalization of the power sector is essential.

Eliminating Weaknesses

1. Reliance on imported energy sources must be reduced at the earliest.
2. The federal government should devise an effective policy mechanism for equitable electricity distribution nationwide.
3. The government should upgrade the system to prevent disruptions in the power sector.
4. Develop a robust transmission network that complements generation plans for smooth power dispersal between generating stations and load centers.
5. Strengthen the electricity distribution system through DISCOs.
6. Establish an effective mechanism to reduce line losses and prevent power theft.

Taking Advantage of Opportunities

1. The government should take prompt action to utilize renewable energy sources.
2. Policies related to renewable energy should emphasize private sector participation in grid development and transmission networking.
3. Selection of new projects under CPEC energy infrastructure should be designed for maximum output.
4. Cohesive efforts are needed to attract FDI.
5. New technologies should be adopted to establish modern coal-based power plants, replacing older ones.
6. The government should leverage the geographic location of KPK and Northern Areas for small hydropower plants.

Hedging Against Threats

1. The CCI should resolve royalty issues for power plants, utilizing revised financial models to create a win-win situation for both provincial and federal governments.
2. Investment in renewable energy projects under CPEC can reduce circular debt by lowering import costs.
3. The government should electrify far-flung areas of Baluchistan on a priority basis to prevent perceptions of discrimination.
4. Strict accountability of DISCOs is needed to eliminate line losses.
5. The distribution system must be upgraded.
6. The government should focus on long-term goals for cheap, environmentally friendly power projects instead of coal-powered projects, which could deepen the economic crisis.

SWOT ANALYSIS OF POLICY AND LEGAL FRAME WORK

Enhancement	Elimination	Taking Advantage	Hedge against threat
• Policy reforms • Policy Integration • Policy simplification	• Integrated policy for Industrial development • One window operation • Digitalization • Emphasis on implementation • Making KPSEZA Functional	• Investment friendly environment • Focus on Export oriented industries	• Federal/Provincial Harmony • Quick processing of cases • Utilization of indigenous natural resources

SWOT ANALYSIS OF INSTITUTIONAL FRAME WORK

Strength	Weaknesses	Opportunities	Threats
• BOA • BOCs • BOI • KPEZDMC • CPEC Authority • Rashakai Authority • KPBOIT	• Lack of coordination • On ground working • Beau acratic Hurdles • 18th Amendment	• Institutional Reforms • R&D • Learn from Best Practices	• Government incompetency • Lack of Political will • Political Uncertainty • Weak institutions

EETH OFANALYSIS OF INSTITUTIONAL FRAME

WORK

Enhancement	Elimination	Taking Advantage	Hedge against threat
• Institutional Reforms • Innovation in governance • Institutional capacity building	• Effective coordination among various units • Improving Efficiency • Business friendly environment	• Geo political location • World leading economies • Coordination b/w Universities and industry	• Capacity Enhancement • Political Commitment • Political Harmony • Strengthening institution

LOGICAL FRAMEWORK MATRIX

Project Description		**Verifiable Indicators**	**Means of Verification**	**Assumption**
Goal	Economic Development	GDP, Remittances, FDI, Current Account Deficit, FBR Revenue, ,	Websites of State Bank of Pakistan	
Purpose /Outcome	FDI, industrial clusters development, promotion of trade generation of employment and transfer of technology through Development of EZ and SEZs	Exports, Imports, PSDP	State Bank of Pakistan	Economic restructuring Industrial growth Regional trade connectivity
Output	Weak infrastructure, complicated administrative process, financial incentives, weak investment climate, political	Relocation of industrial units to SEZs Transfer of high tech industries	KPEZDMC, Board of Investment, Planning Commission KPBOIT	Decentralization of EZ and industrial policies to provinces Human Resource Development Alignment of energy and

	instability development One stop shop Trade facilitation			communication policies to Economic Zones
Activity	Data Collection Case study model Best practices	Feasible vision and objectives for sound SEZs strategies	World best practices	As above

GAP ANALYSIS OF SEZs AND ITS IMPACT ON INDSUTRIALISATION

ACTIVITY	**CURRENT STATUS**	**DESIRED STATE**	**GAPS**	**Responsibility**
Regulatory Framework	• Overlapping • Stringent law • Complicated approval mechanism	• Decentralized single authority at Provincial Level • Investor friendly legal regime	• Centralization of authority at federal level • Short term objectives	• Consensus between the Federal and Provincial Governments- final decision by the Federal Government as per Federal List in the Constitution of Pakistan
Industrial Policy	• Non-existence of national industrial policy at Federal Level • Short term objectives • Multiple and piecemeal various policies	• National Industrial Policy with connectivity with all sectors of economy at federal and provincial level • Sustainable and long term objectives	• Weak industrial base which compel the policy for short term objectives • Sick industries in Pakistan • No focus on export oriented manufacturing industries	• • Ministry of Industries and Production of Federal Government in consensus with industries Departments of Provincial Government
Energy Policy	• Energy deficiency • Line losses and high cost of	• More generation of electricity • Low cost	• Switching over to renewable energy source	• Ministry of Energy (Power Division, and Petroleum Division) ,

	electricity • Circular debt • Transmission issue • Non use of renewable energy sources • Purchasing of high cost electricity from IPPs	electricity generation • Renewable energy resources • Strict regulatory regime for IPPs • Capitalize from TAPI or Iran gas pipeline	• Policy intervention against theft and line losses • Strict regulatory regime for DISCOs	Ministry of Water of Federal Government
Economic Zones Special Economic Zones Policy	• Mostly under developed • Weak infrastructure • Not supporting the local industries • Not creating jobs for local • Very limited operations • Most favourable for Chinese Transit and storage	• Boost industrialization • Relocation of high tech industries to Pakistan • Employment generation • Socio-economic development	• Absence of political will which serves only Chinese objectives • No internal control on SEZs policies • Law order situation • Lack of skilled labour • Weak infrastructure including rail, roads and ports • Overlapping authorities and procedures for development and operationalization of SEZs • High cost of doing business • High cost of land	• Decentralized approach for devolving full authority of approval, development and operationalization of SEZ • Human Resources Development at Provincial Level in coordination of NAVTTC • Utilization of SEZs for local and international industrial clusters rather than dry ports.

Conclusion

The global political landscape is driven by geo-economics. Economic development determines political patterns. Economic zones are the mechanism through which many countries have transitioned from underdeveloped to developing and ultimately developed states. Notable examples include China, India, and Bangladesh, which have attracted multinational firms and their production units through the economic zone framework. Pakistan has also embarked on the journey of developing economic zones across the country. Pakistan's geographical location is favorable for the establishment of economic zones. With well-designed and coordinated policies at the federal and provincial levels, these zones can achieve the desired outcomes. However, the current infrastructure and mechanism of SEZs primarily serve China's interests as an alternate trade route rather than fostering intense industrialization in Pakistan.

Recommendations

i. An exclusive act for SEZs should be promulgated by the Federal Government and Provincial Governments separately, clearly defining their respective roles and responsibilities to fast-track CPEC-related SEZs. The existing act addresses both economic zones and SEZs, creating friction between provincial and federal governments.
ii. The KPSEZ Authority, notified in December 2012 and established under the SEZ Act, is currently non-functional. The Government of Khyber Pakhtunkhwa should urgently revitalize and operationalize it, providing necessary physical infrastructure. Presently, it operates on an ad-hoc basis under KP-BOIT (Investment Promotion Agency of KP).
iii. The CEO of KPBOIT is currently tasked with additional responsibilities as CEO of KPSEZA. The Government of KP should immediately appoint a dedicated CEO for KPSEZA.
iv. A strategy should be devised for conflict resolution within and outside SEZs through special SEZ courts, rather than relying on traditional legal frameworks such as high courts and civil courts. This would enable zone enterprises to resolve disputes through dedicated local tribunals offering speedy and low-cost solutions. Without this approach, SEZs in Pakistan will struggle to thrive.
v. The institutional arrangements provided by the SEZ law are overly complicated, with excessive authority exercised by the Federal Government in SEZ approvals, while provincial governments have limited

control. The approval process should allow pre-approval for a set of activities without requiring further permits or licenses from federal or provincial authorities.

vi. Although time limits for government agencies are stipulated in the law, there are no consequences for non-compliance, resulting in frequent violations. The Board of Investment (BoI), intended to serve as a one-stop shop, does not effectively function as a single-window service. This issue should be urgently addressed by federal and provincial governments.

vii. Political uncertainty in the country undermines the trust of foreign firms in developing SEZs and making Foreign Direct Investments (FDI). Political leadership across all parties should prioritize economic progress and integrate it into their political manifestos.

viii. Aggressive marketing of SEZs for domestic and foreign investment is necessary to attract multinational firms.

ix. The complex land acquisition regime and high land costs discourage domestic investors and small and medium enterprises. The current dollar cap of 0.15 million dollars should be revised by the Federal Government to attract local investors.

x. There is no long-term, sustainable national industrial policy to support networking across economic sectors and SEZs. Existing policies are short-term and often conclude without results due to shifting political priorities. The Federal Government should develop a comprehensive industrial policy to interconnect SEZs with industries.

xi. The traditional education curriculum should be revised, and technical and vocational education should be provided at primary, higher, and secondary levels in collaboration with the National Vocational and Technical Training Commission.

xii. Soft and easy loans should be offered for establishing Small and Medium Enterprises (SMEs) in the province through the Prime Minister Youth Loan scheme, with proper monitoring mechanisms in place.

xiii. A special SEZ police force should be established in Khyber Pakhtunkhwa to ensure security as outlined in the SEZ Act, 2012, thereby restoring investor confidence.

xiv. The provincial industry department of Khyber Pakhtunkhwa should facilitate the relocation of small and medium industries to SEZs.

xv. The Prime Minister Youth Program should be linked to SMEs within economic zones.

xvi. Given their importance, SEZ development should be integrated into Pakistan's overall growth strategy to achieve inclusive and sustained economic growth.

xvii. SEZs should be promoted as hubs of best practices and self-sufficient enclaves supported by robust infrastructure and service provider firms to foster prosperity in KP.

xviii. The provincial government should actively provide transport, electricity, water, telecommunications, waste disposal, and other infrastructure to link SEZs to global and local supply chains before commercially launching project plots for sale.

xix. SEZ plot allotments or commercial launches should only be initiated once basic infrastructure and facilities are in place. Currently, plots are offered for sale, and development work is started afterward using revenue from plot sales.

xx. Incentives need to be refined. For instance, the one-time exemption from customs duties and taxes on importing plant and machinery discourages zone enterprises from expanding. Similarly, income tax exemptions for a fixed period encourage companies to withdraw dividends rather than reinvesting profits. These loopholes should be addressed in the new policy by the Federal Government.

xxi. The Federal Government should demonstrate the political will to shift existing SEZs from serving as transit stores for Chinese supplies to industrial zones that deliver tangible economic development outcomes for Pakistan.

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Critical Evaluation of Current Policies and Practices in TVET and Its Impact on Employment and Industry in Pakistan

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Abstract:

Technical and Vocational Education and Training (TVET) plays a critical role in developing the workforce, aligning skills with market needs, and promoting economic growth. In Pakistan, however, TVET faces significant challenges such as outdated curricula, insufficient funding, and a lack of industry collaboration. Despite efforts like the National Vocational Qualification Framework (NVQF) and the National Skills for All Strategy, the sector remains underfunded, with only 1.5% of the education budget allocated to TVET. These challenges hinder the development of a skilled labor force that can meet the demands of a rapidly evolving job market, particularly with the advent of the Fourth Industrial Revolution. This paper explores the long-term impact of TVET on economic growth in Pakistan, emphasizing the need for curriculum updates, increased investment, and stronger industry linkages. The study proposes policy recommendations to enhance the effectiveness of TVET, focusing on demand-driven skills, governance, and partnerships with local businesses to address emerging trends and global market requirements.

Key words:

Technical and Vocational Education and Training (TVET), economic growth, curriculum development, workforce skills, Pakistan.

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Introduction

Technical and Vocational Education and Training (TVET) is essentially the skill development of the workforce in the industry and economically relevant education for people, according to the United Nations Educational, Scientific, and Cultural Organization (UNESCO)[7], while vocational education refers to lower-level education and training for the preparation of skilled and semi-skilled workers in various trades. TVET develops human potential through market-oriented skills and expands employment opportunities in the labor market. It has both a positive externality and a spillover impact in the labor market, in that the more people with demand-driven skills there are, the more investment and job creation there will be. As a result, it is considered vital to invest in individuals' talents in order to reduce unemployment, increase access to economic-generating opportunities, and contribute to economic growth. Technology and skills have a significant relationship, just like industrialization, economic development, capital, and skills. According to the World Bank (2002)[8], rapid technological advancement has created a high demand for higher-level talents in the job market. Because new technologies require greater ability and knowledge, there is a significant demand for skilled and trained employees in the job market.

Khan (2016), in his study on "The Long-run Impact of Technical and Vocational Education and Training in Pakistan," reasoned that due to fast technological progress, globalization, and economic liberalization, human capital has emerged as one of the most important factors of economic growth in recent years. Because of these rapid developments, the government of Pakistan, like that of other emerging countries, has prioritized skill development as a crucial strategy for economic success. Using an autoregressive distributed lag (ARDL) model, this study investigated the long-term association between technical and vocational education and economic growth in Pakistan. The computed coefficient indicates that technical and vocational education has a positive and significant long-run impact on economic growth and can play a vital role in strengthening the economy by producing skilled and demand-driven workers in the labor market. It was also proposed that the government should invest more in technical and vocational education to develop a strong human foundation that can further enhance the labor market with productive workers and transform the status of the development goals.

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[7] *UNESCO, Research Study on Technical and Vocational Education in Pakistan at Secondary Level (Pakistan, 2009), 10.*

[8] *https://documents1.worldbank.org/curated/en/503261468019793470/pdf/wps3894.pdf*

In Pakistan, TVET (technical and vocational education and training) has long been considered a way to close the skills gap between the labor force and industry. However, there are a number of issues with the current TVET policies and practices in Pakistan, including a lack of funding, subpar facilities, outdated curricula, and insufficient instructor training. These difficulties have had a detrimental effect on Pakistan's economy and industry. The lack of funding is one of the main concerns affecting TVET in Pakistan. The lack of funding for TVET colleges makes it difficult for them to purchase cutting-edge tools and technology. As a result, graduates are not fully prepared with the abilities required in the sector and receive insufficient training. The outdated curricula in TVET institutes is another issue. Graduating students lack the necessary skills to compete in the job market because the curriculum is out of step with the changing needs of the industry. The curriculum needs to be evaluated and revised frequently to reflect the changing demands of the sector. Moreover, the quality of training for TVET instructors is a cause for concern. In order to effectively teach students, the practical skills needed in the workplace, instructors must have relevant industry experience. Nevertheless, many teachers lack the required knowledge and expertise, which results in subpar training outcomes. There is also a lack of collaboration between TVET institutions and industry. To guarantee that TVET programs fulfill the demands of the workforce, industry must be involved in the design of the curricula, and there must be regular industry-academia exchanges.

Many of these issues have resulted in a mismatch between graduates' abilities and the needs of the sector, leading to high rates of unemployment in Pakistan. To overcome these difficulties and improve the quality of TVET in Pakistan, current TVET policies and practices must be re-evaluated. Therefore, TVET policies and practices in Pakistan must be critically assessed in order to improve training quality, better align TVET programs with industry demands, and expand employment opportunities for graduates. To address these difficulties, significant investment in TVET is required, including finance, infrastructure, curriculum, instructor training, and tighter partnerships with industry.

Problem Statement

Despite the emphasis on Technical and Vocational Education and Training (TVET) in Pakistan, the country continues to face high levels of youth unemployment and a skills gap in the labor market. This suggests that current policies and practices in TVET may not be adequately addressing the needs of the industry or properly preparing students for employment. Therefore, there is a need for a critical evaluation of the effectiveness of current TVET policies and practices in Pakistan and their impact on employment and industry. Such an evaluation can help identify the strengths and weaknesses of current TVET systems and inform the

development of evidence-based policies and practices that can better meet the needs of both industry and students.

Scope

The present study will provide an overview of the current TVET system in Pakistan, including its structure, funding, and governance. It will also provide an analysis of the policies and practices currently in place to support TVET in Pakistan, including curriculum development, teacher training, and student assessment, along with an assessment of the effectiveness of the current TVET policies and practices in preparing students for employment in the industry. A discussion of the challenges and opportunities facing the TVET system in Pakistan, including the need for greater collaboration between industry and education, the importance of promoting entrepreneurship, and the need for more investment in TVET, will also be included. Consequently, a set of recommendations for policymakers, educators, and industry stakeholders will be presented on how to improve the TVET system in Pakistan and promote economic development.

Literature Review

In the human capital discourse, the term 'TVET' is defined in different ways. According to UNESCO, the TVET sector comprises education, training, and the acquisition of practical skills required for economic and social life. It empowers individuals and communities for lifelong learning, employment, and decent work, which results in inclusive and sustainable growth (UNESCO, 2016). Its main emphasis is that the TVET sector in a country must provide "control ability" to the individual, meaning that the participants of the TVET sector have all the requisite tools to improve their own lives. Secondly, it promotes equity and aims to provide equal opportunities for access at multiple levels of TVET so that all trainees can participate in the labor market. Thirdly, and importantly, the TVET sector results in a good quality and quantity of human capital to support a country's economic development, which yields gainful employment for its citizens (Renold & Caves, 2017). Globally, the TVET sector is a mixture of formal, informal, and non-formal learning, primarily designed to impart the required skills that allow individuals to secure and successfully retain their jobs (Paryono, 2017). Today, TVET is an emerging agenda at the global level and is considered a driving force to attain SDG-4 of the Sustainable Development Goals, 2015. Therefore, it has become a strategic and operational priority for the G20, OECD, OIC, ILO, UNESCO, ASEAN, and the Shanghai Consensus (Ahmad, 2016).

The role and importance of the TVET sector for a country's socio-economic development is undeniable, and there is enough empirical evidence to support this fact. Multiple examples across the globe, including both developed and developing countries, validate the fact that Technical and

Vocational Education and Training (TVET) offers the shortest and swiftest path to employability in an economy. It is estimated that at least 52 percent of the total workforce in the USA, 68 percent in the United Kingdom, 75 percent in Germany, 80 percent in Japan, and 96 percent in South Korea has undergone some formal skill training (Khan, 2021). However, Pakistan has only 6 percent of its labor force skilled. Pakistan has one of the highest dropout rates after the primary level of formal education, with only 48 percent of the youth completing secondary level education (World Bank data, 2019). These dropouts often do not find any other learning opportunities and end up either joining the informal economy or engaging in non-productive activities.

Pakistan is also faced with the challenge of a youth bulge, and its young workforce is projected to double by 2050, with 236 million Pakistanis in the working-age group. The Industrial Classification (ISIC) and International Standard Classification of Occupations (ISCO) are aware of these different institutional arrangements in the TVET sector and the multitude of organizational approaches, government policies, strategies, and regulations. In 2010, IAG-Tvet established a Working Group on TVET Indicators (WGI) to identify indicators that can assess the TVET sector across the globe, with a special focus on low-income countries. They successfully developed a framework to help strengthen governments in developing countries to design, monitor, and evaluate their TVET sectors. Initially, the WGI mapped indicators commonly collected and used by various international organizations. After detailed deliberations, they identified four key policy areas to assess the TVET sector: Access, Quality, Relevance, and Finance/Governance. Following this identification, a conceptual framework was developed where these four components can substantively contribute to policy dialogue by any government seeking to improve the overall performance of the TVET sector (IAWG, 2012). This is a rare demographic opportunity that can be turned into a dividend by establishing a sustainable and efficient TVET ecosystem in Pakistan, which can bring economic prosperity through enhanced human capital (Alam, 2015).

In recent years, TVET has gained greater importance internationally, and TVET sectors across the globe are undergoing transformative reforms to provide trainees with an enabling environment (such as partnerships with the private sector and linkages with industries) to learn and upgrade their skill sets, which align with changing national, regional, and global economic needs (Nomura, 2019). However, there is a difference between the approaches of developed and less developed countries. While developed countries are shifting to green TVET and sustainable TVET, focusing on quality improvement, monitoring, evaluation, and national development plans, underdeveloped countries are still only focusing on the cost of enrollment and implementation of TVET (Pavlova, 2014). Pakistan's government has been reforming its technical and vocational education and training (TVET) system since 2000. This can be divided into two phases.

Phase 1 mainly revolves around the National Skills Strategy 2009, which ended in 2016 and achieved major milestones such as the National TVET Policy, National Vocational Qualifications Framework (NVQF), and the introduction of Competency-Based Training & Assessment (Ansari & Wu, 2013). The second phase of reforms includes the TVET Sector Support Programme, launched in January 2017 and running until 2022. It was carried out with the support of international organizations such as the European Union, the Federal Republic of Germany, and the Royal Norwegian Embassy, with a focus on improving governance and private sector participation in the TVET sector to increase quality skill development that meets labor market demands.

Internationally, TVET is a diverse sector, comprising formal, non-formal, and informal learning. It takes place in multiple settings, including schools, vocational centers (public and private), vocational institutes, higher education institutions, and various workplaces in both formal and informal economies (Tan et al., 2016). The International Labour Organization (ILO) ascertains that TVET systems and skill development are standardized and aligned with the requirements of labor markets across the globe (ILO, 2018). For this purpose, it emphasizes using international standards by the TVET sector, such as the International Standard. Over time, the TVET sector has evolved and grown in different ways, including the international recognition of TVET's involvement in developing lifelong skills and sustainable economic systems. New policies and strategies are being formulated to grow and enhance the status of TVET, build resilience, and improve its perception as a second and less popular choice compared to the formal education system (UNESCO Strategy for TVET, 2022-29).

Governments, through these policies and strategies, are working on areas such as aligning curricula with industry needs, developing articulation procedures, recognizing earlier skill learning, designing an educational framework for the country's workforce, and acknowledging the critical role of teachers in delivering high-quality TVET programs (Maina, 2019 & Tikly, 2013). A recent and emerging trend is sustainable TVET and Green TVET, which strives for the development of holistic and comprehensive plans that are critical for productive workplace and community practices (Kaliappan & Hamid, 2021). Green TVET aims to make young people active members of the green economy, which will increase individual well-being by reducing environmental risks and ecological scarcity. The United Nations has developed several guidelines and frameworks for green and sustainable TVET that are beneficial for TVET institutions as well as relevant economies (Mustapha, 2015). The Clean Development Mechanism (CDM) is a market-based mechanism under the Kyoto Protocol used by member countries to meet their commitments and reduce greenhouse gas emissions. All these measures suggest that it is critical for governments to meet the demand for green economy and green TVET and ensure a smooth transition to a green and sustainable TVET ecosystem (Maclean, 2013).

Research Methodology

A mixed research methodology was used for this individual research paper. A list of questions (Annex-A) was prepared to obtain data (numerical figures) on the performance of the four key areas of TVET: "Financing," "Access," "Quality," and "Relevance," in order to critically analyze these areas. A perception survey was also conducted (Annexure-B) to understand the issue at hand in greater depth. Secondary sources were also studied and examined for this research, such as scholarly articles written on the subject. Similarly, reports from reputable international organizations such as UNESCO, UNEVOC, ADB, ILO, World Bank, ASEAN, and SAARC were accessed to establish an understanding of the global perspective of the TVET sector, which was later used for critical and comparative analysis. Policies, strategies, and initiatives for TVET sector reforms and improvements in Pakistan were thoroughly examined, along with a comparison with China, India, and Bangladesh.

CRITICAL ANALYSIS OF TVET SECTOR IN PAKISTAN

TVET is a diverse sector in Pakistan with many key policy areas. However, in this chapter, four main areas of the TVET sector will be examined and critically analyzed with the help of data.

Financing:

One of the key challenges facing the TVET sector in Pakistan is inadequate funding. According to a report by the National Vocational and Technical Training Commission (NAVTTC), the government's budget allocation for TVET has remained consistently low, at less than 1-1.5% of the country's education budget. This low funding has resulted in inadequate infrastructure, outdated equipment, and insufficient teacher training, which ultimately affects the quality of TVET programs and limits their effectiveness in preparing students for employment. Another challenge is the lack of coordination between different stakeholders involved in financing TVET. Currently, funding for TVET is fragmented across multiple government departments and agencies, resulting in duplication of efforts and inefficiencies. This fragmentation also makes it challenging to track and monitor the effectiveness of funding in achieving its intended outcomes. Moreover, the private sector's role in financing TVET is limited, despite its critical role in providing employment opportunities for skilled workers. Private sector funding is mostly limited to corporate social responsibility initiatives, which are often small in scale and short-term. This limited private sector funding makes it difficult to sustainably finance TVET programs.

Budget for TVET

The budget allocation for technical and vocational education and training (TVET) in Pakistan has been consistently low, which has affected the quality

of TVET programs and the country's capacity to produce skilled workers. According to the National Vocational and Technical Training Commission (NAVTTC), the budget allocation for TVET in Pakistan has remained less than 1% of the country's education budget in recent years. In the year 2020-2021, the original budget for NAVTEC was PKR 394,591,000, with an expenditure up to December of PKR 167,698,166. However, this budget allocation is still considered insufficient to meet the demand for skilled workers and improve the quality of TVET programs in the country.

TVET Training Cost per Trainee

The cost of technical and vocational education and training (TVET) per trainee in Pakistan varies depending on the program's duration, level of qualification, and the institution providing the training. However, in general, the cost of TVET training per trainee in Pakistan is relatively low compared to other countries. According to a report by the National Vocational and Technical Training Commission (NAVTTC), the average cost of TVET training per trainee in Pakistan is estimated to be around PKR 25,000 to PKR 30,000 (approximately USD 160 to USD 190) for a six-month training program. This cost includes tuition fees, books, and other related expenses. The cost of training may vary depending on the field of study and the level of qualification. For example, the cost of a two-year diploma in a technical field such as electrical or mechanical engineering may be higher than a six-month certificate course in a vocational trade such as welding or carpentry.

Access:

The component of "Access" explains the extent to which a particular TVET sector promotes equity and inclusion in its TVET ecosystem. Its main indicators examine “access of the TVET sector to all genders” and “enrollment by type of TVET program,” which lead to improved labor market outcomes. In the following paragraphs, data obtained for these indicators will be examined to analyze access to TVET institutions and enrollment in preferred skills for the country.

Access of TVET Sector to All Genders:

Table 1.1 shows a gender-based classification of TVET institutions. The results show that the country has male-only, female-only, and co-educational TVET institutions throughout the country. Out of a total of 4,076 TVET institutions, half of them cater to a single gender (male), followed by female-specific TVET training centers, and then co-educational institutes. The following inferences can be drawn:

PROVINCE	INSTITUTES			
	MALE	FEMALE	CO-ED	TOTAL
Punjab	803	527	276	1606
Sindh	349	158	178	685
KPK	517	203	239	959
Baluchistan	117	54	36	207
GB	61	91	33	185
AJK	73	53	28	154
ICT	32	173	75	280
Total	1952	1259	865	4076

Table 1 1 Access of TVET sector to all genders

TVET institutes exist all across the country instead of being concentrated at the economic zones/Industrialized cities where on job training can be readily available to trainees. Need analysis is not conducted before opening a TVET institute. For a city like Islamabad that has one of the highest literacy rates (96%) and inclination towards formal and higher education (Rehman, Jingdong & Hussain ,2015) has 280 TVET institutions. Since TVET sector is mostly opted by individuals with low inclination for higher studies or for NEET therefore, they must be prioritized for areas with higher school dropout rate, facing multi- sectoral poverty so that economic growth in such areas can be accelerated and the beneficiaries be made part of active economy.

Enrolment by type of TVET programme:

Table 1.2 explains enrolment by type of TVET program. Among the top five TVET courses, two are from basic ICT whereas the remaining three are from the conventional traits. Following inferences can be drawn

- Skill mapping for each region is not done separately by taking into account demands of a particular district especially in terms of its economic profile.
- Due to non-availability of district and regional profiling, all students are offered same courses across the country that further reduces their employability and majority of them resort to entrepreneurship/self-employment.

ENROLLMENT BY TYPE OF TVET PROGRAM	RESULTS
Basic Computer	34,372
Tailoring	25,469
Computer Application and Office professional	24,858
Beautician	22,499
Dress making and fashion designing	20,274

Table 1 2 Enrolment by type of TVET programme

Quality:

This component addresses policy options for effective teaching and learning processes in a TVET sector. It measures quality of TVET sector to meet required skill set for a competent and competitive workforce. In preceding paras, Indicators for Quality in TVET sector will be analyzed to critically examine Quality in TVET sector of Pakistan.

AREA	INDICATOR	RESULTS
1	Student teacher ratio in TVET sector	25:1
2	Completion rate in TVET programs	86%
3	Proportion of qualified teacher in TVET sector	1) DAE/B.Tech: 38% 2) BE / ME: 52% 3) PhD: 1% 4) Others: 9%
4	Number of Capacity building for trainer and teachers	Seven Capacity Building Programs GIZ (Donor Agency): 03 NAVTTC: 01 Provincial TEVTAs: 03
5	ICT training modules	Over 30 Programs in ICT Sector being executed by NAVTTC and Provinces
6	Number of conventional programs that are continued for last 30 years	Over 300

Table 1 3 Quality of TEVT and Indicators

Table 1.3 shows following six indicators to assess quality in TVET sector of Pakistan.

Student-Teacher Ratio in TVET Sector:

Results show a student-teacher ratio of 25:1, which is considered a good ratio. However, this is an average for the whole country and does not provide a breakdown of the student-teacher ratio in different provinces. Literature suggests that the teacher-student ratio in public sector TVET institutes in Sindh and Khyber Pakhtunkhwa is 1:45 and 1:49, respectively (Shah & Khan, 2017).

Completion Rate in TVET Programs:

Results show that 86% of students complete their TVET courses. This is higher than many countries in the region, such as Sri Lanka, which has a 70% completion rate (ADB, 2015).

Proportion of Qualified Teachers in TVET Sector:

Results show that 52% of teachers in the TVET sector hold a Bachelor's or Master's degree in Engineering, followed by 38% of teachers who have a degree in TVET streams, such as DAE/B.Tech. Only 1% hold a PhD, while 9% have general education qualifications not specific to TVET streams. Ninety percent of these teachers have an engineering background, making it

challenging to prepare a skilled labor force in emerging TVET sectors such as IT, digital literacy, and e-commerce.

Capacity Building for Trainers and Teachers:

Results show that during 2021-22, seven capacity-building programs for teacher training were conducted. Of these, GIZ, Germany, sponsored three programs, provincial TEVTAs conducted three, and NAVTEC conducted one program. The TVET sector is considered an unpredictable stream of education, where frequent changes in labor skill sets make it imperative to invest more in teacher training, as they are the main knowledge transmitters. Although there are eleven Staff Training Institutes (STIs) across the country (Ansari & Wu, 2013), only four training programs were conducted by NAVTEC and provincial TEVTAs. This shows that priorities vary across TEVTAs in the country. For example, TEVTA Punjab has upgraded its five teacher training institutes into Centres of Excellence.

ICT Training Modules:

Results show that only 30 ICT programs are offered in the TVET sector of Pakistan. This indicates that NAVTEC and provincial TEVTAs' approach to curriculum design is supply-driven rather than demand-driven and does not adequately address emerging trends in the TVET sector, such as resilience for Industry 4.0 and Green TVET.

Number of Conventional Programs Continued for the Last 30 Years:

Results show that over 300 courses taught at TVET institutions are conventional. Over the last three decades, the world has seen digital transformation, but the TVET sector is still focusing on skills that were taught 30 years ago. This highlights another gap: the curriculum is not reviewed regularly, which is a common practice even in middle-income and developing countries such as Malaysia (Azmi & Salleh, 2021) and Ghana.

Relevance:

Relevance in the TVET sector examines the extent to which a particular TVET sector is responsive to labor market needs, requirements, and employability rates. In the following paragraphs, data for indicators such as "employment status" and "unemployment rate" will be critically analyzed to assess the relevance of the TVET sector in Pakistan.

Employment Status:

Results for the first indicator, "employment rate," show that the overall employment rate of graduates after completing training at TVET institutes is 63%. The provincial breakdown of the employment rate shows that the highest employment rate was observed in Baluchistan at 84%, while AJK

showed the lowest at 49%. The employment rate is expected to improve further with NAVTEC's initiatives such as PMYSDP, Saudi Takamol, and a Memorandum of Understanding (MoU) signed with Qatar to create job opportunities for graduates of Pakistan's TVET sector.

PROVINCE	EMPLOYMENT RATE (%)
Punjab	62
Sindh	82
Khyber Pakhtunkhwa	52
Baluchistan	84
AJK	49
ICT	82
AVERAGE	63

Table 1 4Employment Status

Employment Status by Gender

PROVINCE	MALE	FEMALE	TOTAL
Punjab	69	51	62
Sindh	84	70	82
Khyber Pakhtunkhwa	57	38	52
Baluchistan	92	60	84
AJK	67	42	49
ICT	82	78	82

Table 1 5 Employment Status by Gender

In order to explore gender wise employment data is compiled in Table-7. Results for "employment status by gender" show that overall employment rate for male graduates remained higher than female graduates. Provincial breakup for gender wise employment rate shows that in ICT, female employment rate remained highest at 78% and it remained lowest in KPK at 38%. For Males, it remained highest in Baluchistan at 92% and lowest in KPK at 57%. It suggests that employment rate for female graduates is lower as compared to male graduates. An enabling environment such as lack of access to safe transport, soft loans, household responsibilities and social norms are some major social barriers due to which female labour force participation (Isran & Isran , 2012) remainslow even after getting a TVET specific training.

Type of Employment Attained by Graduates

PROVINCE	GOVERNMENT	PRIVATE	ENTREPRENEURE/SELF EMPLOYMENT	OVERSEAS EMPLOYMENT	OTHERS
Punjab	5.5	39.2	49.5	1.4	4.4
Sindh	3.0	61.0	32.3	0.1	3.6
Khyber Pakhtunkhwa	7.4	40.0	49.9	1.1	1.6
Baluchistan	4.0	41.8	52.1	0.1	2.0
AJK	5.5	41.7	47.4	1.8	3.5
ICT	3.5	50.5	44.4	0.9	0.7
GB	7.5	7.9	84.2	0.4	0.0
AVERAGE	5.4	41.9	48.2	1.1	3.4

Table 1 6 Type of employment attained by graduates (in percentage)

Results for the "type of employment attained by graduates" show that the highest number of employments was attained in "entrepreneur/self-employment" at 48%, followed by the private sector at 41.9%, and the government sector at 5.4%. Among all provinces, this trend remains uniform, with a few exceptions. In Sindh, the private sector remained the highest employment provider at 61%, and in ICT, the private sector provided 50.5% of employment. The following inferences can be drawn:

• Overall, TVET-industry linkages are weak in the country, but they are weakest in the far-flung areas of Pakistan, such as Gilgit Baltistan.
• Although entrepreneurship/self-employment remained the highest employment-providing sector for TVET graduates, according to the Global Entrepreneurship and Development Institute (GEDI), Pakistan is ranked 120th out of 137 countries in the 2018 Global Entrepreneur Index (GEDI, 2018). It performed poorly on all entrepreneurship indicators, especially on pillar 2, "start-up skills," raising questions about the performance of the TVET sector in imparting relevant skills for successful entrepreneurship.
• Results show weaker linkages between TVET authorities in Pakistan and the main labor migrant destinations of the world. The "overseas employment" sector provides the lowest employment to TVET graduates at 1.1%. Many countries, such as the Philippines, earn significant remittances due to their skilled labor force, especially in the overseas hospitality sector. However, in Pakistan, there is a constant rise in unskilled migrant workers, particularly in the Gulf. The Bureau of Immigration reports a 21% increase in unskilled labor migration and employment in the Gulf in 2021 (Mian, 2022).

Unemployment

Data shared by NAVTEC indicates that the unemployment rate among TVET graduates is 37%. However, considering the growing population and overall unemployment in the country, the TVET sector's capacity to provide professional skills is insufficient. According to the latest Labor Force Survey

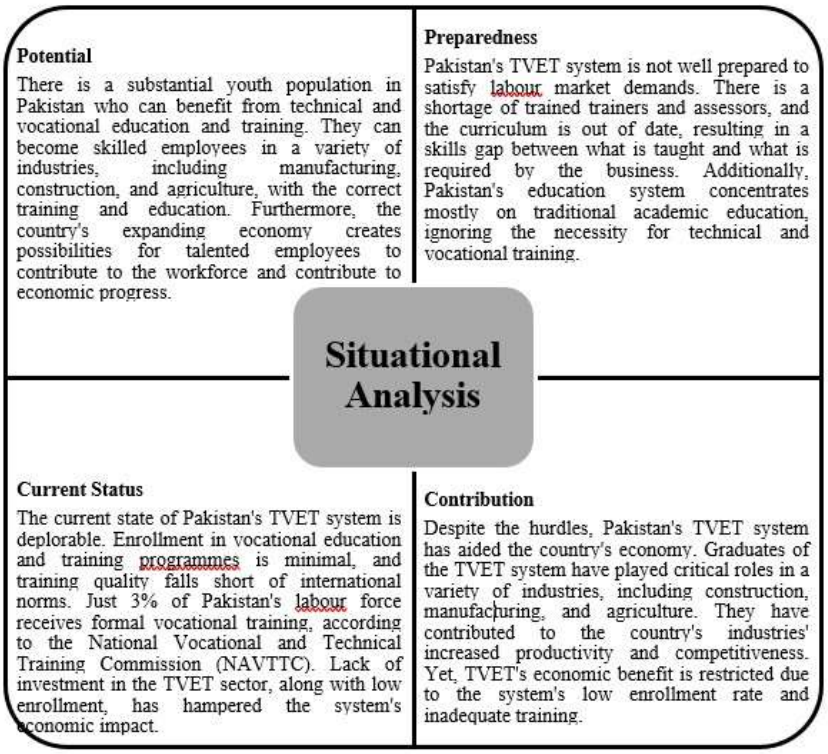
2020-21, the unemployment rate in the country is 37% (LFS 2020-21). It further suggests that the labor force in Pakistan is 71.76 million, of which 67.25 million are employed and 4.51 million are unemployed (GoP, 2022). This creates ample room for the TVET sector to bridge the gap in terms of productivity and competitiveness. However, data from the TVET sector shows that there are 4,259 TVET institutes available in the country for an estimated 2 million new entrants into the labor market, which is clearly insufficient to cater to the demand and may result in an increased rate of unemployment.

PROVINCE	TVET SECTOR UN EMPLOYMENT RATE (%)
Punjab	38
Sindh	18
Khyber Pakhtunkhwa	48
Baluchistan	16
AJK	51
ICT	18
GB	19
AVERAGE	37

Table 1.7 Unemployment in TVET Sector

SITUATIONAL ANALYSIS OF TVET IN PAKISTAN

The technical and vocational education and training (TVET) system in Pakistan has the potential to significantly contribute to the country's economic development. Unfortunately, its current preparedness and position are inadequate, and its contribution to the economy has been limited. To understand the existing dynamics of the technical and vocational training and education system in Pakistan, it is important to assess its potential, preparedness, current status, and contribution.



POLICY, LEGAL AND INSTITUTIONAL FRAME-WORK

Policy Framework	Legal Framework	Institutional Framework
Pakistan's National TVET Policy aims to create a demand-driven and quality-assured TVET System that meets the country's labor market needs. The policy outlines The importance of providing access to quality vocational education and training programs for all individuals, including marginalized communities, and emphasizes the need for Collaboration between Industry andtraining providers to ensure that Training programs are relevant to industry needs. NAVTTC has also introduced National Skills Strategy 2009-2013, National "Skills for All" Strategy 2019, and (TVET)Policy for Pakistan, 2018.	The TVET system in Pakistan operates under the National Vocational and Technical Training Commission (NAVTTC) Act, 2011, which provides for the establishment of NAVTTC and its role in regulating and coordinating The TVET sector. Additionally, each province in Pakistan has its own TVET Law and regulatory body Responsible for overseeing TVET programs within its jurisdiction. KP TEVTA, Act was Promulgated in 2015 and amended in 2018. TEVTA regulations 2015 and 2018 are also being implemented in KP and revised in 2021.	At the national level, the National Vocational and Technical Training Commission (NAVTTC) is the apex body responsible for the overall coordination and regulation of the TVET sector in Pakistan. NAVTTC is also Responsible for developing national occupational skills standards and assessing and certifying skilled workers. The Technical Education and Vocational Training Authority (TEVTA) in Khyber Pakhtunkhwa (KP), Azad Jammu and Kashmir Technical Education and Vocational Training Authority TEVTA, Muzaffarabad, TEVTA Punjab, Sindh Technical Education & Vocational Training Authority, BTEVTA: Baluchistan Technical Education & Vocational Training Authority and TVET Sector

TEVT in KP

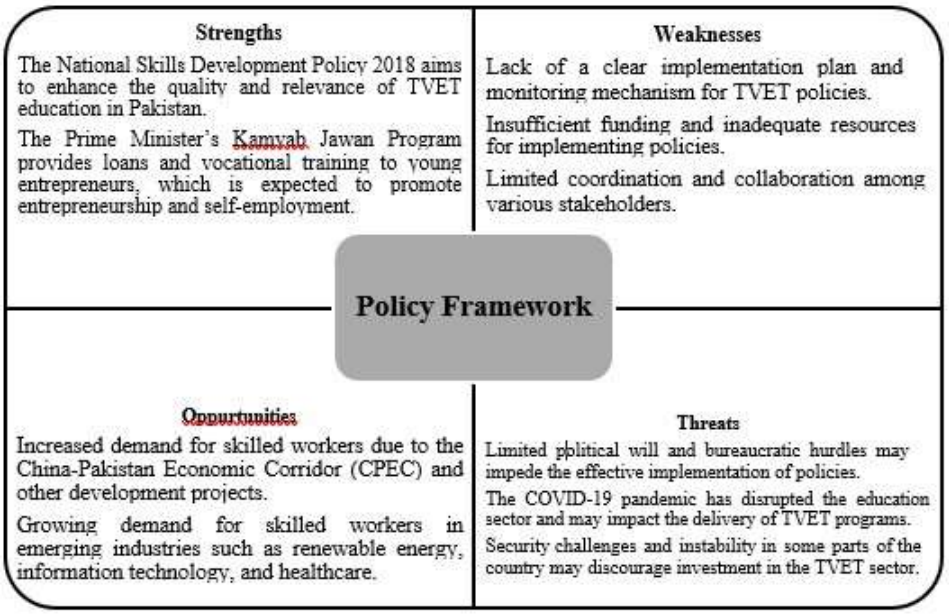
Previously, the Technical Education and Vocational Training (TEVT) sector had remained neglected, fragmented, and unevenly developed. Under the reform agenda, the PTI Government, recognizing the importance of the TEVT sector as a means to address a number of socio-economic challenges,

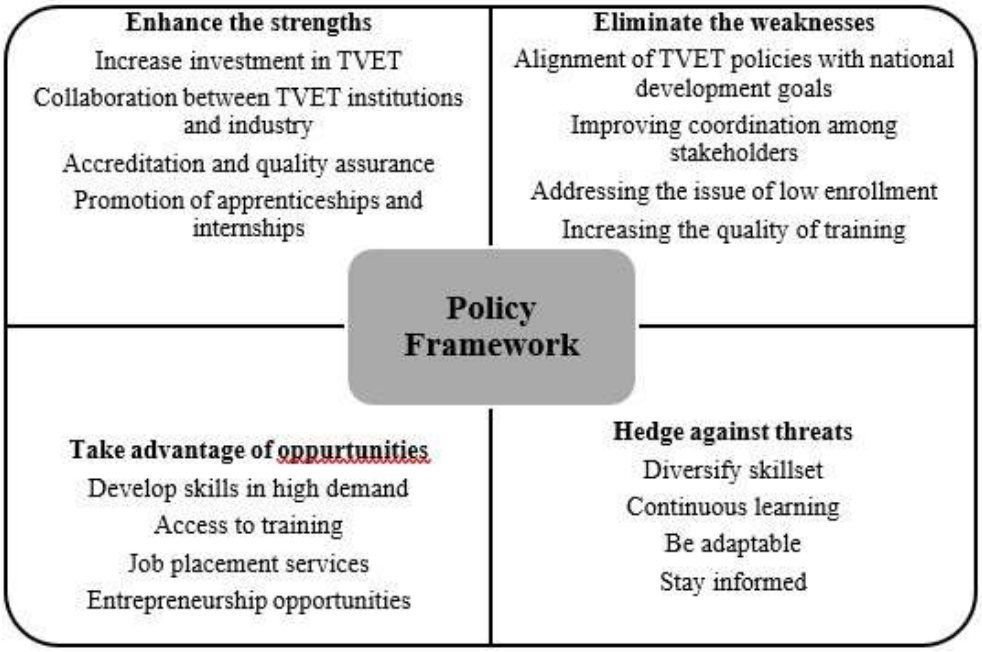
passed the Technical Education & Vocational Training Authority Ordinance 2014. This ordinance replaced the Technical Education and Vocational Training Agency Ordinance 2002 and elevated DTE&MT to an agency. Immediately after this ordinance, the Provincial Assembly passed the Khyber Pakhtunkhwa Technical Education & Vocational Authority Bill in February 2015, which was then notified in the official gazette in March 2015. Consequently, the agency was transformed into an authority, resulting in the formation of KP-TEVTA.

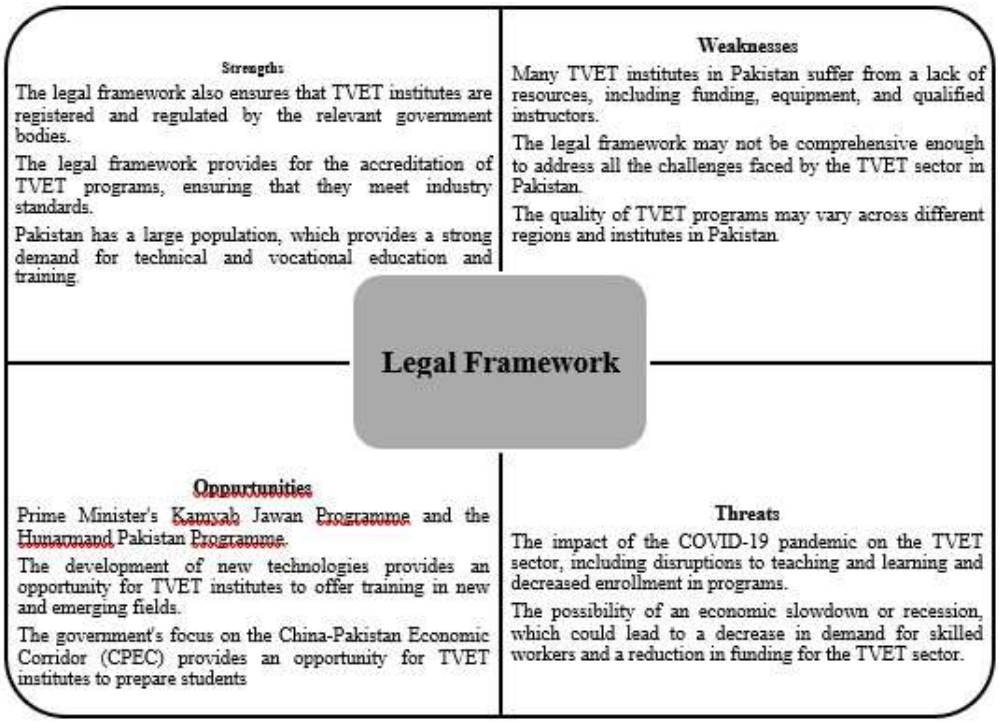
KP-TEVTA is an autonomous organization governed by its own laws and by-laws, in addition to certain other general or special laws. The first enactment introduced was the Khyber Pakhtunkhwa Technical Education and Vocational Training Authority Act, 2015 (KP Act No. XII of 2015). Similarly, KP-TEVTA Rules were framed by the Provincial Government in 2016. In exercise of the powers conferred by section 21 of the Act, KP-TEVTA framed its Regulations, eight in total, in December 2015. These regulations are currently undergoing various amendments. Additionally, the KP Delegation of Powers under the Financial Rules and the Power of Re-appropriation Rules 2015 has been approved by the Government. Furthermore, KP-TEVTA has its own Board of Directors, which holds full authority over strategic decisions, budget approval, financial matters, and other related issues concerning KP-TEVTA.

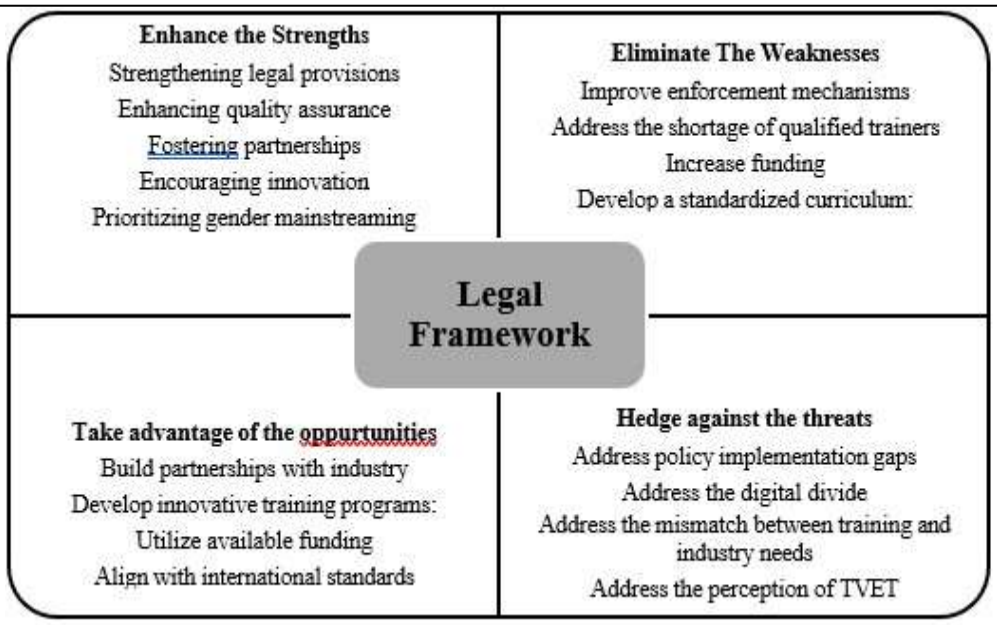
SWOT-EETH ANALYSIS

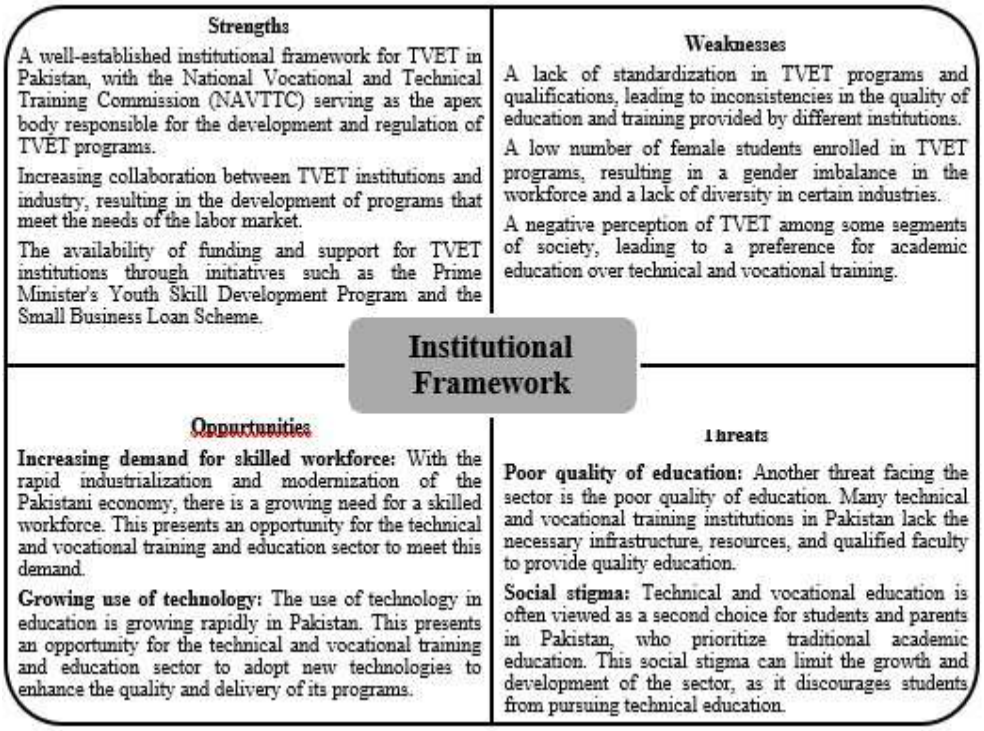
Based on results of perception survey SWOT-EETH analysis is drawn as below;

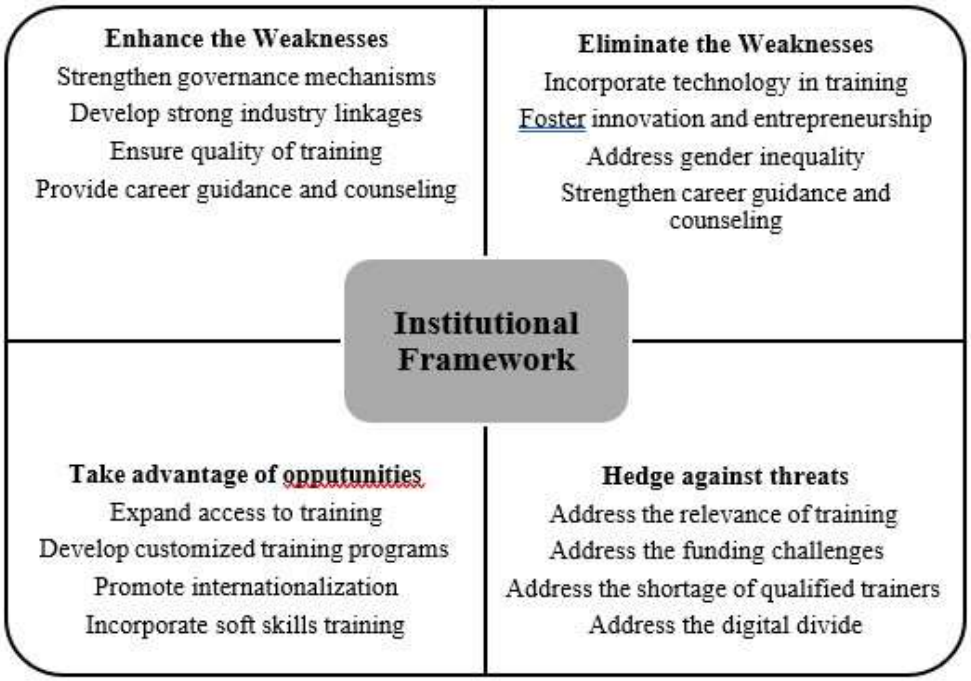



Enhance the strengths
Increase investment in TVET
Collaboration between TVET institutions and industry
Accreditation and quality assurance
Promotion of apprenticeships and internships
Eliminate the weaknesses
Alignment of TVET policies with national development goals
Improving coordination among stakeholders
Addressing the issue of low enrollment
Increasing the quality of training
Policy Framework
Take advantage of oppurtunities
Develop skills in high demand
Access to training
Job placement services
Entrepreneurship opportunities
Hedge against threats
Diversify skillset
Continuous learning
Be adaptable
Stay informed


Strengths
The legal framework also ensures that TVET institutes are registered and regulated by the relevant government bodies.
The legal framework provides for the accreditation of TVET programs, ensuring that they meet industry standards.
Pakistan has a large population, which provides a strong demand for technical and vocational education and training.
Weaknesses
Many TVET institutes in Pakistan suffer from a lack of resources, including funding, equipment, and qualified instructors.
The legal framework may not be comprehensive enough to address all the challenges faced by the TVET sector in Pakistan.
The quality of TVET programs may vary across different regions and institutes in Pakistan.
Legal Framework
Oppurtunities
Prime Minister's Kamyab Jawan Programme and the Hunarmand Pakistan Programme.
The development of new technologies provides an opportunity for TVET institutes to offer training in new and emerging fields.
The government's focus on the China-Pakistan Economic Corridor (CPEC) provides an opportunity for TVET institutes to prepare students
Threats
The impact of the COVID-19 pandemic on the TVET sector, including disruptions to teaching and learning and decreased enrollment in programs.
The possibility of an economic slowdown or recession, which could lead to a decrease in demand for skilled workers and a reduction in funding for the TVET sector.


Enhance the Strengths
Strengthening legal provisions
Enhancing quality assurance
Fostering partnerships
Encouraging innovation
Prioritizing gender mainstreaming
Eliminate The Weaknesses
Improve enforcement mechanisms
Address the shortage of qualified trainers
Increase funding
Develop a standardized curriculum:
Legal Framework
Take advantage of the oppurtunities
Build partnerships with industry
Develop innovative training programs:
Utilize available funding
Align with international standards
Hedge against the threats
Address policy implementation gaps
Address the digital divide
Address the mismatch between training and industry needs
Address the perception of TVET


Strengths
A well-established institutional framework for TVET in Pakistan, with the National Vocational and Technical Training Commission (NAVTTC) serving as the apex body responsible for the development and regulation of TVET programs.
Increasing collaboration between TVET institutions and industry, resulting in the development of programs that meet the needs of the labor market.
The availability of funding and support for TVET institutions through initiatives such as the Prime Minister's Youth Skill Development Program and the Small Business Loan Scheme.
Weaknesses
A lack of standardization in TVET programs and qualifications, leading to inconsistencies in the quality of education and training provided by different institutions.
A low number of female students enrolled in TVET programs, resulting in a gender imbalance in the workforce and a lack of diversity in certain industries.
A negative perception of TVET among some segments of society, leading to a preference for academic education over technical and vocational training.
Institutional Framework
Oppurtunities
Increasing demand for skilled workforce: With the rapid industrialization and modernization of the Pakistani economy, there is a growing need for a skilled workforce. This presents an opportunity for the technical and vocational training and education sector to meet this demand.
Growing use of technology: The use of technology in education is growing rapidly in Pakistan. This presents an opportunity for the technical and vocational training and education sector to adopt new technologies to enhance the quality and delivery of its programs.
Threats
Poor quality of education: Another threat facing the sector is the poor quality of education. Many technical and vocational training institutions in Pakistan lack the necessary infrastructure, resources, and qualified faculty to provide quality education.
Social stigma: Technical and vocational education is often viewed as a second choice for students and parents in Pakistan, who prioritize traditional academic education. This social stigma can limit the growth and development of the sector, as it discourages students from pursuing technical education.


Enhance the Weaknesses
Strengthen governance mechanisms
Develop strong industry linkages
Ensure quality of training
Provide career guidance and counseling
Eliminate the Weaknesses
Incorporate technology in training
Foster innovation and entrepreneurship
Address gender inequality
Strengthen career guidance and counseling
Institutional Framework
Take advantage of opputunities
Expand access to training
Develop customized training programs
Promote internationalization
Incorporate soft skills training
Hedge against threats
Address the relevance of training
Address the funding challenges
Address the shortage of qualified trainers
Address the digital divide

GAP ANALYIS OF TVET SECTOR IN PAKISTAN

Current State	Desired State	Gaps	Remedy
Infrastructure: Many of Pakistan's existin TVET facilities are out of date and lack access to modern equipment and technology. This may limit the quality of training delivered and affect graduates' employability. Curriculum and Teaching Materials The curriculaused at TVET institutes in Pakistan are out of date and do not represent current labour market needs. In addition, there is a lack of industry input in the formulation of TVET curricula in Pakistan. This	Infrastructure: Pakistan's TVET infrastructure should be modern, well-equipped, and open to all. This entails providing cutting-edge training equipment, tools, and technology, as well as enough space and facilities for practical training. Furthermore, developing TVET institutes in remote and rural areas of the country should be prioritized. Curriculum and Teaching Materials: TVET curricula should be tailored to fulfil the demands of industry and learners. It must be adaptable,	Infrastructure: Pakistan's current TVET infrastructure Curriculum: The TVET curriculum in Pakistan is frequently out of date and out of step with industry needs. The T curriculum places little focus	Infrastructure: The government should invest technology. This will necessit ate additional Curriculum: The TVET curriculum should be evaluated and modified on a regular basis to ensure that it meets the needs of
Reduces the	competency-based,	And innovation,	business. This can
relevance of	And sensitive to	Limiting TVET	Be accomplished by
curricula to labor-	changing industry	graduates' capacity	Forming industry-
market needs and	requirements.	to start new firms	led curriculum
the effectiveness of	Furthermore, to	and jobs.	development
TVET training.	encourage the	Partnerships with	committees,
Industry	formation of new	industry: There is a	including
Partnerships:	firms and job	low level of	entrepreneurshi p
In Pakistan,	possibilities, the	collaboration	and innovation into
coordination	curriculum should	Between TVET	the curriculum,

			and
between TVET	include	Institutes and	Emphasizing the
institutions and	entrepreneurship	industry in Pakistan,	development of
industry is limited.	and innovation.	Resulting in a	practical skills.
This can limit	Industry	Mismatch between	Partnerships with
students'	Partnerships:	the skills of TVET	industry: There has
opportunity to get	Cooperation	graduates and the	To be more
practical experience	between TVET	Labour market	collaboration
And lessen the	institutes and	needs. Employers	Between TVET
relevance of TVET	industry is critical	Frequently express	institutes and
Training to labor-	For ensuring that	dissatisfaction with	industry in Pakistan.
market needs.	training is aligned	TVET graduates'	This can be
Training and	with labour market	Lack of practical	accomplished by
Capacity Building:	needs. TVET	Training and soft	establishing
NAVTTC has	institutes should	skills.	industry advisory
implemented a	collaborate closely	Training and	boards to provide
variety of training	with companies to	capacity building:	recommendatio ns
programmes for	identify skill gaps,	TVET training in	on skill
TVET teachers and	provide training	Pakistan is	requirements,
trainers, including	programmes that fit	frequently of poor	Designing work-
Competency-Based	industry demands,	quality, with an	based learning
Training and	and offer chances	emphasis on theory	programmes, and
Assessment	for work-based	rather than actual	allowing industry to
(CBT&A) and the	learning.	Skill development.	Engage in TVET
Teachers' Training Program. The development of	Training and Capacity Building: TVET training	Many TVET instructors also lack the qualifications	Programme design and delivery.

the National Skills	should be of high	And training	Training and
Information System	quality and relevant	Required to give	capacity building:
(NSIS) to improve	to learners' and the	high-quality	TVET instructors
TVET programme	labour market's	instruction.	And employees
planning and	needs. Hands-on	Additionally,	Should have
coordination.	training, industry-	Opportunities for	opportunities for
Partnership with	relevant skill	professional	professional
international	development, and	Development and	development and
partners such as the	soft skills training	Capacity building	Capacity building to
German	are all part of this.	For TVET	improve their skills
International	Initiatives to	Instructors and	And knowledge.
Cooperation	develop the	Personnel are	This can be
Agency (GIZ) and	capacity of TVET	scarce.	accomplished by
the British Council	instructors and		establishing training
To give technical	personnel are also		programmes and
assistance and	necessary to ensure		workshops, offering
Capacity building	The quality of		access to worldwide
Support to the	training delivery.		training
TVET sector.			possibilities, and
			Building TVET
			instructor
			certification
			programmes.

COMPARATIVE ANALYSIS

Pakistan	**Institutional Framework:** The TVET sector in Pakistan is mainly administered by the National Vocational and Technical Training Commission (NAVTTC), with various other public and private institutions playing a significant role. **Accreditation and Quality Assurance:** The NAVTTC is responsible for the accreditation and quality assurance activities to ensure that the courses offered meet the required standards. **Funding:** The budget allocation for the TVET sector in Pakistan has increased significantly in recent years. In the 2021-22 federal budget, the government allocated PKR 8.7 billion for vocational education and training, which was an increase of 42% over the previous year's allocation. The government also encourages private investment in the sector through various schemes such as the Prime Minister's Kamyab Jawan Youth Entrepreneurship Scheme.[9]
China	**Institutional Framework:** The TVET sector in China is mainly administered by the Ministry of Education, with various other public and private institutions playing a significant role. the curriculum to ensure that students acquire hands-on experience. **Accreditation and Quality Assurance:** The Ministry of Education is responsible for the accreditation of TVET institutions in China. The ministry also carries out quality assurance activities to ensure that the courses offered meet the required standards. **Funding:** The budget allocation for the TVET sector in China has increased significantly in recent years. In 2021, the government allocated CNY 128.7 billion (approximately USD 20 billion) for vocational education and training, which was an increase of 18.5% over the previous year's allocation.[10] The government also encourages private investment in the sector through various schemes such as the "Internet Plus" Vocational Education program.
India	**Institutional Framework:** The TVET sector in India is mainly administered by the Ministry of Skill Development and Entrepreneurship (MSDE), with various other public and private institutions playing a significant role. **Accreditation and Quality Assurance:** The National Skill Development Corporation (NSDC) is responsible for the accreditation of TVET institutions in the country. The NSDC also carries out quality assurance activities to ensure that the courses offered meet the required standards. **Funding:** The budget allocation for the TVET sector in India has increased significantly in recent years. In the 2021-22 Union Budget, the allocation for the MSDE was Rs 3,000 crore, which was an increase of 24% over the previous year's allocation. The government also encourages private

[9] *Source:* https://navttc.gov.pk/wp-content/uploads/2022/06/National-Skills-for-All-Strategy-2018.pdf

[10] *Source:* https://unevoc.unesco.org/wtdb/worldtvetdatabase_chn_en.pdf

	investment in the sector through various schemes such as the Pradhan Mantri Kaushal Vikas Yojana (PMKVY).[11]
Bangladesh	**Institutional Framework:** The TVET sector in Bangladesh is mainly administered by the Directorate of Technical Education (DTE) under the Ministry of Education, with various other public and private institutions playing a significant role. **Accreditation and Quality Assurance:** The Bangladesh Technical Education Board (BTEB) is responsible for the accreditation of TVET institutions in the country. The board also carries out quality assurance activities to ensure that the courses offered meet the required standards. **Funding:** TVET in Bangladesh is mainly funded by the government, with additional support from international organizations such as the World Bank and the Asian Development Bank. Private institutions also contribute to the sector through their own funding.[12]

FAULT LINES IN TVET SECTOR IN PAKISTAN AND LESSONS TO BE LEARNT FROM TVET SECTOR IN PHILLIPINES

TEVT in KP

Previously, the Technical Education and Vocational Training (TEVT) sector remained neglected, fragmented, and unevenly developed. Under the reform agenda, the PTI Government, recognizing the importance of the TEVT sector as a means to address a number of socio-economic challenges, passed the Technical Education & Vocational Training Authority Ordinance 2014, which replaced the Technical Education and Vocational Training Agency Ordinance 2002 and elevated DTE&MT to an agency. Immediately after this ordinance, the Provincial Assembly passed the Khyber Pakhtunkhwa Technical Education & Vocational Authority Bill in February 2015, which was then notified in the official gazette in March 2015. Consequently, the agency was transformed into an authority, resulting in the formation of KP-TEVTA.

KP-TEVTA is an autonomous organization governed by its own laws and by-laws, in addition to certain other general or special laws. The first enactment introduced was the Khyber Pakhtunkhwa Technical Education and Vocational Training Authority Act, 2015 (KP Act No. XII of 2015). Similarly, KP-TEVTA Rules were framed by the Provincial Government in 2016. In exercise of the powers conferred by section 21 of the Act, KP-TEVTA framed its Regulations, eight in total, in December 2015. These regulations are currently undergoing various amendments. Additionally, the KP Delegation of Powers under the Financial Rules and the Power of Re-appropriation Rules 2015 has been approved by the Government.

[11] *Source: https://www.skillreporter.com/2023/02/announcements/union-budget-2023-highlights-education-skill- development/*

[12] *Situation Analysis of Bangladesh TVET Sector, 2019*

Furthermore, KP-TEVTA has its own Board of Directors, which holds full authority over strategic decisions, budget approval, financial matters, and other related issues concerning KP-TEVTA.

Republic of the Philippines is located in Southeast Asia, covers an area of 299.7 thousand kilometers, and has a population of 104.9 million. The Philippines is an emerging international market with a GDP of USD 394.086 billion (World Bank, 2021). According to a survey on the labor market in the Philippines, its service industry constitutes 57.5%, followed by agriculture at 23.1%, and industry at 19.4%. Since 2010, the Philippines has experienced robust economic growth of 6.6% per annum, coupled with the growth of the TVET sector, which has focused on reskilling, upskilling, and developing strong technical and soft skills to produce work-ready and globally competitive workers. In this chapter, a comparative analysis of the TVET sectors of Pakistan and the Philippines will be made to identify similarities and differences.

Governing Authority:

Both the Philippines and Pakistan have national-level governing authorities with regional offices in all regions of the country, primarily working to develop skills for employability.

The central authority for TVET in the Philippines is the Technical Education and Skills Development Authority (TESDA). It came into being in 1994 through the enactment of Republic Act No. 7796, with a mandate to formulate manpower and skill plans, set standards for skills and tests, monitor and coordinate policies related to human capital, and issue guidelines and directions to TVET institutes within the Philippines (www.Tesda.com). It is also responsible for encouraging active participation from different sectors, especially private enterprises, which are direct beneficiaries of a globally competitive skilled workforce. TESDA is governed by a board, which is the highest TVET policy-making body in the Philippines. The board consists of 13 members from the public and private sectors and is co-chaired by the Secretary of Labor and Employment and the Secretary of Trade and Industry. The Secretariat is headed by the Director-General, who acts as the implementation arm of TESDA.

In Pakistan, the National Vocational and Technical Education Commission (NAVTEC) was established in 2005 to regulate and manage the TVET sector. This apex body is mandated to promote, facilitate, regulate, approve curricula, build the capacity of trainers, and provide policy guidelines and directions to the TVET sector. It also has a 13-member board of governors as the main policy/decision-making body, with a Chairman appointed by the federal government, six members from the private sector, and six members from the public sector. The Secretariat is headed by the Executive Director, who also acts as the implementation arm.

Financing in TVET:

Pakistan's literacy rate is 63%, and it spends 1.77% of its GDP on education (GoP, 2022). The majority of the spending goes to the higher education sector, amounting to 109 billion out of the total allocated amount of 135 billion. The share of TVET varies around 1.5% of the total allocated education budget. NAVTEC receives its budget from the federal government. Other sources of funding include international donor agencies that provide support to the TVET sector in the country.

In the Philippines, the literacy rate is 99.27%, and it spent 3.9% of its GDP on education in 2020 (World Bank, 2022), of which around 1.5% is allocated to the TVET sector. Since 2019, a decline of almost 3% has been observed in the budget allocation for TESDA, but it manages its resources efficiently by offering scholarships for trainees, while the majority of training expenses are borne by the trainees themselves. In addition to government funding, major sources of finance for TESDA include international donor agencies and "company finance" from companies and industries that provide on-the-job training, accounting for 15.5% of total TVET spending (AFD, 2019).

Vocational Qualification Framework:

The National Vocational Qualification Framework (NVQF) provides a national system for classifying qualifications and outlining various progression pathways within the TVET system. It also offers guidelines for recognizing prior learning. In Pakistan, there is one pre-vocational level for people with little or no schooling but who possess skills that need to be credited for a qualification. The NVQF in Pakistan has eight levels, where levels 1 to 4 offer certificates, level 5 provides diplomas, and level 6 offers a B-Tech qualification. Levels 7 and 8 provide qualifications in the higher TVET system, such as Master's and PhD degrees.

In the Philippines, the "Ladderized Education Program Act of 2014" provides a ladderized interface between TVET and higher education. Universities in the Philippines offer TVET programs along with formal programs. All such programs are in a ladderized training mode, where TVET is integrated into a course with a bifurcation of course timelines between coursework and vocational and technical training. A test is also conducted by TESDA for national certification, and upon graduation, students receive a Bachelor's or Master's degree. The Philippine Qualifications Framework empowers students and workers to choose when to enter or exit the ladder, with job opportunities available at each level. Both systems in Pakistan and the Philippines are flexible and have clear guidelines on qualification progression and accreditation, enabling trainees/students to earn qualifications.

Increased Public Awareness:

Globally, the major challenge posed to the TVET sector is the lack of awareness and understanding of its real worth compared to formal and higher education. The perception that TVET is inferior to formal education is deeply rooted in both Pakistan and the Philippines. To address this, TESDA launched several initiatives to improve the public image and acceptance of TVET. Since this perception prevailed equally among all segments of society, including parents and close family members, TESDA carried out an intensive nationwide advocacy program called SMAP in 2009. This program aimed to present TVET as a viable education stream for socio-economic development (Moses, 2019). After that, similar programs became a constant part of TVET plans and strategies, playing a crucial role in improving the image of TVET as an educational pathway. Pro-TVET slogans were created, and awards were given to notable TVET players and partners to improve its image and ownership (Paryono, 2017).

In contrast, no such drive has been carried out by NAVTEC and the respective TEVTAs in Pakistan. Their major initiatives are announced in newspapers or on social media, primarily providing information about the concerned initiative and its expected outcome.

Role of Government in Establishing Linkages:

The government of the Philippines plays a central role in connecting its skill development policies to its National Economic Development plan, which helps reduce the supply and demand gap and promotes economic transformation, as evidenced by its robust growth rate since 2010. When the government of the Philippines designed and implemented its economic development plan, it aligned its technical and vocational strategies accordingly, with a special focus on ensuring a smooth supply of skilled workers to support the execution of the development plan. HRD and skill development are important vertical measures reflected in its industrial policy, emphasizing effective coordination with TESDA (Llanto, Ortiz & Kristina, 2015). Similarly, the National Technical Education and Skill Development Plan 2018-2022 is the latest strategy in the area, taking into account directives from the Philipzpines Development Plan 2017-2022, as well as industry and regional roadmaps to produce an expansive, public-oriented, and sector-based plan (TESDA, 2018).

In Pakistan, there is an obvious gap between the National Skills Strategy for All and industrial and development policies/plans in the country. No correlations have been drawn, leading to the inference that TVET policy-making is done in isolation. The latest strategy primarily focuses on international assessment areas such as governance/financing, access, quality, and relevance, suggesting action plans for these specific areas without linking them to any national development or industrial plans, which creates a gap and raises questions about NAVTEC's role as the central

TVET authority in the country for nation-building and economic development.

Resilience in TVET:

A comparison between the TVET sectors of the Philippines and Pakistan reveals that the Philippines has progressive and forward-looking TVET policies and strategies. The NTESDP 2018-2022 is indeed a timely document that not only responds to the challenges of preparing a work-ready and globally competitive Filipino workforce but also anticipates the impact of the Fourth Industrial Revolution and globalization on industries and jobs. Emerging industrial technologies, referred to as Industry 4.0, are changing the nature of work and the required skills in the industrial sector. Therefore, it is a significant challenge for developing countries that rely on industries for their economic growth and prosperity. Recently, in 2021, with the help of the Asian Development Bank (ADB), TESDA prepared policy recommendations as a comprehensive response to Industry 4.0. This includes improved coordination among the three education agencies in the Philippines, strengthening governance, enhancing enrollment in TVET priority sectors, intensifying linkages with industries, improving R&D, and collaborating with international partners and national stakeholders (Zhongming et al., 2021).

Agility, however, is not incorporated in policy formulation for the TVET sector in Pakistan. As discussed in earlier chapters, outdated and traditional skills are still prevalent in the courses offered in Pakistan's TVET sector. The National Skills Strategy for All 2018 does not address this issue. Although the National Skills Strategy represents a paradigm shift from conventional learning to practical learning, it does not incorporate guidelines for tackling the challenges arising from Industry 4.0.

Sustainable and Green TVET:

Another distinguished feature of the Philippines' TVET sector is its preparedness for future challenges such as climate change, with strategies in place to cater to the upcoming demand for green jobs in the green TVET sector. As part of its strategy, the Philippines is conducting capacity-building programs for its technical directors and assistant technical directors to help them understand the importance of green TVET for sustainable development.

Although Pakistan is a signatory to the Sustainable Development Goals (SDGs), ecology, climate change, and green technology for a sustainable TVET sector are major missing links in the policy arena. Pakistan is one of the top seven countries most affected by climate change, which necessitates diversification and improvement in green manpower within the country. The use of green technology in Pakistan is currently limited, and many TVET professionals lack a clear understanding of green technology (Rajput,

Akhtar & Akram, 2021). This creates a gap and highlights the need for incorporating these concepts into TVET policies and strategies.

ISSUES & CHALLENGES

1. The world of work is changing on a daily basis, and as a result, the world is witnessing the Fourth Industrial Revolution (IR 4.0), which has given new impetus to the education and training sectors. Unfortunately, Pakistan is lagging behind in synchronizing its TVET sector with the emerging needs of the Fourth Industrial Revolution (IR 4.0).
2. There has been a failure to implement Green TVET in Pakistan, resulting in a lack of opportunities for individuals to acquire the skills and knowledge needed for green jobs, such as renewable energy, energy efficiency, and sustainable agriculture.
3. Despite being part of the TVET policy, there have been issues of access and inclusivity in Pakistan, especially in terms of gender disparities. Women in Pakistan face severe challenges in obtaining technical education and training, limiting their job and economic empowerment options.
4. One of the most significant difficulties confronting Pakistan's TVET sector is a lack of finance. Because the government only devotes a small percentage of its budget to TVET, there is a scarcity of resources, equipment, and qualified instructors.
5. In Pakistan, the TVET curriculum is frequently obsolete and does not reflect current industrial needs. This makes it difficult for graduates to find work and adjust to a changing labor market.
6. TVET education in Pakistan is often of poor quality, with insufficient hands-on training and low levels of student participation. As a result, there is a misalignment between the skills gained by graduates and those required by industry.
7. There is a significant gap in policies and their alignment with economic, development, and industrial plans, an area which has been emphasized heavily by other countries with successful TVET models, such as the Philippines.
8. In Pakistan, there is a lack of market intelligence. TVET colleges frequently lack access to current information on industry demands and employment trends. This makes designing and delivering training programs that suit the needs of the job market difficult.

Conclusion

Being cognizant of the importance of TVET, most countries across the world seem keen and passionate about establishing a TVET ecosystem to ensure "lifelong skills" and "decent work opportunities" as envisioned in Sustainable Development Goals 4 and 8. In Pakistan, the TVET sector has primarily been a neglected area of the country, despite all the potential it holds to turn around the country's economic fate. The established National Vocational and Technical Commission formulated the first National Skills Strategy (2009-13), which marked a major shift from curriculum-based TVET to skills-based TVET. Although it did not fully achieve the benefits projected in this strategy, it remained successful in achieving significant milestones such as NVQF and CBT&A.

In 2019, Pakistan formulated its "National Skills for All Strategy," which provides an action plan in four major areas of governance: TVET Governance (financing), Access to TVET, Quality in TVET, and Relevance of TVET. A critical analysis of these areas shows that the TVET sector in the country is not a priority of the government, as only 1.5% of the education sector's budget is spent on TVET. The per-trainee spending on TVET in Pakistan is low when compared with other countries in the region. Planning is not done before opening a TVET institute, leading to saturation in areas with low demand for TVET, especially in regions with higher literacy rates and a greater inclination toward higher education. In terms of quality, teacher training is the weakest area, and despite having dedicated training institutes, training sessions are not conducted frequently. Teachers' qualifications are mostly engineering-related, with little to no knowledge of new skill sets such as digital literacy and e-commerce. The curriculum is outdated and has remained consistent for the last three decades. Although the rate of trainees is almost 70%, it is mostly concentrated in self-employment or entrepreneurship, which indicates that the TVET sector in Pakistan lacks established linkages with industries in the country and overseas markets for its skilled labor force.

Pakistan's TVET sector is clearly lagging behind in areas such as effective TVET awareness drives, the role of government in developing linkages between the TVET sector and central development plans and industries, reskilling and upskilling its workforce to mitigate the impacts of the Fourth Industrial Revolution, and incorporating green and sustainable TVET policies. This creates a gap in research and suggests the need for future studies to explore its possible causes and recommend policy actions to address these issues and incorporate them into Pakistan's TVET ecosystem.

Recommendations

From the research conducted above, the following recommendations are suggested in the policy domain for an efficient and sustainable TVET system.

Policy Recommendations

- Curriculum development in TVET should not be done in isolation. Closer collaboration among the business/industrial sector, academia, and TVET authorities can help better understand and incorporate the latest global trends and demands into the curriculum, and enhance ownership of the TVET sector by all stakeholders.
- NAVTEC should conduct regular demand and supply gap analyses, as well as an analysis of the latest trends in the job market, to support informed decision-making by the government and its Board of Governors.
- NAVTEC, in collaboration with relevant TEVTAs, must establish job centers in all industrial zones to link industry, job seekers, and NAVTEC/TEVTA.
- A policy shift from a "skills system approach" to "lifelong learning," as per the requirements of the Sustainable Development Goals, is recommended in the policy arena of TVET in Pakistan for a sustainable TVET sector.
- Local businesses/industries can help the government mitigate the impacts of the Fourth Industrial Revolution by designing response programs and upskilling their employees as part of their Corporate Social Responsibility (CSR).
- The government needs to commit to labor market outcomes instead of just the supply of training. This can be achieved by conducting skill mapping of individuals and regions to offer the right courses to the individuals and regions, and by devising soft loan plans in collaboration with the banking sector to ensure employability across all sectors.
- NAVTEC should initiate dedicated awareness programs to improve the image of TVET in the country.
- A National Skills Development Fund should be established to collect human resource development levies from certain sectors of the economy to enhance the pool of skills development.

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ANNEXURE I

Questions from NAVTEC, TEVTA (Provincial Government Personnel)

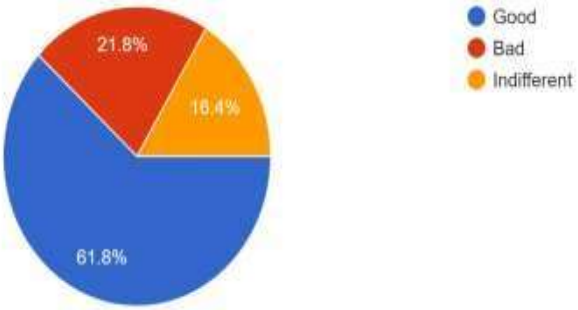
i. What are the main challenges facing the TVET sector in Pakistan?
ii. What are the strengths of TVET in Pakistan, and how can these be leveraged to improve the sector?
iii. How does the TVET curriculum in Pakistan compare to industry needs, and what improvements could be made?
iv. How does the TVET sector in Pakistan support gender equality and provide opportunities for women?
v. What role does technology play in the delivery of TVET in Pakistan, and how can it be improved?
vi. What measures are in place to ensure the quality of TVET in Pakistan, and how are they monitored?
vii. What are the employment opportunities for TVET graduates in Pakistan, and how can these be improved?
viii. How can the TVET sector in Pakistan better engage with industry, and what benefits can this bring to both parties?
ix. What policies and initiatives are in place to support the TVET sector in Pakistan, and how effective have they been?
x. What are the future opportunities and challenges for the TVET sector in Pakistan, and how can they be addressed?

ANNEXURE II

Perception Survey
results

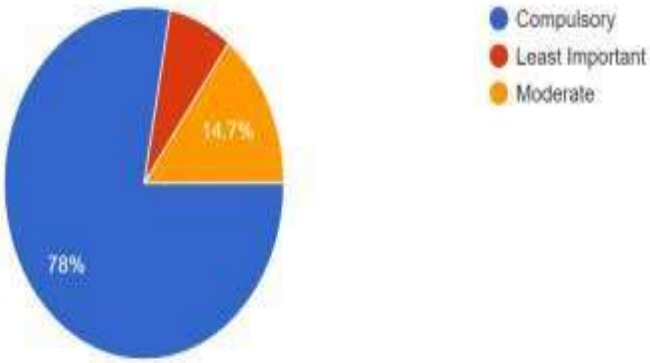
What is your current level of awareness about technical and vocational education and training (TVET) in Pakistan

110 responses



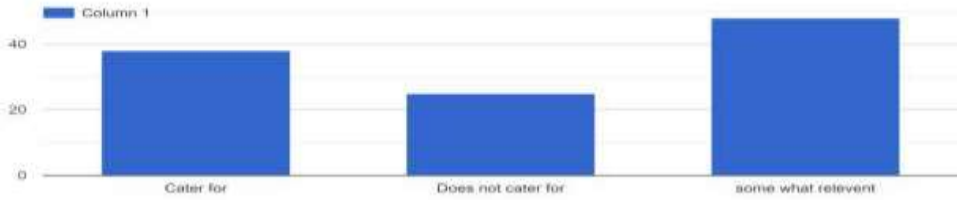
How important do you believe TVET is for the economic development of Pakistan?

109 responses

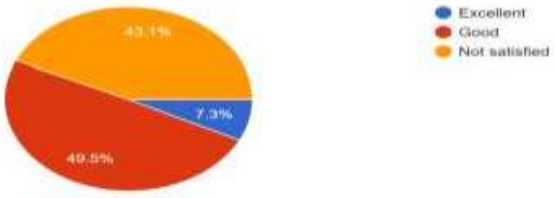


How effective do you believe the current TVET policies and practices are in preparing students for employment in the industry?
109 responses

How well do you believe the TVET system in Pakistan is aligned with the needs of the industry?



How satisfied are you with the quality of TVET programs currently available in Pakistan?
109 responses



How important do you think it is for TVET programs to incorporate entrepreneurship education and training?
109 responses

Critical evaluation of current policies and practices of SMEs and its impact on economy and women led enterprises in Pakistan

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Abstract:

The Government of Pakistan is actively promoting industrialization, innovation, and export growth to enhance economic development and job creation. Small and medium-sized enterprises (SMEs) play a pivotal role in this effort, contributing significantly to the country's economic growth. However, the SME sector faces several challenges, including weak data infrastructure, inefficient policy implementation, lack of coordination among stakeholders, and insufficient support for women entrepreneurs. Key recommendations include improving data infrastructure, enhancing single-window operations, and strengthening coordination between SMEDA, provincial governments, and TVETs. Additionally, incentives should be tied to formalization measures, and R&D needs to be promoted. SMEDA should also focus on increasing domestic market access through awareness programs and quality certification. Furthermore, measures to improve access to finance, such as tax incentives and low-interest loans, should be implemented. The promotion of business development through strategic proposals, particularly in import substitution, is also crucial for SME growth.

Key words:

Governance, climate change, Pakistan, resilience, adaptation.

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Introduction

The Government of Pakistan is undertaking a concerted effort to promote industrialization, innovation, enterprise development, and export growth in the country. This effort contributes to the government's target of creating jobs and catalyzing economic growth. Pakistan, with its large and growing population, natural resource reserves, geo-strategic location, and improving global connectivity, has the necessary elements to enhance its role as a regional hub for investment, manufacturing, and business.
The majority of manufacturing and business activity in Pakistan takes place in SMEs; therefore, growth in the SME sector contributes directly and substantially to overall economic growth. Facilitating rapid growth in the SME sector is consequently an important pillar of the government's economic development strategy.

Statement of the Problem

SMEs play a crucial role in national output and employment, with the sector contributing upwards of 80% to national GDP in developed economies. In Pakistan, however, this sector only contributes 40% to GDP, and growth in the sector has plateaued for quite some time. An in-depth analysis of the framework in which SMEs operate is required to identify the challenges and roadblocks preventing growth in this sector, so that workable policy recommendations can be devised to achieve the true potential of this sector.

Scope and Research Methodology

This study aims to review the legal and institutional framework governing the SME sector, as well as undertake a comparison of practices within the region to identify gaps and alternatives that could be adopted to facilitate the growth of the sector.

The study shall be limited to the SME sector under the Federal Government, with a particular focus on SMEDA and the SME Policy 2021. Provincial institutions and measures have been excluded, as the Federal Government remains the key driver in this regard. However, a brief overview of the situation in the province of Khyber Pakhtunkhwa shall be provided to highlight the relationship between the Federal Government and the provinces, as well as the challenges and opportunities that this interaction poses.
Primary data has been collected via interviews with senior management of certain key stakeholders, and secondary data has been gathered from official statistical reports and academic studies. The data has been subjected to descriptive analysis with the aid of a formal Gap and SWOT analysis.

Literature Review

SMEs are generally recognized as engines of economic development and can help countries decrease their reliance on international markets. In order to do so, SMEs must improve their marketing, service quality, HR management, operations management, and financial management (Othman, Mahmud, Mustafa, & Abujarad, 2022).

SMEs must also overcome certain crucial factors in order to survive. These include lack of financial resources, internal and external trade barriers, and entrepreneurial ideation and innovation. It is also imperative that they receive government support in the form of infrastructure support, R&D, and export promotion programs (Javed & Syed, 2013).

Innovation has also been identified as a crucial factor for success in the modern economy. Innovation refers to the adoption of new processes and technologies, as well as new products and strategies (Adam & Alarafi, 2021). Networking is another key factor in promoting SME growth. Interaction with financial institutions, government agencies, international organizations, and trade communities is of immense utility in growing businesses and finding new buyers and markets (Ojotu, Tersoo, & Kenneth, 2019).

SMEs have been observed to have a 90% failure rate at the initial stages in Pakistan, despite being mindful of the above factors. Pivoting towards high-value manufacturing and targeting diverse markets can help overcome this (Khan & Abasyn, 2017). One factor that is beyond their control in this regard is the macroeconomic environment, as it has been documented that macroeconomic conditions tend to throttle SMEs. However, adopting the right strategies can help avoid this. For example, high inflation has been linked to higher turnover growth and better export prospects (Ippinaiye, Dineen, & Lenihan, 2017).

Situational Analysis

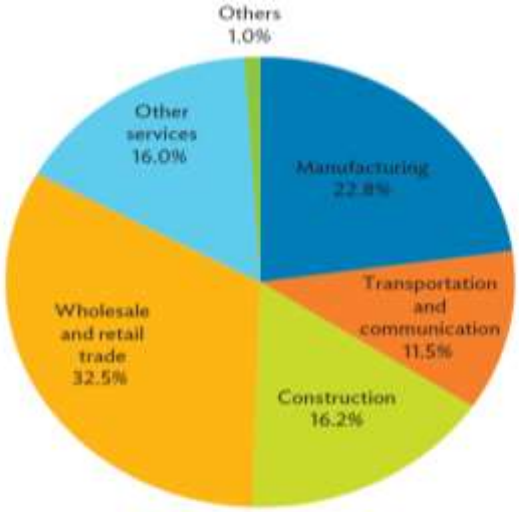
Current Economic Statistics

The SME sector is of great significance to the economic growth and overall development of the country. This section will summarize the current state of the SME sector in Pakistan through various statistics, with the aim of developing an understanding of the sector's health so that it is possible to better visualize the way forward and set meaningful targets. SMEDA defines small enterprises as firms with a turnover below PKR 150 million, medium enterprises as firms with a turnover of PKR 150 million and above, and startups as any SME that is less than 5 years old. However, this definition is not standardized, as various institutions such as the

Pakistan Bureau of Statistics, the FBR, the SECP, etc., utilize their own definitions in this regard.

Currently, the SME sector is estimated to consist of 5.2 million enterprises. These enterprises contribute 40% to the national GDP and account for 30% of exports excluding services, which reveals that the sector is largely serving the domestic market. However, some firms are trade-oriented or are part of the supply chain of larger export-oriented firms. The overall growth rate for the sector during the period 2010-2020 was calculated at 3.3% (ADB Institute, 2021). As per data accumulated by SMEDA, 53% of these enterprises operate in the wholesale and retail sector, 22% in community and personal services, and 20% in manufacturing (SMEDA, Annual Report 2021-22, 2022). Geographically, 65.2% of SMEs are situated in Punjab, 17.8% in Sindh, 14.2% in Khyber Pakhtunkhwa, 2.2% in Baluchistan, and 0.6% in the ICT region. The sector is also the second-largest employer in the country, employing 72% of the non-agricultural labor force. The sector-wise breakup is depicted below in Figure 1.1.

SMEs were the recipients of 5.2% of the total loans by value disbursed by the banking sector and constituted 3.5% of total borrowers. The Non-Performing Loan rate recorded by banks for SMEs stood at a staggering 16.9%. Overall, the lending rate has not seen any growth and has actually remained negative for many years during the last decade. The contribution of NBFIs in this regard is quite minor, contributing only 1.2% of the financial landscape, but the sector is in its nascent stages and is exhibiting healthy growth (ADB Institute, 2021).



FY = fiscal year; MSME = micro, small, and medium-sized enterprise.
Note: data based on non-agriculture informal economy (as MSMEs).
Source: ADB Asia SME Monitor 2021 database. Data from Labor Force Survey 2017-18.

Figure 1.1 Category wise employment in SMEs

Challenges in SME Growth

The National SME Policy 2021 identifies the key challenges faced in developing the SME sector in Pakistan. The main challenge pertains to financing. At present, the majority of enterprises operate at the micro and small levels due to their inability to meet capital requirements. Banks are hesitant to lend to SMEs as they are considered high-risk, are not documented in any way, and do not have credit ratings. SMEs also find it very difficult to meet the lengthy and complex requirements imposed by banks and, more importantly, are unable to put up collateral, which is a basic prerequisite imposed by all banks. At the same time, the level of government borrowing in Pakistan is very high, which crowds out private sector businesses, as government debt is more profitable and much more secure from the perspective of banks. There are also socio-religious factors at work, as there is a marked preference for Shariah-compliant financing through Shariah-compliant organizations. The alternatives to the banking sector are also in a fledgling state, as NBFIs and leasing options are just starting to develop in the country.

The second major problem pertains to skilled labor. There is a severe dearth of trained manpower in the country, which handicaps the performance of

businesses.

There are also problems with market access and internationalization. The domestic market is dominated by large firms and cheap imports, against which it is very difficult for SMEs to compete. There is also a general perception of local products being inferior, which significantly dampens sales. In the case of exports, the major problems are weak knowledge of export and trade procedures, the absence of quality certifications, and the inability to meet foreign environmental, social, and quality requirements. The cost of legal and tax compliance for SMEs is also quite high, as there are numerous independent organizations with which a business must interface, and most owners lack the knowledge and skills to handle these themselves. Another aspect of this issue is that the overwhelming majority of SMEs operate in the informal sector and are not registered with SMEDA or other government bodies. Apart from the obvious repercussions this has on access to finance and taxation, this severely handicaps the policy process, as governments have very little data on which to rely during policy formulation and evaluation.

The general business management and operational skills of owners are also low, with most being unaware of the tools and methods that can aid in production, marketing, sales, and compliance management. The level of technological adoption and innovation is very low, which restricts business development.

Challenges to Women-Led Enterprises

Apart from the challenges common to all business enterprises, women-led SMEs face an additional set of challenges as well (SMEDA, Sector Report Women Entrepreneurship in Balochistan, 2019). The main challenge pertains to financing, as women generally do not possess assets and are disadvantageously treated in inheritance matters, preventing them from putting up collateral to seek loans.

Secondly, socio-cultural factors discourage the participation of women in employment and business activities, and there is a lot of resistance faced by women in this regard from their own homes and society in general. Women also have reduced mobility compared to men, which reduces their operational efficiency.

Thirdly, due to historical circumstances, women in Pakistan are less educated and skilled, which prevents them from integrating into the economic sphere and competing with other entities.

Domestic Institutional & Policy Framework

SMEDA

SMEDA is an autonomous body established under the SMEDA Ordinance 2002 as the premier institution for the promotion and development of SMEs. It has 4 regional offices in the provincial capitals and 21 Regional Business Centers through which it performs its functions.

Its main functional areas are policy formulation, legal facilitation, sector and cluster development, and business development and support services.

Achievements during FY 2021-22

The bulk of SMEDA's operations consist of business support and development activities. As per their annual report for the year, their achievements were as follows (SMEDA, Annual Report 2021-22, 2022):

1. Facilitating 4,555 SME owners via walk-ins, email, and phone calls.
2. Increasing the total number of pre-feasibility studies of various business opportunities to 137.
3. Developing an additional 14 business plans.
4. Facilitating investment worth PKR 811 million.
5. Conducting 229 training activities targeting 600 participants on various aspects of entrepreneurship and business management.
6. Receiving 389 applications through their online SMEDA One Window portal and issuing 341 Letters of Intent.
7. Reservation of 19,500 plots in various industrial estates and economic zones for the exclusive use of SMEs.

Initiatives

SMEDA has adopted a component-based approach to SME development, whereby it has identified key target areas requiring intervention and then proceeds to take measures to address the challenges posed in these areas in parallel to each other. These main strategic areas are regulatory simplification, ease of doing business, data availability, entrepreneurship development, financial access, gender inclusion, and HRD.
In the regulatory area, with a means to increase the ease of doing business, SMEDA compiled 170 regulatory change proposals regarding various procedures, of which 118 have been implemented. It has also successfully achieved the simplification of the tax regime for SMEs via the Finance Act 2021, which was one of its major goals set in the SME Policy 2021. SMEDA is also part of the Economic Revitalization of KP Project as a contributor to its multi-donor fund, through which it has disbursed PKR 361.4 million to 567 SMEs for the purpose of upgrading facilities and

capacities.

In the field of data compilation, SMEDA has launched the Research, Regulatory Insight, and Advocacy Assistance project. This project is of utmost importance, as at present there is almost a complete absence of data on the SME sector, with current figures being projections based on data collected in 2005 and 2015 by the Pakistan Bureau of Statistics. This project aims to develop data gathering capabilities in order to generate reliable statistical measures of activity in the sector.

SMEDA has also established an online single-window portal to provide a single point of access for all Government-SME interactions to business owners. The system, however, is not automated or comprehensive and relies on linking applicants to shortlisted consultants, who then proceed to handle their issues ranging from registration with SECP or the Registrar of Firms, tax matters, licensing, etc.

In order to promote entrepreneurship and startups, SMEDA has partnered with the HEC and 5 universities to launch a National Idea Lab, which aims to serve as a central coordinator and facilitator between incubator labs set up at these universities.

SMEDA has also taken measures to facilitate the participation of women in the SME sector. In this regard, it sponsors the participation of women entrepreneurs in various trade exhibitions. In FY 2021-22, it sponsored 52 participants in the WEXNET exhibition organized by the Ministry of Commerce, and 30 participants in the National Blue Fair in Multan. It has also arranged online e-commerce training specifically for women entrepreneurs and pushed through a 25% tax concession from the FBR for women-led enterprises.

State Bank of Pakistan

The State Bank of Pakistan is a major stakeholder, as the number one challenge in the SME sector is access to financing, an area that is under the direct regulatory control of the central bank. Financial inclusion programs, digital channels and gateways, and other financial infrastructure are just some of the areas that the central bank intervenes in to facilitate and strengthen the SME sector.

The challenges in lending have already been highlighted above. A major reason behind the reluctance of banks is the high NPL ratio. The reasons behind this are economic uncertainty, fragile consumer demand, and difficulty in assessing creditworthiness. At the same time, consumers also avoid turning towards banks due to socio-religious factors, as there is a marked preference for Shariah-compliant institutions and products. There is also low trust in the banking sector, and little diversity and returns in

banking products, due to which most people prefer to hold cash outside of banks or invest in safe options like savings certificates and real estate. It is estimated that only 16% of adults in Pakistan hold bank accounts (ADB Institute, 2021). An interview (Annex-A) with an ex-senior manager of the SME Bank and corporate financial consultant revealed that the environment of corporate banks is also not very SME-owner-friendly, as most of these individuals are from less-educated backgrounds and are uncomfortable in formal branch environments. This was one of the advantages of the SME bank, which was established specifically to cater to this segment. However, the institution has remained in loss since inception and is now almost redundant.

The SBP has taken many steps to rectify these problems. It has resorted to digitalization as the key driver toward financial inclusion by launching projects such as the RAAST payment gateway, Roshan Digital Accounts, and liberalizing the regulatory regime to allow digital microfinance banks. It launched numerous lending schemes targeted toward SMEs. The SME Asaan Finance Scheme offers short-term export financing at 3% and long-term capital financing at 6%. Banks have also been given the target of increasing SME borrowers to 700,000 via the NFIS 2015, but no rules or directives have been issued in this regard yet. It has also created the Pakistan Credit Guarantee Company as a workaround to the requirement of collateral for loans, but the company is yet to commence public operations. It has also launched refinance schemes for the purpose of modernization of businesses, arranging working capital, and providing credit guarantees for small firms. The total users of these initiatives to date are only 185. Interviews with the regional managers of three banks who were overseeing the Peshawar region, however, revealed that the utilization of these facilities was very low and that the requirements and formalities were not easily fulfilled by clients (Annex-B).

Other Federal Institutions

There is a long list of players in the SME sector in Pakistan. Seeing how SMEDA and the SBP are the primary drivers of all initiatives in this regard, the main focus of this paper shall remain on them. Other relevant institutions shall be briefly deliberated upon below.

The SECP is responsible for regulating affairs related to companies and is authorized to register corporations. It also regulates the securities and equities markets, which has special significance when it comes to arranging non-banking finance for SMEs. The SECP has established the Growth Enterprise Market (GEM), a sub-listing of the PSX with easier listing requirements, as a platform for SMEs to obtain market-based financing from pre-approved investors. The exchange has zero listings at the moment, as SME owners do not wish to dilute ownership, are put off by high

compliance costs, have poor accounting practices, and have a very limited understanding of the capital market.

TVETs such as NAVTTC also have a very important role to play, as one of the major challenges in the SME sector is a shortage of skilled labor. NAVTTC and other TVETs are at the forefront of diversifying and raising the standards of the labor pool by imparting training, certifications, and accreditations in a wide variety of skills.

The Ministry of Commerce is also an important stakeholder, as it is responsible for export development and trade policies. Apart from policy and trade regime formulation, the Ministry facilitates trade through TDAP, an autonomous body tasked with promoting Pakistani businesses and products via exhibitions and networking. Ms. Shumaila Sikandar, Deputy Director (Expos), TDAP Karachi, in an interview pointed out that the organization also works toward women empowerment as a matter of policy by reserving a 10% quota for women entrepreneurs in all exhibitions and delegations, and by subsidizing their participation up to 80% in WEXNET, Pakistan's largest women-only trade expo (Annex-C).

Networking opportunities are provided by numerous business chambers registered across the country. Currently, there are 58 chambers of commerce and 16 women chambers providing business connectivity and trade-related services to all kinds of businesses. It is estimated that 40% of SMEs are registered with these bodies (ADB Institute, 2021).

Policies

The primary policies of the government for the SME sector are the SME Policy 2021 and the SME Action Plan 2020. The goals set under the policy are to increase the economic contribution of SMEs, make SMEs more competitive and productive, enhance formalization and increase the number of SMEs, and improve networking. The key policy recommendations are to create a single national definition of SMEs, simplify the regulatory and tax environment, improve access to finance, enhance human resource skills and technology utilization, build infrastructure, facilitate entrepreneurship and incubation, promote women entrepreneurship, and provide business development services. The policy also recommends improving market access by integrating SMEs into public procurement. This has the benefit of improving formalization, resolving finance issues, and promoting business growth. The policy also constituted the National Coordination Committee to bring all key players onto the same page, including the provincial governments.

Provincial Institutions in Khyber Pakhtunkhwa

The 18th amendment granted greater freedom and independence to provinces in managing their industrial policies and economies. It was partially in this context that the SME Policy 2021 was made. At present, KPK does not have a holistic SME policy or institutional framework and is currently operating through multiple organizations. This situation is representative of the other provinces as well. The main institutions working in this regard in the province are the SIDB, BoI, KPEZDMC, and KPTEVTA. These institutions operate independently with little coordination among them, as evidenced by the fact that three of these organizations work on establishing special industrial zones in parallel, often within the same city. Their focus is on business infrastructure, business development services, and training. Apart from their independent operations within the province, there is also little coordination with the federal government. Though the NCC has been established under the SME Policy 2021, the constitution of the committee is such that it prevents it from doing any meaningful business.

International Comparison

Bangladesh

The Bangladesh SME Policy 2019 defines SMEs based on the number of employees (up to 100) and net assets under 2.0 million USD (Ministry of Industries Bangladesh, 2019). This definition is standard across organizations.

Bangladesh reports the existence of 7.8 million SMEs, contributing 25% to GDP and accounting for 86% of employment, 16% of which is female. The sector primarily caters to domestic markets, with 87.4% of production sold locally, which is indicative of strong local supply chains. 71.5% of enterprises are scattered in rural areas, which explains the sectoral distribution: 87.5% are cottage enterprises, 1.33% are micro, 10.99% are small, and 0.09% are medium (ADB Institute, 2021).

Bangladesh has managed healthy SME growth by focusing on financing needs. The central bank has set mandatory loan quotas for SMEs, broken up by category, with 15% reserved for women without the requirement of collateral. Loans to SMEs account for 20.2% of the total portfolio and are growing by 13% year on year. They also have credit refinancing and guarantee institutions that facilitate refinancing and lending without needing to put up collateral. They also have a newly emerging NBFI segment exhibiting healthy growth and accounting for 5.9% of the financial space. Bangladesh has also managed to tap into equity markets and has two fully functioning, dedicated SME funding equity markets.

Their current focus is on continued financial access, internationalization, and education and training. Their policy aims at improving the business environment, simplifying procedures, improving coordination between stakeholder institutions, and developing internet and road infrastructure. The government is using ICT interventions in all these areas, as well as promoting the same in the internal operations of SMEs.

India

The definition of MSMEs in India is laid down by law and categorized based on the value of investment and turnover. India has over 63 million MSMEs employing 110 million people. 20.3% of these firms are women-owned. MSMEs are growing at the rate of 18% and are sectorally spread as follows: 36.3% in trade, 32.6% in services, and 31% in manufacturing. These firms contribute 30% to GDP and 48% to exports. 51% operate out of rural areas. The sector is managed by the MSME Ministry, which has a permanent separate board to evaluate policies and make recommendations. It also has a dedicated data-gathering wing. The ministry has an app and online portal through which all related services can be accessed.

The ministry runs many programs aimed at improving overall growth as well as the individual scaling up of firms. They have signed numerous international cooperation agreements and have a dedicated program for women's empowerment, from which 259,000 women-led firms have benefitted from 2015 to 2020. They have also reserved a 25% quota for MSMEs in public procurement, including 3% for women, via a centralized online procurement app. They have also set up a Champions Portal to help successful firms scale up their operations and grow into larger firms. The Indian government also offers production incentives by allowing 4-6% tax concessions based on an incremental increase in production over 5 years. They also offer credit-linked subsidies for technological upgradation. They promote research and better practices by establishing common facility centers that provide communal production, processing, designing, and R&D services. They are also pushing the concept of One District One Product to ensure growth across the country and reduce intra-firm competition. MSMEs in India account for 17.6% of all loans disbursed, with an NPL of 7%. MSMEs in India have access to developed equity markets, a credit guarantee fund, and credit rating companies. Furthermore, loans are provided at subsidized rates without collateral, with mandatory targets set by the central bank.

Interestingly, the overwhelming majority of these initiatives have been linked to registration with their official portal, which has greatly enhanced the formalization of enterprises.

Malaysia

The definition of SMEs in Malaysia is based on turnover or number of employees. There are 1.2 million enterprises comprising 97.4% of all firms. 83.8% of these operate in the service sector, 8% in manufacturing, 5.8% in manufacturing, and 1.9% in agriculture. These firms contribute 37.4% to GDP and 11.7% to exports, indicating strong domestic consumption. They employ 47.8% of the labor force, which seems low based on the 97% share in companies but seems reasonable when considering that the majority of the firms are in services, where labor requirements are lower. The SME Corporation of Malaysia is the main policy driver and has formulated a business strategy plan for 2022-2030 to facilitate growth. The focus is on entrepreneurship and scaling up. The corporation conducts competitiveness ratings, as well as awards the National Mark of Malaysian Brand to overcome negative perceptions of domestic products. It runs the PRESTIGE program to support and guide medium enterprises with the potential to upscale their operations and grow larger. It has also launched an e-National Single Window with a comprehensive array of services pertaining to SMEs.

The Malaysian central bank has also mandatorily announced the provision of Shariah-compliant loans at a 2% profit per annum, which have been linked to SME registration. Bangladesh also has 10 equity crowdfunding operators.

Turkey

The definition of SMEs in Turkey is based on the number of employees and net turnover. The sector comprises 3.5 million enterprises, of which 8.8% are women-owned. 36.5% of these are in the wholesale sector, 14.9% in transport and storage, and 12.3% in manufacturing. These enterprises contribute 30.4% to exports, with the bulk coming from the manufacturing segment. 78% of total employment in Turkey is in the SME sector. Turkey has a strong focus on R&D, with the SME sector accounting for 27.1% of all R&D expenditure in the economy. SMEs are also the owners of 513 patents (GoT, 2023).

Gap and SWOT Analysis

Gap Analysis

Based on the material reviewed in sections II and III above, certain gaps in the framework and approach to development of the SME sector are apparent. The main gaps categorized by strategic policy focus areas are presented subsequently.

Institutional and Regulatory Level

a. Absence of a single cross institutional definition of MSMEs.

b. Absence of data sourcing and provision infrastructure.

c. Minimal coordination and collaboration amongst stakeholder institutions and Governments.

d. Minimal digitization and automation of the Government/SME interface.

e. Weak integration in domestic supply chains.

f. Absence of strategic goals based approach to business development services, feasibilities and business plans prepared randomly.

g. No incentives offered for formalization and adopting growth-oriented practices.

h. Incentives offered in isolation, not as a package nor are these offered in a way where Government can achieve its own strategic goals as well.

Financial Inclusion Gaps

a. Absence of mandatory lending targets and enforcement mechanisms.

b. No solution for problem of collateral, no credit guarantee system available.

c. No credit rating mechanism to aid banks in better assessing risks.

d. Absence of special quotas for women entrepreneurs.

e. Lack of accommodation of societal values, non-mainstreaming of Shariah compliant institutions and products.

f. Low level of awareness in the banking sector on how to handle and facilitate SME sector clients.

g. Absence of alternative financing options. No leasing or factoring services available.

h. Extremely low literacy of equity markets.

Market Access

a. No local brand awareness and domestic product promotion strategy.

b. No quality certifying mechanism to build trust.

c. No preferential access to public procurement, nor ease of access through digitization.

d. No District/Regional level strategy on the lines of "One village one product".

e. No dedicated institution for cottage industries to mainstream rural areas.

Capacity Building

a. Insufficient managerial skills of business owners coupled with a dearth of knowledge/awareness of management/operational best practices.

b. Lack of awareness of buyer requirements, and certification options that build trust,

c. Low adoption of technological tools in management operations.

d. No incentives to improve efficiency and competitiveness.

Women Entrepreneur Facilitation

a. No dedicated quotas in lending policies.

b. No special access to public procurement and domestic markets.

c. No tax and customs concessions to overcome structural imbalances.

SWOT Analysis

A SWOT analysis of the various individual policy measures undertaken by the countries under comparison was conducted. These findings are summarized in the following sub-sections.

Pakistan

Strengths	Weaknesses
• Existence of SMEDA as a central policy mover, dynamic and well resourced • Strong digital financial infrastructure • Strong TVET network across the country, diverse and voluminous training activities	• Poor integration into public procurement • Failure of SBP to increase access to financing • Failure of SMEDA to automate processes and reduce human interaction • Failure to focus on development

• Strong ICT development institutions now exist in public sector • Effective and continued efforts in regulatory simplification • Establishment of online portal	of SME internal management practices • Failure in tying incentives to strategic policy requirements • Failure to strengthen financial infrastructure • Weak measures to facilitate women in domestic markets
Opportunities	**Threats**
• Chinese BRI and CPEC • Transit trade • Diverse agricultural produce, with close access to high demand Gulf countries • Recent overtures towards Russia offering access to Russian markets • Look Africa Policy	• International isolation • Political instability • Fallout from international power politics • Dependence on foreign technological equipment and developments

Bangladesh

Strengths	**Weaknesses**
• Strong rural integration • Support to cottage industry • Strong domestic market access • Financial inclusivity, quotas for women • Mandatory lending targets • Credit guarantee and refinancing options • Strong equity market • Coordinated approach by stakeholder institutions	• Low participation in exports • Insufficient connectivity and logistics facilities • Low presence of manufacturing enterprises
Opportunities	**Threats**
• Strong international export ties	• Dependence on imported raw materials and equipment in manufacturing

Malaysia

Strengths	**Weaknesses**
• Local brand awareness and promotion • Competitiveness ratings and awards • PRESTIGE program for upscaling	• Weak manufacturing sector • Low export growth orientation • High compliance costs

• E-National Single Window with comprehensive range of services • Single national level organization as policy setter and coordinator • Shariah based financial inclusion model • Equity crowd funding	
Opportunities	**Threats**
• Global halal certification award	• Dependence on imported raw materials in manufacturing growth

Turkey

Strengths	**Weaknesses**
• Strong manufacturing exports • High levels of R&D and innovation	• Weak presence of services and manufacturing in overall SME sector
Opportunities	**Threats**
• Access to European and African markets	• International restrictions due to international politics

Conclusions and Recommendations

Key Findings

a. The data infrastructure in the SME sector is extremely weak and greatly hampers growth as well as policy formulation and evaluation.

b. Pakistan needs to improve its one-window operations.

c. Policy implementation controls need to be strengthened.

d. Coordination between stakeholders needs to be improved, rather than working in silos.

e. Incentives need to be tied to formalization measures.

f. Women entrepreneurs need additional facilitation measures.

g. R&D needs to be promoted.

h. Management practices of SME owners need special attention.

i. Domestic access needs to be improved.

Recommendations

1. SMEDA needs to sign formal MoUs with provincial governments to define roles so that they can work in a coordinated fashion. The NCC established for this purpose is too elaborate and needs to be done away with.

2. Similar MoUs need to be signed with all TVETs so that SMEDA can get programs tailored to the needs they observe in the market.

3. Single-window operations need to be improved, made comprehensive, and automated. It should be fully integrated with all departments SMEs need to interact with, and all operations should run through the app. Incentives can be tied to registration on the platform to enhance formalization and registration.

4. SMEDA needs to prioritize data infrastructure development. The RRIAA Project needs to be fast-tracked.

5. SMEDA should start a "Made in Pakistan" awareness program to improve domestic market access. This initiative should be tied to a quality certification program.

6. SMEDA should devise an upscaling project on the lines of the Champions and PRESTIGE programs highlighted above.

7. Standardized software tools for finance, HR, supplies, accounting, and order management should be developed by SMEDA and offered for free to SMEs upon registration through the portal. Incentives can be tied to continued use of these software tools.
8. In coordination with the FBR, tax concessions for production growth, in-house R&D capacity building, and women entrepreneurs should be provided as incentives.
9. PPRA should mandate quotas for SMEs and women SMEs in public procurement and adopt an online e-procurement system.
10. SBP should bring the Pakistan Credit Guarantee Company into immediate operation to resolve the challenge posed by collateral requirements.
11. SMEs should be incentivized to register with credit rating services by linking subsidized, collateral-free loans to registering with a credit rating authority.
12. SBP should set mandatory low-interest SME loan targets for banks, with built-in penalties for non-compliance.
13. Business development through feasibility studies and business proposals by SMEs should be strategically done. An import substitution approach may be adopted, whereby imported items are studied, and their potential for profitable local production is used as a criterion for whether to develop a feasibility or business proposal for the product.

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A Critical Analysis of Implementation of Economic & Industrial Development Strategies in Pakistan

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Abstract:

This study examines the environmental challenges faced by Pakistan, focusing on pollution caused by industries such as textiles and tanneries. Despite having laws like the Pakistan Environmental Protection Act (PEPA), enforcement remains weak due to factors such as limited resources and insufficient governmental will. The industrial sector, particularly in textiles, is a major contributor to air and water pollution, significantly impacting the environment and human health. Public perception surveys reveal widespread dissatisfaction with government efforts and a lack of awareness about environmental regulations. The paper proposes short-term and long-term recommendations to address these issues, including raising public awareness, promoting renewable energy, incentivizing cleaner production practices, and enhancing industrial compliance through stricter enforcement. The establishment of Environmental Tribunals across provinces and better coordination among stakeholders is also essential for effective environmental governance in Pakistan.

Key words:

Environmental Pollution, Industrial, Environmental Laws, Public Awareness, Renewable Energy

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Introduction

In reaction to rising pollution, most developed states have been successful in endorsing environmental laws. However, developing countries like Pakistan face challenges in enacting environmental regulations, which can be attributed to, among other factors, limited capacity, lack of resources, and lack of willingness by authorities. Despite having environmental protection legislation, such as the Pakistan Environmental Protection Act (PEPA, 1997) and, post-devolution, the Punjab Environmental Protection Act (PEPA, 2012), pollution levels related to air and water remain major problems, predominantly in industrial areas.

According to the World Bank, Pakistan's industrial sector is responsible for approximately 22% of the country's total greenhouse gas emissions, making it a significant contributor to climate change (World Bank, 2020). In Pakistan, the textile industry is characterized by high levels of air and water pollution and solid waste (Sial, 2018). The rise of tanneries in Pakistan has caused severe environmental degradation, as untreated tannery wastewater is released into nearby water bodies.

Industrialists consider environmental protection an unavoidable business compulsion imposed by foreign buyers and willfully neglect to maintain the standards of their products utilized by domestic consumers, mainly because compliance requires a significant amount of socio-economic responsibility, along with consistent monitoring, maintenance obligations, and resources.

Statement of the Problem

The unbridled industrial development in Pakistan has led to severe environmental degradation, posing significant threats to human health, biodiversity, and the ecosystem. Despite having policies, laws, and regulations in place to protect the environment, the implementation and enforcement of these measures have remained challenging. This has resulted in widespread environmental pollution, loss of biodiversity, and degradation of natural resources, all of which impact the country's economic and social development. Therefore, a critical analysis of environmental protection policies, laws, and practices in relation to industrial development in Pakistan is essential to identify gaps in the existing framework and suggest measures for their effective implementation.

Scope of the Study

This research aims to provide a critical analysis of the environmental protection policies, laws, and practices in relation to industrial development in Pakistan. The study will focus on the legal and institutional framework for environmental protection, the enforcement mechanisms for

environmental laws and regulations, and the role of the government, industry, and civil society in promoting sustainable industrial development.

Literature Review

Pakistan is experiencing rapid economic growth, along with high population and urbanization growth. Ineffective natural resource management over many years and a long history of unplanned development have not only had negative impacts on Pakistan's socioeconomic fabric but also on its environment, particularly in urban areas. Safeguarding public health and preserving natural wonders has made environmental protection increasingly important. In order to make informed decisions and facilitate sustainable development for future generations, environmental impact assessment (EIA) offers a systematic process for examining the environmental consequences of a development-related initiative (Glasson et al., 1999).

The environment is degrading rapidly due to the expansion of urban settlements on the best agricultural land, pollution of streams, destruction of fisheries by industrial effluents, and the promotion of narrow agricultural practices that encourage the extensive use of chemical pesticides. The list could go on and on as time passes. Thus, we urgently need to develop institutions and enforce laws to overcome environmental problems (McKinney & Schoch, 2003).

The important national institutions in Pakistan that play or could play a significant role in safeguarding the environment can be broadly classified into two categories: (a) governmental institutions and (b) non-governmental institutions. Presently, both the government and non-governmental sectors are addressing environmental issues. Internationally, Pakistan is a member of several organizations established to safeguard the regional and global environment, such as the United Nations Environment Programme (UNEP) and the South Asia Cooperative Environmental Program (SACEP) (Trzyna & Didion, 2013). Pakistan is also a signatory to a number of Multilateral Environmental Agreements (MEAs) and has acceded to other non-legally binding instruments, such as the Earth Summit held in Rio de Janeiro, Brazil in 1992, and Agenda-21 Rio Principles and the Johannesburg Plan of Implementation, which aim for the sustainable development of natural resources (Razzaque, 2004).

Among them are the United Nations Convention on Biological Diversity (CBD), the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES), the United Nations Convention to Combat Desertification (UNCCD), the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol, the Convention on Migratory Species (CMS), the Ramsar Convention on Wetlands, the Basel Convention on the Control of Trans-boundary Movement of Hazardous Wastes and Their Disposal, the Rotterdam Convention on Prior Informed Consent for Certain Hazardous Chemicals and Pesticides in International Trade, the Stockholm Convention on Persistent Organic Pollutants (POPs), and the Montreal Protocol on Substances that Deplete the Ozone Layer (Naureen, 2009).

Different government agencies and departments have been established to deal with various areas of environmental pollution. These agencies have the power to form expert advisory bodies, issue permits, and grant licenses allowing companies or factories to pollute within a limited and mandated manner. The provincial institutions are primarily concerned with resource augmentation and conservation. The major natural resource management and protection responsibilities for forests, agriculture, and water lie at the provincial level, even though these authorities are often overwhelmed by federal projects. Examples of these organizations include the Water and Power Development Authority (WAPDA), the Geological Survey of Pakistan (GSP), the Pakistan Forest Institute (PFI), the Soil Conservation Department, the Irrigation Department, the Wildlife Department, the Industry and Mineral Departments, the Pakistan Agricultural Research Council (PARC), and Provincial Forestry and Livestock Departments. Many of these institutions carry out surveys, monitoring, and research work that are highly relevant to environmental protection.

Environmental law is a fast-developing branch of law. Society has increasingly turned to legal avenues to protect the environment over the past century. It attained global recognition within four decades. The twenty-first century will be dominated and guided by environmental laws, conventions, and ethics. A number of laws dealing with environmental issues have been enacted at local, national, and international levels. Yet, there are many gaps in these laws, as this field is still developing. Initially, the prime motivating force behind most environmental legislation was to protect human safety and welfare. In the broadest sense, the field of environmental law encompasses all laws, statutes, regulations, agreements, treaties, declarations, resolutions, and similar instruments that have a bearing on environmental issues. Environmental laws range in scale from local community ordinances prohibiting litter on the streets to international treaties regulating trade in endangered species or the release of stratospheric ozone-depleting substances (Naureen, 2009).

Research Methodology

For this study, a qualitative research method has been used, relying on data from research articles, journals, books, government departments, and online sources. For primary data collection, an online perception survey was conducted with 414 study respondents.

SITUATIONAL ANALYSIS OF ENVIRONMENTAL PROTECTION REGIME IN PAKISTAN: AN ANALYSIS OF INSTITUTIONAL FRAMEWORK

Environmental issues affecting Pakistan:

The following table shows some major environmental issues in Pakistan.

1	Extraordinary Gaseous Emissions	9	Inadequate Capacity for Management of Environment
2	Water Pollution from Raw Sewage	10	Poor Re-Generation of Forests
3	No Waste Disposal Management Facilities	11	Soil Degradation, Erosion and Desertification
4	Rapid Urbanization	12	Industrial Wastes
5	Lack of Co-ordination between Various Levels of Government	13	Agricultural Runoff
6	Deforestation	14	Limited Natural Freshwater Resources
7	Livelihood of Local People	15	Air Pollution
8	Destruction of Biodiversity	16	Vehicular Pollution

Source: Handbook on National Environmental Legislation and Institutions in Pakistan

Industrial sectors causing excessive pollution in Pakistan

1. **Textile Industry**: The textile industry is one of the largest and most important industries in Pakistan, but it is also one of the major sources of pollution. The industry produces a large amount of wastewater and releases harmful chemicals into the environment, including dyes, heavy metals, and organic pollutants.
2. **Power Generation**: Pakistan heavily relies on fossil fuels for power generation, which is a significant source of air pollution. Coal-fired power plants are the biggest contributors to air pollution in the country, emitting sulfur dioxide, nitrogen oxides, and particulate matter.
3. **Chemical Industry**: The chemical industry in Pakistan is another significant source of pollution, particularly due to the production of petrochemicals and other industrial chemicals. These chemicals can contaminate soil and water and pose a risk to human health and the environment.

4. **Leather Industry**: In Pakistan, the leather industry generates a large amount of wastewater, which contains various chemicals, including chromium, sulfides, and organic pollutants, which are harmful to aquatic life and contaminate water supplies. In this industry, various chemicals are used, which can lead to the emission of volatile organic compounds (VOCs) and other air pollutants. These pollutants can harm human health and contribute to the formation of smog.
5. **Steel Industry**: The steel industry in Pakistan is a major contributor to pollution, particularly in the cities of Lahore and Karachi. The industry faces several environmental challenges, including air pollution, water pollution, and solid waste management.
6. **Cement Industry**: The cement industry emits various air pollutants, such as particulate matter, sulfur dioxide, and nitrogen oxides, during the manufacturing process.
7. **Marble Industry**: The marble mining industry is one of the biggest sources of pollution in Pakistan. It causes air pollution and severely damages the flora and fauna of the surrounding area. It also causes water pollution.
8. **Brick Kilns**: The brick kiln industry in Pakistan is a significant source of air pollution and is known to have negative impacts on human health and the environment. The brick kiln industry in Pakistan typically operates using traditional methods that involve burning coal, wood, and other materials to fire the kilns. This process produces large amounts of smoke and particulate matter that can cause respiratory problems and other health issues for those living and working near the kilns. In addition, the brick kiln industry is also known to contribute to deforestation and soil erosion due to the use of wood as a fuel source.
9. **Transportation**: The transportation sector in Pakistan is rapidly growing, and it is also a major source of pollution. The use of old and poorly maintained vehicles, along with a lack of proper emissions controls, leads to high levels of air pollution in urban areas.
10. **Agriculture Industry**: Agriculture is another major industry in Pakistan, but it is also a significant source of pollution. The use of chemical fertilizers and pesticides can lead to soil contamination and water pollution, which can harm both human health and the environment (Daily Dawn, 2019 & 2023).

Main Sources of Air Pollution in Khyber Pakhtunkhwa

The following are the main sources of air pollution in Khyber Pakhtunkhwa:

1. **Crush Plants**: Dust emissions and operation of crushing machines without proper pollution control systems, with most of them installed in residential areas.

2. **Brick Kilns**: Conventional brick kilns using rubber, rexene, plastic waste/old shoes, low-quality coal, clothes, etc.
3. **Cement Industry**
4. **Vehicular Emissions**: Due to low-quality fuels, old vehicles (with no fixed age limit), and traffic congestion.
5. **Marble Industry**
6. **Mining Activity**: Uncontrolled blasting.
7. **Sugar Mills**: Gaseous emissions from the stacks of boilers.
8. **Steel Furnaces**: Steel furnaces lack proper pollution control systems.
9. **Plaster of Paris**: Open grinding of raw material.

Main Sources of Water Pollution in Khyber Pakhtunkhwa

1. **Paper Mill**: Squeezing of desolated paper, which produces wastewater.
2. **Sugar Industries**: A huge amount of wastewater is discharged outside the industry without proper treatment.
3. **Marble Industries**: Direct discharge of large amounts of wastewater into water channels.
4. **Ghee Industries**: A large amount of wastewater with oil content and sulfides is discharged outside the industry without proper treatment.
5. **Municipal Effluents**: No treatment facilities are available, and the effluents are directly discharged into water channels, polluting irrigation canals, rivers, and underground water.

Main Sources of Noise Pollution in Khyber Pakhtunkhwa

1. **Vehicles**: Old vehicles and pressure horns.
2. **Mining**: Blasting creates severe noise pollution.
3. **Generators**: Standby generators create severe noise pollution in the nearby area.
4. **Commercial Activities**: Steel, iron bars, iron doors, windows, furniture, household items, etc.
5. **Crushing of Stone**: Crushing machines.
6. **Various Industrial Activities**: Steel mills, sugar mills, chipboard factories, marble factories, etc.

(Khyber Pakhtunkhwa EPA, 2022)

Problems Associated with Marble Mining in District Buner, KP

1. Contamination of drinking water
2. Contamination of air (aerosols containing marble dust suspended in the air)
3. Disturbance of water bodies, e.g., ponds, streams
4. Impact on field production and reduced crop productivity
5. Spread of diseases, including skin rashes and eye irritation
6. Impact on fish habitats and their nourishment

7. Contamination of river/stream water
8. Disturbance of flora and fauna
9. Disturbance of natural habitats
10. Road safety

Pictures of marble mining in District Buner, KP, are provided in Annexure-A.
Source: Office of the Deputy Commissioner, Buner

Institutional Framework for Environmental Protection in Pakistan

1. **Pakistan Environmental Protection Council**: This is headed by the Prime Minister and includes relevant Federal and Provincial Ministers, as well as up to 35 representatives from various sectors. Its role is one of overall supervision and coordination, and it includes:
    1. To approve the National Environmental Quality Standards (NEQS);
    2. To approve comprehensive national environmental policies;
    3. To provide guidelines for the protection and conservation of species, habitats, and biodiversity in general, and for the conservation of non-renewable resources; and
    4. To ensure that sustainable development is fully incorporated.
2. **The Pakistan Environmental Protection Agency**: This is the central implementing agency for the Act. Its functions and powers are extensive and cover all aspects of implementing the Act, including:
    1. Administering and implementing the provisions of PEPA and its rules and regulations;
    2. Preparation, revision, and establishment of the National Environmental Quality Standards (subject to prior publication for the purposes of soliciting public opinion);
    3. Enforcement of the National Environmental Quality Standards;
    4. Establishment of the standards for the quality of ambient air, water, and land;
    5. Establishment of systems for surveys, monitoring, inspection, and audits to prevent and control pollution, and to estimate the costs of cleaning up pollution and rehabilitating the environment;
    6. Rendering advice and assistance in environmental matters;
    7. Encouraging the formation and operation of NGOs, community organizations, and village organizations to prevent and control pollution and promote sustainable development;
    8. Taking all necessary measures for the protection, conservation, rehabilitation, and improvement of the

environment, prevention and control of pollution, and promotion of sustainable development.

3. **Provincial Environmental Protection Agencies**: Each of Pakistan's four provinces has its own environmental protection agency responsible for enforcing environmental laws and regulations, monitoring pollution levels, and promoting sustainable development.

Overview of the Environmental Protection Agency Khyber Pakhtunkhwa

1. Works under the Forestry, Environment & Wildlife Department.
2. Regulation and enforcement of environmental protection laws.
3. A total human resource of 304 (121 filled, 183 vacant), including newly merged districts.
4. EPA offices: EPA Headquarters in Peshawar, Central Directorate in Peshawar, Southern Directorate in D.I. Khan, Northern Directorate in Abbottabad, Malakand Directorate in Swat, Divisional Offices in Bannu, Kohat, and Mardan, and district offices in Orakzai and Khyber.

Progress on enforcement function

Sr. No	Region	Cases Submitted to EPT
1	EPA Head Office/Central Directorate	1814
2	EPA Northern Directorate Abbottabad	631
3	EPA Southern Directorate D I Khan	695
4	EPA Malakand Directorate, Swat	590
	Total	**3730**

Total Cases with EPT	Cases Decided	Cases Pending	Total fine imposed (PKR)
3730	2012	1718	60.5 Million

(Khyber Pakhtunkhwa EPA 2022)

5. **Environmental Tribunals**: Environmental Tribunal has the power to try offenses under PEPA as well as issue arrest warrants. This body also acts as an appellate authority against the orders of EPA. There are four Environmental Tribunals each at provincial capital, however, only the Environmental Tribunal of Punjab is fully functional.

LEGAL FRAMEWORK OF ENVIRONMENTAL PROTECTION REGIME IN PAKISTAN: A COMPARATIVE ANALYSIS WITH BEST PRACTICES AROUND THE WORLD

Environmental Laws in Pakistan:

Pakistan attended and signed the Stockholm Declaration in Sweden in 1972, which is widely regarded as the first document in international environmental law to recognize the right to a healthy environment (Alam 2018). Correspondingly, in Pakistan, the reaction to the world's growing understanding of environmental issues was to include, for the first time, the subjects of "environmental pollution and ecology" in the Concurrent Legislative List of the Constitution of 1973 (IUCN 2007); the establishment of the Environment and Urban Affairs Division within the Ministry of Housing and Works at the Federal level in 1974 (Naureen 2009); and the creation of a separate Ministry of Environment in the Federal Government.
With the inclusion of "environmental pollution and ecology" in the Concurrent Legislative List of the Constitution, the Federation was vested with executive and legislative jurisdiction over the same. Therefore, in 1983, the President of Pakistan, exercising legislative powers conferred by Article 89 of the Constitution, promulgated the Pakistan Environmental Protection Ordinance, 1983 ("PEPO"). By the early 1990s, environmental law in Pakistan was governed by the PEPO.

With this background in environmental law, Pakistan participated in the United Nations Convention on Sustainable Development held in Rio de Janeiro, Brazil, in 1992 and became a signatory to the Rio Declaration on Sustainable Development (Alam 2018).

1. **National Conservation Strategy (NCS) 1992**: The National Conservation Strategy was a professionally researched project (Khan, 2014) that provides a comprehensive framework for sustainable development in Pakistan. This strategy outlines a comprehensive approach to conserving Pakistan's natural resources, including forests, wildlife, water, and soil.
2. **Pakistan Environmental Protection Act (PEPA) 1997**: The Act provides "for the protection, conservation, rehabilitation, and improvement of the environment, for the prevention and control of pollution, and promotion of sustainable development" (EPA 1997). It expanded on environmental matters covered in the earlier PEPO and defines "environment" as air, water, land; all layers of the atmosphere, all organic and inorganic matter and living organisms; the ecosystem and ecological relationships; buildings, structures, roads, facilities, and works; all social and economic conditions affecting community life; and the inter-relationship between any of the above factors (Section 2 Ibid).

The Act envisages a Pakistan Environment Protection Council ("PEPC") to be the supreme policy-making body, supported by the Pakistan Environment Protection Agency ("Pak-EPA"), Provincial Environmental Protection Agencies, Provincial Sustainable Development Funds to be managed by Provincial Sustainable Development Fund Boards, and Environmental Tribunals and Environmental Magistrates.

3. **National Environmental Quality Standards (self-monitoring and reporting by industries) Rules, 2001**: These are the most important rules under the Pakistan Environmental Protection Act, 1997, as they prescribe pollution limits for industry. They place obligations upon all industries to submit correct and timely Environmental Monitoring Reports to the Federal Environmental Protection Agency.
4. **National Environmental Policy (NEP) of Pakistan 2005**: The National Environmental Policy (NEP) of Pakistan was first formulated in 2005, with the aim of promoting sustainable development while protecting the country's natural resources and ecosystems. The policy was updated in 2012 to reflect the changing environmental challenges faced by the country. The NEP outlines the government's commitment to promoting sustainable development through the integration of environmental considerations into all aspects of decision-making. It emphasizes the need to address climate change, biodiversity conservation, pollution control, and natural resource management.
5. **National Climate Change Policy 2012**: The national policy on climate change aimed to focus on the issues related to the sectors of agriculture, forestry, water, and coastal lands, along with their biodiversity and protection of ecosystems in Pakistan (Ahmad, 2022).

C. Ten Billion Tree Tsunami Programme (TBTTP)

The government of Pakistan initiated a program to tackle the issue of climate change and deforestation in the province of Khyber-Pakhtunkhwa from 2013–2018. The project is known as the Billion Tree Afforestation Project (BTAP). One salient feature of the project is that it adopted a participatory approach for the plantation campaign (Rayan, Gruehn, & Khayyam, 2021). The project was praised internationally, and the international community encouraged the expansion of this initiative to other provinces as well (Ehtasham et al., 2022). After BTAP in KPK, the government announced the expansion of the Billion Tree Project into the plantation of up to Ten Billion Trees across the whole of Pakistan. The project was then renamed the "Ten Billion Tree Tsunami Project" (TBTTP).

During Phase I of the project, during Fiscal Year 2021 (July 2020–March 2021), the program achieved the plantation of about 350 million trees.

Not only was this proven to be beneficial for climate change and environmental purposes, but the project also generated around 100,000 daily wage employees by March 2021 (Ehtasham et al., 2022).

Best Practices around the World

1. The European Union (EU)

The European Union (EU), comprising 27 countries, has a comprehensive set of environmental regulations that apply to all member states.

1. The EU's Industrial Emissions Directive sets limits on emissions of pollutants, while the REACH regulation requires companies to register, evaluate, and authorize the use of chemicals (REACH, 2023).
2. The EU also has an emissions trading scheme that puts a price on carbon emissions and incentivizes companies to reduce their emissions.
3. The EU has adopted the Industrial Emissions Directive (IED), which sets standards for industrial emissions, and the Waste Framework Directive, which aims to reduce waste generation and promote recycling.
4. The EU also promotes sustainable development through initiatives such as the European Green Deal, which sets out a roadmap for achieving climate neutrality by 2050.
5. The EU has established several voluntary programs and initiatives to encourage sustainable industrial development. The European Eco-Management and Audit Scheme (EMAS) is a voluntary program that encourages companies to adopt environmentally friendly practices and improve their environmental performance (EMAS, 2023).
6. The EU's Circular Economy Action Plan sets out a framework for transitioning to a more sustainable and circular economy, including measures to promote eco-design, reduce waste, and improve resource efficiency.
7. The EU also promotes circular economy principles, which aim to minimize waste and maximize the use of resources by reusing and recycling materials.

2. United States of America

1. The United States has the Environmental Protection Agency (EPA), which is responsible for enforcing federal environmental regulations, such as the Clean Air Act and Clean Water Act, which set standards for industrial emissions and the discharge of pollutants.
2. The EPA has also established several programs to encourage environmental stewardship among businesses and industries, such as the Energy Star program and the Green Power Partnership.

3. These programs provide incentives for companies to reduce their environmental footprint and adopt sustainable practices (epa.gov).
4. The U.S. also offers tax incentives and grants to encourage industries to adopt more environmentally friendly practices.

3. China

1. The Chinese Environmental Protection Law provides a legal framework for environmental protection and pollution control. The law requires companies to carry out environmental impact assessments and obtain environmental permits before commencing operations (npc.gov.cn).
2. The government has recently implemented stricter environmental regulations and penalties for non-compliance.
3. The Chinese government has also launched several initiatives to promote sustainable development. The "Made in China 2025" plan aims to upgrade and modernize the country's manufacturing industry to make it more sustainable and environmentally friendly.
4. The Chinese government has established a range of incentives and programs to promote sustainable industrial development. These include subsidies for companies that adopt clean technologies, tax incentives for energy-saving and emissions-reducing investments, and financial support for the development of renewable energy (csis.org).
5. The government has also established a number of voluntary programs to encourage businesses to adopt sustainable practices. These include the Green Supply Chain program, which promotes the use of environmentally friendly materials and production methods, and the Circular Economy pilot programs, which aim to reduce waste and promote resource efficiency.

4. India

1. India has a number of laws and regulations governing environmental protection, including the Air (Prevention and Control of Pollution) Act and the Water (Prevention and Control of Pollution) Act. The government has also established several institutions to oversee environmental protection, such as the Central Pollution Control Board (moef.gov.in).
2. The Indian government has established a range of incentives and programs to promote sustainable industrial development. The National Action Plan on Climate Change, launched in 2008, aims to promote sustainable development and address climate change through various measures, including energy efficiency, renewable energy, and sustainable transport.

3. The Indian government has also established several programs to promote sustainable industrial development, including the National Cleaner Production Centre and the Energy Conservation Building Code. These programs provide technical assistance and training to businesses to help them adopt environmentally friendly practices.

5. Japan

1. The Japanese government also regulates industrial pollution through laws such as the Air Pollution Control Act and the Water Pollution Control Act. These laws require businesses to comply with environmental standards and regulations and establish penalties for non-compliance.
2. The Japanese government has also established several incentives and programs to promote sustainable industrial development. These include tax incentives for businesses that adopt clean technologies, subsidies for energy-saving and emissions-reducing investments, and financial support for the development of renewable energy.
3. The Japanese government also promotes sustainable industrial development through various initiatives, such as the Eco-Products Exhibition, which showcases environmentally friendly products and technologies.
4. The government also works with businesses to develop and promote eco-friendly products through the Top Runner Program, which encourages businesses to compete to develop the most energy-efficient and environmentally friendly products.

Comparative Analysis

The relationship between industrial development and environmental protection is complex and varies widely around the world. While industrial development has brought many benefits to societies, including economic growth and improved standards of living, it has also led to increased pollution, resource depletion, and environmental degradation.

The impact of industrial development on the environment remains a major global challenge. Climate change, biodiversity loss, and pollution continue to pose significant threats to the environment and human well-being.

Here is a comparative analysis of Pakistan's environmental protection regime in comparison with some of the best practices around the world:

1. **Regulatory Framework (Command and Control Regulations)** Pakistan has a number of environmental laws and regulations that apply to industrial development, such as the Pakistan Environmental Protection Act and the National Environmental Quality Standards. However, enforcement of these regulations has been weak.
2. **Monitoring and Reporting**
   Pakistan has a National Environmental Information Management System, but the system is not yet fully operational. The country lacks a comprehensive system for monitoring and reporting on the environmental impacts of industrial activities. In contrast, countries like China and India have established comprehensive monitoring and reporting systems that allow for real-time tracking of air and water quality, with industries required to report their emissions data regularly.
3. **Environmental Impact Assessments**
   Environmental impact assessments (EIAs) are required in Pakistan for certain types of industrial development projects, but the quality and rigor of these assessments vary widely. The quality of these assessments is often poor, and they are not always conducted in a transparent and participatory manner. In contrast, developed countries have more rigorous processes for environmental impact assessments, with clear criteria for assessing potential environmental impacts and requirements for public consultation and participation.
4. **Industrial Practices (Pollution Control Measures)**
   Pakistan has a significant industrial sector, including textile, cement, and chemical industries, which are major contributors to pollution and environmental degradation. However, many of these industries operate without adequate pollution control measures or environmental management systems in place. Pakistan has limited pollution control measures in place, particularly in industrial areas. Best practices around the world include the use of pollution prevention and control technologies and the implementation of best management practices to minimize environmental impacts. In contrast, countries like Germany and Japan have implemented world-class industrial practices, focusing on reducing waste, energy efficiency, and sustainable production methods.
5. **Sustainable Development**
   Pakistan has yet to fully integrate sustainable development into its industrial development policies and practices. Best practices around the world prioritize sustainable development through the use of green technologies, renewable energy, and resource efficiency. While Pakistan has some policies and initiatives to promote sustainability, such as the Alternative Energy Development Board and the Clean Development Mechanism, their implementation has been limited.

In contrast, countries like China and Japan offer significant incentives for industries to adopt more sustainable practices, such as tax incentives and subsidies for renewable energy and low-emission technologies.

6. **Market-based Mechanisms**
   Pakistan does not have effective market-based mechanisms, such as tax incentives for industries, clean technologies, and renewable energy, to promote environmental protection.
7. **Collaborative Approaches**
   Pakistan has established a number of institutions to oversee environmental protection, such as the Pakistan Environmental Protection Agency and the National Council for Conservation of Wildlife, but collaboration between government, industry, and civil society is limited. In contrast, countries like the United States and the European Union have established collaborative frameworks that bring together stakeholders from various sectors to develop joint strategies for environmental protection. Japan has implemented successful public-private partnerships to promote environmental protection.

Corporate Social Responsibility

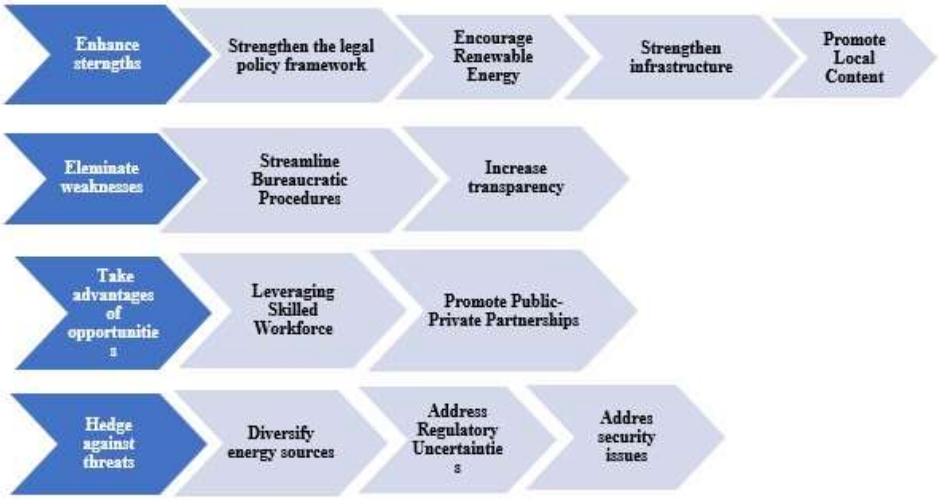
Many companies in Pakistan do not prioritize environmental sustainability, and there is little pressure from consumers or investors to do so. In contrast, many developed countries have more robust systems for corporate social responsibility, with stronger incentives for companies to adopt environmentally sustainable practices.

SWOT analysis of the Energy sector legal policy framework to promote the industry in Pakistan:

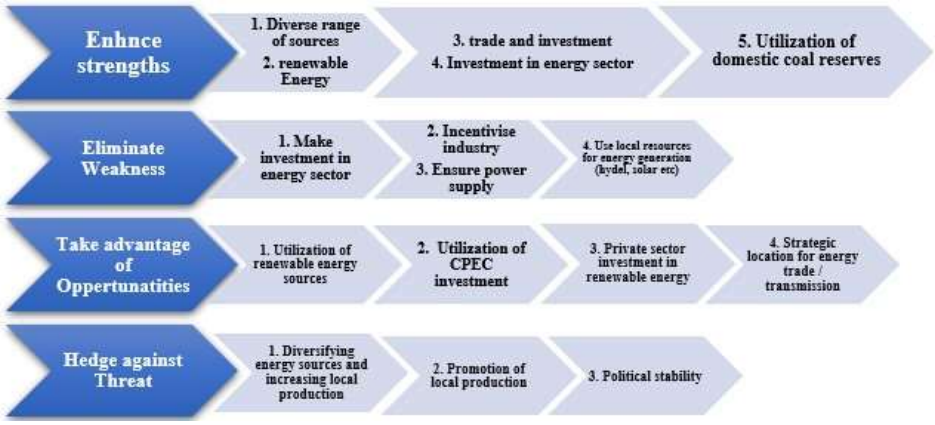
1. Strong policy framework 1. acts, policies, and regulations governing the industry 2. Diversified energy matrix 1. coal, natural gas, oil, hydropower, solar, wind 3. Private sector participation 4. Growing demand for energy 1. rapid industrialization and population growth	**Weaknesses** 1. Inconsistent implementation 2. Inadequate infrastructure 3. Lack of transparency 4. Dependence on imported energy 70% of its energy mix 1. price fluctuations 2. supply disruptions 5. Political instability
• Investment in renewable energy • Regional integration • Technology adoption • Public-private partnerships	• Political instability • Security concerns • Economic challenges • Regulatory uncertainties

SWOT analysis of Energy sector institutional policy framework to promote industry in Pakistan:

EETH analysis of Energy sector legal policy framework to promote industry in Pakistan:



EETH analysis of Energy sector institutional policy framework to promote industry in Pakistan



Perception Survey

An online survey was conducted, wherein questions were asked on the legal and institutional regime in relation to industrial development in Pakistan. A total of 414 people responded to the survey. Majority of the respondents were of the opinion that protecting the environment is one of the major challenges in Pakistan where air, water, and solid waste are the main areas of pollution. Research questions and survey results are at Annexures **A** & **B**.

GAP Analysis:

GAP analysis has been conducted within the legal and institutional framework viz a viz industrial development

S#	PRESENT STATE	KEY STEPS TO BRIDGE THE GAP	DESIRED STATE
1.	Law Enforcement Mechanism in the Industrial Sector: 2. Lack of awareness 3. Environmental Non Compliance in Textile and Leather Industry in Air Emissions, Noise Level, Wastewater, Solid Waste 4. Non Compliance in Health Sector 5. Health Impacts of Leather Industry 6. Community Health Impacts	7. Awareness campaigns 8. Establishment of Combined affluent treatment plants for cluster of industries which cannot afford to run the individual affluent treatment plants due to financial, physical or technological reasons 9. Joint coordination among top industries 10. Small and medium industry to attain some minimum standards with trained workforce. 11. Workers Health Sickness Monitoring 12. Rewards/Awards/Positive Incentives 13. Impositions of Stricter Punishments/Fines 14. Mainstreaming of Environmental Management 15. Environmental Rights of Citizens 16. Enhanced Awareness Campaign 17. Minimizing the Communication gaps with public 18. Insufficient Energy and Power Generation 19. Standardize data to be gathered	20. Awareness 21. National Conservation Plan 22. Cleaner Production 23. Regulations 24. Environmental Legislation 25. Tribunals
26.	Disposal of Clinical waste and electronic waste in Baluchistan Environmental Protection Act, 2012 only	The same may be inculcated in EPA, 1997 and laws of other provinces	Comprehensive and unified legislation
27.	Pakistan Environmental Protection Legislation suffers from lack of quantified limits and standards of carbon emissions which makes these laws ineffective and difficult to enforce	To inculcate quantification of limits and standards of carbon emissions from industries	Enactment of objective and quantified legislation
28.	Weak Implementation	Comprehensive procedures for effective implementation	Effective Implementation
29.	The regulations are generally strict and people try to use tactics to avoid their enforcement	Some sort of flexibility may be inculcated in the rules as incentive to the industrialists so that these may be enforced at the initial level	Balanced and incentivized Legislation/policies
30.	Energy Institutions, both public and private, have been providing electricity produced with less environmentally friendly and costlier fuel by cartelizing with each other.	Government has to launch more projects for producing electricity through renewable resources. Competition Commission to monitor the cartelization of power producers.	Alternate energy from renewable resources
31.	Environmental Impact Assessment guidelines are not adequate to ensure effective appraisal of large infrastructure projects such as Dams and	Adequate Impact Assessment guide lines to be prepared covering all categories of Projects besides area.	No major project without Environmental Impact Assessment

	Water Management Projects. A major Challenge associated with the large Infrastructure Project would be to address resettlement and compensation issues in the absence of resettlement policy.		

CONCLUSIONS

1. Pakistan, for the first time, included the subjects of "environmental pollution and ecology" in the Concurrent Legislative List of the Constitution of 1973 and established the Environment and Urban Affairs Division within the Ministry of Housing and Works at the Federal level in 1974, which was ultimately carved out into a separate Ministry of Environment in the Federal Government.
2. The President of Pakistan promulgated the Pakistan Environmental Protection Ordinance, 1983, which led to the promulgation of the Pakistan Environmental Protection Act (PEPA) 1997.
3. The government of Khyber-Pakhtunkhwa initiated the Billion Tree Afforestation Project (BTAP) in 2013, which was praised at the international level. Later, in 2018, the federal government initiated the Ten Billion Tree Tsunami Project (TBTTP).
4. Despite the existence of environmental policies, laws, and practices, Pakistan continues to confront significant environmental issues such as air and water pollution, deforestation, and biodiversity loss, all of which endanger both the environment and human well-being. The government's/agency's attempts to safeguard the environment have yielded no significant outcomes, and it has been established that enforcing these rules is ineffective. According to the perception survey, 96.5% of respondents named environmental degradation as Pakistan's top issue, and 67.9% were dissatisfied with the effectiveness of government agencies.
5. Industries in Pakistan are major contributors to pollution and environmental degradation (72.1% of the respondents were of the opinion that industry is the primary cause of environmental contamination in Pakistan).
6. The perception survey conducted for this study reveals that the general public is unaware of the legal and institutional framework for the environmental protection regime in Pakistan (70.9% of the respondents showed unawareness of the current legal/institutional regime in Pakistan).
7. In the western world, industries are encouraged to reduce waste and maximize resource use by recycling materials, as well as by adopting more ecologically responsible practices through taxes and grants (81% of the study respondents were of the opinion that industries should be given incentives to embrace eco-friendly technologies).

8. Environmental protection regulations in Pakistan are not very effective in terms of non-compliance. Furthermore, the absence of Environmental Tribunals (ET), except in Punjab, demonstrates the government's weakness in enforcing environmental laws.
9. The government has not taken effective measures to ensure environment-friendly practices, particularly the use of renewable energy resources and their incorporation into the legal framework for environmental protection (98% of the respondents stated that renewable energy resources should be used for environmental protection, while 80.2% stated that the government has not taken serious steps in this area).
10. Pakistan currently lacks a National Environmental Information Management System (NEIMS) to monitor and report on the environmental impacts of industrial activities.
11. There has been a lack of involvement of the local community to bridge the gap between industry and environmental protection organizations (89.6% of respondents were of the opinion that the community should be involved to bridge the gap between industry and environmental protection organizations).
12. The majority of companies in Pakistan do not prioritize environmental sustainability, and there is a lack of corporate social responsibility (CSR) to adopt environmentally sustainable practices (73.4% of the respondents were of the opinion that the Pakistani industrial sector does not prioritize environmental sustainability).

RECOMMENDATIONS

Short & Medium Term

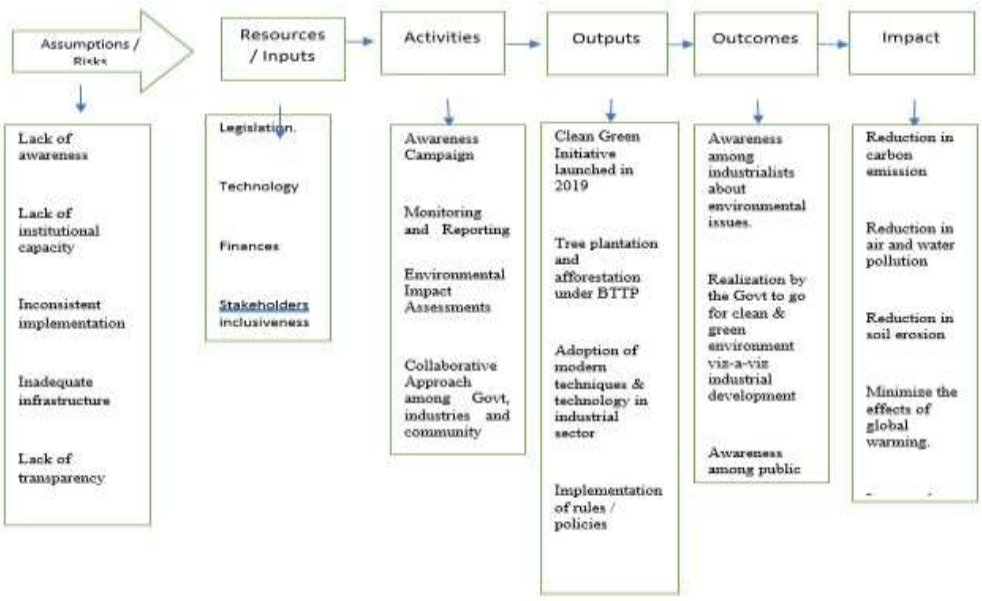
1. Raise public awareness and educate citizens about environmental issues, encouraging participation in environmental protection efforts through students and local communities. Implement rules, regulations, and policies regarding environmental protection.
2. Ensure transparency in the implementation of rules, regulations, and policies regarding environmental protection.
3. A collaborative approach among the respective government, industries, and local communities needs to be adopted. All Pakistan Textile Mills Association (APTMA), All Pakistan Textile Processing Mills Association (APTPMA), Pakistan Textile Exporters Association (PTEA), Pakistan Tanners Association (PTA), Pakistan Leather Garments Manufacturers and Exporters Association (PLGMEA), the Chamber of Commerce and Industry, Water and Sanitation Agency (WASA), Provincial Environmental Protection Agencies (EPAs), and other relevant public sector organizations should be part of one forum for better coordination and collaboration in environmental compliance through staff training and joint research.

4. Establish partnerships with international organizations to access funding and expertise for environmental protection initiatives.
5. Promote tree plantation and afforestation on the pattern of the Billion Tree Tsunami Project.
6. The government should publicize environmental reports and devise a rating system to provide incentives, rewards, and tax rebates to industrial entrepreneurs based on their performance in complying with environmental legislation.
7. In small and medium-sized industries, environmental management systems should be made compulsory, along with mandatory capacity building of the workforce through training and workshops.
8. Promote and incentivize cleaner production practices in industrial estates. Industrial symbiosis should be introduced in the master plans of industrial estates.

Long Term

1. Shift to renewable energy sources, such as hydel, solar, wind, and atomic energy, to produce clean and green energy.
2. Encourage the industrial sector to adopt modern treatment techniques and technologies by installing electronic emissions control devices and effluent treatment plants, as necessary.
3. Establish combined effluent treatment plants for clusters of industries that cannot afford to run individual effluent treatment plants due to financial, physical, or technological limitations.
4. Promote sustainable development by incentivizing industries to adopt environmentally friendly practices and technologies, similar to the EU model.
5. Environmental protection regulations in Pakistan should be strengthened in terms of enforcement for non-compliance.
6. Environmental Tribunals (ET) should be made functional in all provinces of the country.
7. During all phases of a project's lifecycle, such as planning, designing, construction, and operation, the relevant persons should comply with environmental and socio-economic requirements.
8. Industrial estates and zones should be established far from populated areas to ensure that communities are not adversely affected or displaced by pollutants discharged from industries.
9. Pak-EPA and other provincial environmental protection agencies should set industry-specific standards rather than general or uniform standards, taking into account the geographical and ecological conditions of the area where the industry is proposed to be installed.

Log frame Matrix



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Labor Related Policies, Regulations, Practices and welfare activities in the context of Industrial Development and Social Protection in Pakistan

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Abstract:

This study critically examines labor-related policies, regulations, practices, and welfare activities in Pakistan, emphasizing their implications for industrial development and social protection. Despite government efforts such as the Minimum Wage Ordinance, Industrial Relations Act, and Social Security Ordinance, significant gaps in enforcement and implementation persist. Many workers, especially in the informal sector, remain excluded from basic labor rights and social protection. Challenges include weak enforcement of minimum wage laws, limited social security coverage, and insufficient vocational training and welfare programs. Additionally, gender disparities in the labor market exacerbate the plight of women workers. The paper highlights the need for a comprehensive, coordinated approach to address these challenges by strengthening labor law enforcement, expanding social protection coverage, and fostering gender equality. Such reforms are essential for enhancing worker well-being, promoting equitable labor practices, and driving industrial development in Pakistan.

Key words:

Labor policies, Social protection Industrial development, Gender equality, Informal sector

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Introduction

The International Labor Organization (ILO) defines "labor" as all forms of work, whether paid or unpaid, formal or informal, and performed in the public or private sector, including self-employment. This broad definition encompasses any economic activity undertaken for the production of goods or services. It covers all types of jobs, ranging from manual labor to intellectual work, and includes managerial, administrative, and professional roles.

According to the Pakistan Bureau of Statistics' Labor Force Survey (2020–21), the total employed workforce is categorized as the "Worker Population." Pakistan boasts one of the largest labor forces globally, ranking among the top 10. This workforce is continuously expanding, with an annual increase of approximately 1.5 million individuals. Currently, about 47% of the labor force is engaged in the agriculture sector, 10.5% in the manufacturing and mining sectors, and the remaining 42.5% in various other professions, including services, trade, and other industries. This growing labor force highlights both the country's economic potential and the pressing need to address challenges such as job creation, skill development, and equitable distribution of opportunities across sectors.

S.No	Labour Force	Total (million)	Male (million)	Female (million)
1.	Labour in **Pakistan**	71.76	54.92	16.84
2.	**Punjab**	41.9	30.3	11.6
3.	**KP**	10.3	8.3	2.1
4.	**Sindh**	15.9	13.3	2.7
5.	**Balochistan**	3.6	3.1	0.5

Source: Pakistan Bureau of Statistics

Problem Statement

Pakistan's labor market faces several challenges, including high levels of informality, low wages, limited social protection, and inadequate enforcement of labor laws. Despite the presence of various labor-related policies, regulations, practices, and welfare activities, workers in the country, including women and children, continue to encounter significant barriers to accessing decent work and social protection.

Consequently, there is a need for a critical evaluation of the effectiveness of existing labor-related frameworks in the context of industrial development and social protection in Pakistan. This study aims to evaluate and identify gaps and weaknesses in the current system and to recommend measures that enhance the protection of workers' rights, promote the formalization of the labor market, and ensure comprehensive social protection for all.

Scope

The scope of this study is to evaluate the effectiveness of labor-related policies, regulations, practices, and welfare activities in Pakistan, with a particular focus on industrial development and social protection. This evaluation examines the impact of various factors on the labor market, including economic growth, political stability, labor market regulations, and social safety net programs. It also incorporates the perspectives of employers, employees, and government policymakers to identify potential areas for improvement in labor-related policies and practices.

The significance of this topic lies in addressing the critical issue of labor rights and social protection in Pakistan, where a substantial proportion of the workforce is engaged in informal and low-paying jobs. Evaluating labor-related policies, regulations, practices, and welfare activities in the context of industrial development and social protection is vital for identifying challenges and opportunities in promoting decent work and ensuring social protection for workers.

This evaluation aims to inform policymakers and stakeholders about gaps and weaknesses in the current system and to suggest measures for enhancing the protection of workers' rights, promoting the formalization of the labor market, and ensuring inclusive social protection for all. The findings of this study can contribute to the ongoing discourse on labor rights and social protection in Pakistan and provide valuable insights for future policy and research initiatives in this area.

Research Methodology

This study is based on descriptive approach on secondary data against the socio-political and administrative backdrop which is highlighted by the qualitative analysis. Primarily secondary data has been used for different perspective analysis retrieved from newspaper articles, ILO report, National Labor Surveys, Economic Surveys, websites of WWF and Labor Departments. Situational analysis, Gap analysis, SWOT analysis, and Log-frame matrix is used on secondary data for conclusions.

Literature Review

The National Labor Law Profile of the Islamic Republic of Pakistan (2004) by the International Labour Organization (ILO) examines the historical evolution of labor laws in Pakistan, considering national legislation, the constitutional framework, international obligations, and ILO conventions. The profile primarily focuses on challenges faced by trade unions, enforcement of labor laws, protection of workers' health and safety, and the low participation of women in trade unions. While the research highlights a broad regulatory framework, it also reveals situations of exploitation and discrimination. For instance, the registration of trans-provincial centers remains unclear, and the constitutional right to form trade unions has been suspended in some provinces. Numerous workplace fatalities underscore critical issues in health and safety protections. Women's participation in trade unions is notably low due to mistrust of union leaders, fear of job loss, and significant pay disparities with male counterparts. Moreover, labor laws exclude the agricultural sector, despite it being the most productive and employing the largest proportion of the workforce.

The Economic Survey of Pakistan (2021–22) provides crucial data on various labor-related indicators, including population estimates, urban and rural demographics, total labor force, unemployment rates, fund distribution statistics, and the employment-to-population ratio. These metrics shed light on labor welfare and economic trends in the country.

An agreement document between the ILO and the Netherlands underscores the need to strengthen labor inspection systems in Pakistan. This partnership emphasizes creating efficient and effective inspection regimes to enforce labor laws and protect workers' rights. It also aims to strengthen institutional mechanisms, enhance the capacity of human resources to enforce labor inspections, and collaborate with the private sector to promote and ensure compliance with international labor standards.

The Labor Policy of 2010 focuses on the social and economic well-being of the population as a key objective of the government. It aims to achieve these objectives by aligning policies with the country's resources and economic conditions. The policy stresses the urgent need to revitalize the economy through sustained efforts to increase productivity, promote investment, and maximize employment. It also highlights the importance of fostering awareness among workers and employers about their responsibilities toward national objectives. While promoting these goals, the government recognizes that workers and employers must enjoy reasonable benefits that the economy can sustain without setbacks.

Situational & GAP Analysis
Legal and Regulatory Framework

Legislative Structure

The legal and regulatory framework related to labor and social protection in Pakistan is governed by several laws and regulations. Bills pertaining to items in the second part of the Federal Legislative List or the Concurrent Legislative List may be introduced in either house. The Concurrent Legislative List, outlined in Article 70(4) of the Constitution, includes provisions for the welfare of labor: conditions of labor, employer liability, workers' compensation, health insurance, trade unions, industrial and labor disputes, the establishment and operation of labor exchanges, employment information bureaus, training establishments, regulation of labor and safety in mines, factories, and oil fields, and unemployment insurance.

Hierarchy of Labor Courts

In Pakistan, the hierarchy of Labor Courts is as follows:

Labor Court

The Labor Court is the first court of reference for all labor-related disputes. It has jurisdiction to hear and decide cases related to employment, wages, working conditions, and other labor-related matters.

Labor Appellate Tribunal

The Labor Appellate Tribunal serves as the appellate court for decisions made by the Labor Court. It hears appeals against the decisions of the Labor Court and has the authority to revise or confirm those decisions.

High Court

If a party is dissatisfied with the decision of the Labor Appellate Tribunal, they may file an appeal in the High Court. The High Court has the power to review the decision of the Labor Appellate Tribunal and may confirm, reverse, or modify the decision.

Supreme Court

If a party is dissatisfied with the decision of the High Court, they may file an appeal in the Supreme Court. The Supreme Court has the authority to review the decision of the High Court and may confirm, reverse, or modify the decision. The decision of the Supreme Court is final and cannot be challenged in any other court.

Labor Rights in the Constitution

The Constitution of Pakistan contains various provisions regarding labor rights, outlined in Part II: Fundamental Rights and Principles of Policy.

- Article 11 of the Constitution prohibits all forms of slavery, forced Labor and child labor;
- Article 17 provides for a fundamental right to exercise the freedom of association and the right to form unions;
- Article 18 proscribes the right of its citizens to enter upon any lawful profession or occupation and to conduct any lawful trade or business;
- Article 25 lays down the right to equality before the law and prohibition of discrimination on the grounds of sex alone;
- Article 37(e) makes provision for securing just and humane conditions of work, ensuring that children and women are not employed in vocations unsuited to their age or sex, and for maternity benefits for women in employment.

Key Laws

These rights are protected and enforced through some of the key laws mentioned below:

Factories Act, 1934

This law regulates working conditions in factories, including provisions related to the safety, health, and welfare of workers, employment of young persons and women, and leave entitlements. The law requires employers to provide clean drinking water, adequate lighting, ventilation, temperature control, and other facilities to ensure the safety and welfare of workers.

Industrial Relations Act, 2012

This law governs the relationship between employers and workers, including collective bargaining, dispute resolution, and the formation and recognition of trade unions. The law provides workers with the right to form and join trade unions and engage in collective bargaining.

Minimum Wage for Unskilled Workers Ordinance, 1969

This ordinance sets a minimum wage for unskilled workers in various industries, including agriculture, manufacturing, and mining. The minimum wage is periodically revised by the government to account for inflation and other economic factors.

Social Security Ordinance, 1965

This ordinance provides for the establishment of social security schemes for workers, including old-age benefits, disability benefits, and survivors' benefits. The law requires employers to register their employees with the social security system and contribute towards their social security benefits.

Workers' Compensation Act, 1923

This law provides compensation to workers who are injured or disabled during the course of their employment. It requires employers to compensate workers or their families in the event of injury or death while on the job.

Employment of Children Act, 1991

This law prohibits the employment of children below the age of 14 in any occupation, including factories and mines. It also sets restrictions on the employment of children aged between 14 and 18, such as limiting their working hours and ensuring their safety and welfare.

Workers' Welfare Fund (WWF) Ordinance, 1971

This ordinance establishes the Workers' Welfare Fund for providing accommodation and other facilities for workers and for matters connected therewith. Every industrial concern with a total income of not less than five lakh rupees in any year must contribute two percent of its total income to the fund.

However, gaps in the implementation and enforcement of these laws and regulations must be addressed to ensure the protection and welfare of workers in Pakistan.

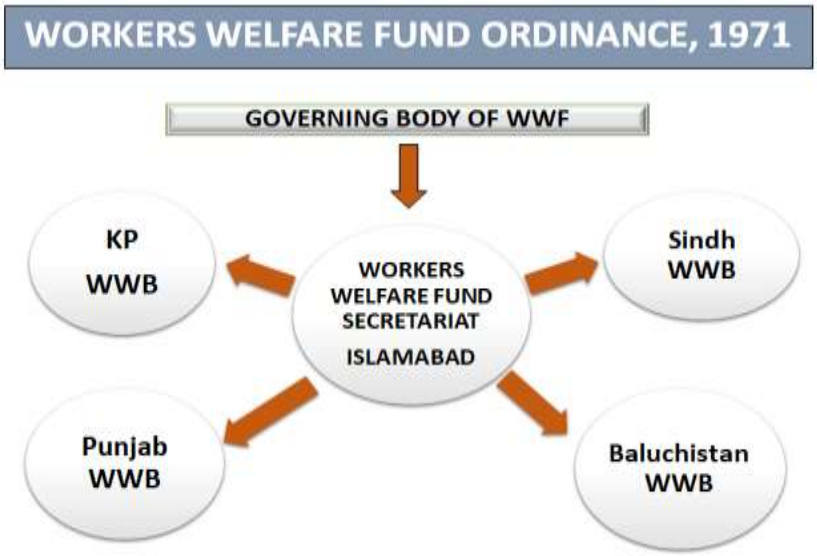
Capacity and Resources

The WWF is an autonomous organization established under the Workers' Welfare Fund Ordinance, 1971. Its administrative control lies with the Ministry of Overseas Pakistanis & Human Resource Development, Islamabad. Four (04) Provincial Workers' Welfare Boards (PWWBs) have been established under the WWF Ordinance, 1971. These PWWBs are funded by the WWF, Islamabad, while their administrative control is entrusted to the respective Provincial Governments.

The WWF receives 2% of the income of industrial establishments under the WWF Ordinance, 1971. Additionally, the leftover amount of 5% of profit, after distribution among eligible workers, is contributed to the fund under the Companies Profit (Workers' Participation) Act, 1968.

As per section 7 of the Workers Welfare Fund Ordinance 1971, a Governing Body constituted of the Fund to whom shall be entrusted the *management* and *administration* of the Fund. The Governing Body shall consist of the Secretary to the Government of Pakistan in the Ministry dealing with matters relating to labor welfare, who shall be its Chairman and not more than Eighteen (18) other members to be appointed by the Federal Government of whom-

- At least One (01) shall be appointed from each Province upon the recommendation of the Provincial Government concerned;
- At least One (01) shall be appointed from each Province from amongst the Workers; and
- At least One (01) from each Province shall be appointed from amongst the Employers.



Provincial Worker Welfare Boards

Provincial Worker Welfare Boards, PWWBs are constituted under Workers Welfare Fund Ordinance, 1971.The following are salient features:

- Four (04) Provincial Workers Welfare Boards are funded by WWF
- Administrative Control is with Concerned Provincial Government.

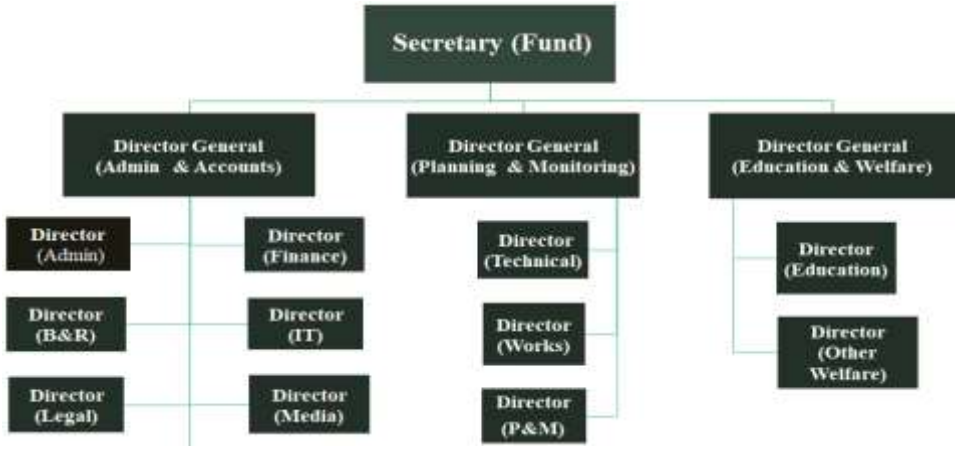
- Budget, Posts and Projects are approved by Governing body, WWF.
- Development Projects are executed by Provincial WWBs.
- Sindh promulgated their own Sindh Workers Welfare Fund Act, 2014 and started collection from Sindh Industrial Establishments in 2016.
- Punjab also promulgated their own Punjab Workers Welfare Fund Act, 2020 and constituted their own Governing Body. Moreover, WWF-Punjab started collection from Punjab Industrial Establishments in 2022.
- Worker Welfare Boards, KP & Baluchistan still follow WWF-Ordinance, 1971 and does not support the devolution of WWF.

HR Strength

HR Strength

Grade	Sanctioned Strength			Filled In	Vacant Posts
	Total	HO	RO		
BS 20 (Secretary WWF)	01	01	-	01	0
BS-20	03	03	-	-	03
BS-19	16	12	04	03 + 02	11
BS-18	24	16	08	17 + 01	06
BS-17	41	23	18	34	07
BS-01 to 16	239	129	110	210	29
Total	**324**	**184**	**140**	**268**	**56**

Organogram



Budget 2020-21

Approved Budget 2020-21	20.85 Billion
Actual Expenditure	9.5 Billion
Revised Estimates 2020-21	9.5 Billion

KP Labor Department

The following are the attached departments:

1. Workers Welfare Board
2. Directorate of Labor
3. Employee Social Security Institution
4. Workers Children Education

Budget

Budget estimates as per Finance Department Medium Term Budget Estimates for Service Delivery 2020-23 are given below:

Budget Estimates: By Outcome(s) & Output(s)

Description	BE 2019/20	BE 2020/21	FBE 2021/22	FBE 2022/23
1. Labour welfare for improved economic activity bringing economic prosperity	**393.281**	**457.529**	**463.1048059**	**486.1420754**
1.1 Improved working conditions and environment	**259.991**	**234.56**	**243.7441501**	**257.702607**
Salary	154.936	116.243	118.56786	120.9392172
Non Salary	86.217	72.866	81.60992	91.4031104
Development/Capital	18.838	45.451	43.56637008	45.36027944
1.2 Promoting welfare of the industrial and commercial labour and strengthening of labour-management relations	**88.057**	**68.969**	**71.74628**	**74.7468536**
Salary	66.475	54.99	56.0898	57.211596
Non Salary	21.582	13.979	15.65648	17.5352576
1.3 Discouraging and combating bonded labour and child labour	**45.233**	**154**	**147.6143758**	**153.6926148**
Development/Capital	45.233	154	147.6143758	153.6926148
2. Improved governance	**196.483**	**148.223**	**151.6642374**	**158.4003255**
2.1 Improved policy, planning, budgeting and monitoring	**66.692**	**41.475**	**42.48902959**	**44.02068488**
Salary	40.391	31.022	31.64244	32.2752888
Non Salary	5.344	5.122	5.73664	6.4250368
Development/Capital	20.957	5.331	5.109949592	5.320359281
2.2 Enforcement of standardized system of weights and measures	**129.791**	**106.748**	**109.1752078**	**114.3796406**
Salary	70.299	55.034	56.13468	57.2573736
Non Salary	47.287	21.496	24.07552	26.9645824
Development/Capital	12.205	30.218	28.96500784	30.15768463
Grand Total	**589.764**	**605.752**	**614.7690433**	**644.5424009**

Punjab

- Non-Development Budget for 2021 - 2022 is RS 737.000 Million (approx)
- Annual Development budget for 2021 - 2022 is RS 335.000 Million (approx)

Sindh

Development Budget for 2021-22 is RS 165 Million

Baluchistan

- Non Development Budget for 2021-22 is 2.3 billion
- Annual Development Budget for 2021-22 is 384 million

Stakeholder Engagement

Stakeholder engagement is crucial for the topic of critical evaluation of labor-related policies, regulations, practices, and welfare activities in the context of industrial development and social protection in Pakistan. Here are some stakeholders that could be engaged in the process:

Government Agencies and Policymakers

Government agencies responsible for labor and social protection policies and regulations, such as the Ministry of Labor and Human Resource Development, the Ministry of Social Welfare and Special Education, and the National Industrial Relations Commission, should be engaged in the process. They can provide information on existing policies and regulations, identify gaps in implementation, and offer suggestions for improvement.

Employers and Business Associations

Employers and business associations, such as the Pakistan Business Council, the Federation of Pakistan Chambers of Commerce and Industry, and the Employers' Federation of Pakistan, should also be involved in the process. They can provide insights into the challenges and opportunities businesses face in complying with labor-related policies and regulations and suggest ways to improve compliance and promote decent work.

Workers and Their Representatives

Workers and their representatives, such as trade unions and workers' associations, are essential stakeholders in the process. They can provide insights into the challenges workers face regarding working conditions, wages, and social protection and propose ways to improve the situation.

Civil Society Organizations

Civil society organizations, including non-governmental organizations (NGOs) and labor rights groups, play a significant role in advocating for the rights and welfare of workers. They can offer valuable insights into the gaps in existing policies and regulations and suggest ways to address these issues.

International Organizations

International organizations, such as the International Labor Organization (ILO), the World Bank, and the Asian Development Bank (ADB), are also important stakeholders in the process. They can provide technical support, resources, and expertise to enhance labor-related policies, regulations, practices, and welfare activities in Pakistan.

Engaging these stakeholders in the critical evaluation of labor-related policies, regulations, practices, and welfare activities in the context of industrial development and social protection in Pakistan ensures that their perspectives and inputs are considered, leading to more comprehensive and effective recommendations.

Labor Market Dynamics

The ingredients of labor market dynamics are complex and multifaceted but generally include the following:

Labor Force Participation

The proportion of working-age individuals who are either employed or actively seeking employment. Pakistan's labor force participation rate increased to 32.3% in December 2021, compared with 32.0% in the previous year.

Employment/Unemployment

The number of individuals who are currently employed, either full-time or part-time, in a particular sector or occupation. Pakistan's unemployment rate for 2021 was 4.35%, a 0.05% increase from 2020.

Job Creation

Pakistan's economy created 5.5 million jobs during the past three years – an average of 1.84 million jobs per year, which is far higher than the yearly average of new jobs created during the 2008–2018 decade, according to findings from the Labor Force Survey (LFS) published by the Pakistan Bureau of Statistics (PBS).

Wage Growth

The rate at which wages are increasing or decreasing within a particular sector or occupation. Pakistan's average monthly wages were reported at 24,028 PKR in 2021, marking an increase from 21,326 PKR in 2019. The data is updated yearly, averaging 12,636.5 PKR from June 2008 to 2021, with 10 observations. The data reached an all-time high of 24,028 PKR in 2021 and a record low of 6,612 PKR in 2008.

Skill Demand

The demand for specific skills within a particular sector or occupation. Skilling, reskilling, and upskilling in Pakistan have traditionally been led by the public sector, a model that comes with its own challenges and limitations. There is a gap between the quality and relevance of training offered and the skilled labor force that industries actually need in market-relevant and demand-driven trades.

In reality, there are fewer private training opportunities, higher costs, and limitations associated with public-sector skills delivery. Beneficiaries struggle to keep pace with technological shifts and rapidly evolving market trends.

Case Study

Parwaaz is an alliance of influential leaders from both the public and private sectors, with a mission to develop a forward-looking approach to reskilling the Pakistani workforce. The name *Parwaaz* signifies "taking flight," and the alliance is committed to elevating the nation's workforce to new heights.
Parwaaz has three primary focus areas: lifelong learning and upskilling, youth employability and future-readiness, and innovative skills funding models. The alliance has identified six sectors as priority areas for the country's future growth: ICT, Financial Services, Textile, Hospitality, Retail and Services, Manufacturing and Light Engineering, and Agriculture and Livestock.

With the support of the Punjab Skills Development Fund, Parwaaz is facilitating collaboration among 42 of Pakistan's leading employers to establish six incubators at the sector level. These incubators aim to identify new and emerging roles for reskilling, upskilling, and new-skilling that will be in high demand in the future. Through these efforts, Parwaaz is proactively building a skilled and competitive workforce capable of addressing future challenges.

Education and Training

The level and quality of education and training required for employment within a particular sector or occupation.

Labor Market Policies

The regulations and policies that affect the supply and demand of labor within a particular sector or occupation, including minimum wage laws, unemployment benefits, and tax incentives for businesses.

Social and Cultural Factors

Education: The level of education among the labor force can affect their awareness and understanding of labor policies and their ability to advocate for their rights.

Gender: Women's participation in the workforce and their treatment by employers and society can impact labor policies and practices.

Social attitudes: Cultural beliefs about work, labor, and social protection can affect how policies are viewed and implemented.

Social inequality: The prevalence of social inequality can impact labor policies and practices, as well as access to social protection and welfare activities.

Cultural factors:

Religion: Religious beliefs and values can shape attitudes towards work, labor practices, and social protection. It is narrated in a hadith that the Prophet (ﷺ) said, “Give employee his/her wages before the sweat is dry on him”. In another hadith, it is related, “The rich, despite his riches, cannot delay of payment to the worker, for it is a crime”.

Traditional customs: Traditional customs and practices can impact labor practices, such as the use of child labor or the treatment of women in the workplace.

Family values: Family values and obligations can impact labor practices, such as the ability to balance work and family responsibilities.

Political culture: The political culture of a society can impact labor policies and practices, such as the level of government intervention in labor issues.

Information Management

In the current labor market, an Information Management System (IMS) is of paramount importance for organizations to effectively manage and utilize their workforce data. By using an IMS, companies can access valuable information on employee performance metrics, skill sets, training records, and other relevant details. This information helps organizations make informed decisions about hiring, promotions, and employee development, as well as identify workforce trends and implement necessary changes to ensure the availability of skilled workers when needed**.**

Moreover, with the increasing complexity of workforce regulations and compliance requirements, an IMS is a critical tool for companies to ensure compliance and avoid potential legal issues. In summary, an IMS is indispensable for organizations seeking to optimize their workforce management strategies and achieve their business objectives.

Unfortunately, as an AI language model, I do not have access to current facts and figures. However, according to the International Labour Organization (ILO), Pakistan's labor force participation rate stood at 56.6% in 2020, with a significant portion of the workforce employed in the agriculture sector. The country's labor laws are complex and can be challenging for organizations to navigate, which highlights the importance of having an effective IMS to ensure compliance.

In Pakistan, the use of technology in the workforce is increasing rapidly, with the country's IT industry experiencing significant growth. According to a report by the Pakistan Software Export Board, the IT industry grew by 47% in 2019, generating revenues of over $2 billion. As the demand for skilled IT workers continues to rise, the need for effective workforce management systems, such as IMS, becomes increasingly important.

Moreover, the textile industry is one of Pakistan's largest employers, accounting for over 40% of the industrial labor force. With the sector experiencing rapid growth, it is essential for organizations to have accurate workforce data to ensure they have the necessary skilled workers to meet demand. An IMS can provide valuable insights into the current workforce and identify emerging trends, enabling organizations to take proactive steps to optimize their workforce management strategies.

In summary, having an effective IMS is essential for organizations in Pakistan to stay compliant with labor laws, manage their workforce effectively, and ensure they have the right skilled workers to meet demand.

Labor Market Information System LMIS

The availability of data, information, and analysis is critical for identifying labor market issues. Labor Market Information Systems (LMIS) play a crucial role in providing a foundation for employment and labor policies, as well as informing the design, implementation, monitoring, and evaluation of policies that are more focused and targeted. LMIS also help reduce the transaction costs of labor markets by providing complete information to labor market agents.

Most countries, including developing economies, are committed to developing Labor Market Information Systems. However, LMIS in developing economies often face various constraints, including data limitations, which can hinder their effectiveness. Despite these challenges, LMIS remains an important tool for policymakers to develop effective labor policies and improve labor market outcomes.

Labor Inspection Management Information System LIMIS

The Labor and Human Resource Department of Punjab has developed the Labor Inspection Management Information System (LI-MIS), which can serve as a model for the development of similar platforms in other regions or provinces. To ensure effective implementation, it may be beneficial to designate a centrally positioned government institution as a "convener" for the development of LI-MIS platforms in other regions or provinces.

GAP ANALYSIS

Current State

There are various labor-related policies and regulations in place in Pakistan, such as the Factories Act, 1934, and the Industrial Relations Act, 2012. The government has implemented several labor welfare activities, including social security schemes, health and safety regulations, and minimum wage laws. However, the implementation and enforcement of these policies and regulations are weak, leading to violations of workers' rights, particularly in the informal sector. The social protection system in Pakistan is limited, with only a small percentage of the workforce covered by social security schemes.

Desired State

The government needs to strengthen the implementation and enforcement of labor-related policies and regulations to ensure workers' rights are protected. There should be more comprehensive and inclusive social protection systems in place to cover all workers, including those in the informal sector. Greater emphasis should be placed on promoting decent work, including job security, fair wages, and safe working conditions. The government should work towards reducing informal employment and increasing formal employment opportunities.

Gaps

The implementation and enforcement of labor-related policies and regulations are weak, leading to violations of workers' rights, particularly in the informal sector. The social protection system in Pakistan is limited, with only a small percentage of the workforce covered by social security schemes. There is limited focus on formal employment creation and a lack of emphasis on promoting decent work. Additionally, the participation of workers and their representative organizations in policymaking and implementation processes is limited.

Plan

- Strengthen the enforcement mechanisms of labor-related policies and regulations, including increased monitoring and penalties for violators, by developing Information Technology platforms for live monitoring. Inspectors/enforcers should be equipped with tablets with pre-set indicators and checklists, which they can use to report to a central dashboard through pictures and videos, along with geo-tagging.
- Develop and implement more comprehensive and inclusive social protection systems to cover all workers, including those in the informal sector. A significant portion (39%) of workers are engaged in the agriculture sector, where labor laws do not currently apply. The Brazilian model, PRONAF, can be used to extend coverage to informal workers.
- For mine workers who are working in extremely deplorable conditions, laws framed after the **Silicosis Case** and the **OSH Act** need to be implemented. Mine workers must be provided with social security.
- Promote formal employment creation through policies and incentives, including skills development programs and tax incentives for formal employment.

- Increase the participation of workers and their representative organizations in policymaking and implementation processes through social dialogue and consultation mechanisms.

By addressing these gaps, Pakistan can work towards improving the protection and welfare of its workers, promoting decent work, and achieving more sustainable and inclusive industrial development.

Performance and welfare Activities of WWF & Labor Department KP

Welfare Measures by WWF

Marriage & Death Grants (From 1999 to 31-12-2022)
Marriage grant @ PRs. 400,000.
Death grant @ PRs. 800,000.

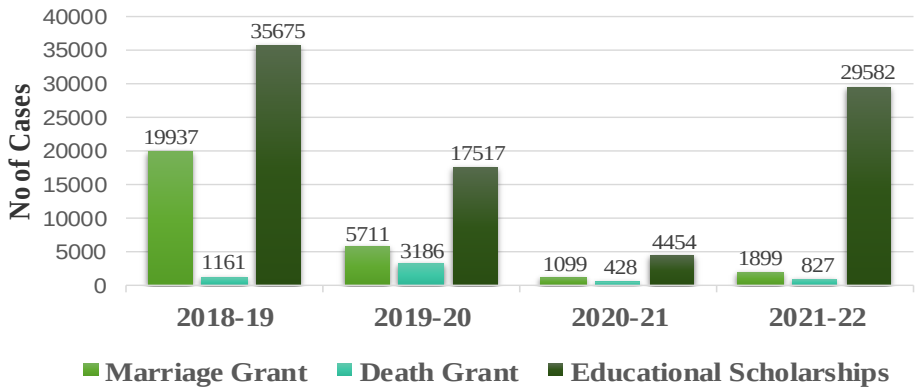
Sr. #	PROVINCE	Death Grant		Marriage Grant	
		No. of Cases	Amount (Rs. in million)	No. of Cases	Amount (Rs. in million)
1	PUNJAB	17,251	6,196.99	113,657	7,768.85
2	SINDH	3,399	1,019.13	45,736	1,900.88
3	KPK	1,896	699.36	15,060	758.94
4	BALOCHISTAN	965	871.68	1,947	87.75
5	ISLAMABAD	699	293.95	2,963	248.96
TOTAL		**24,210**	**9,081.11**	**179,363**	**10,765.38**

Source: Workers Welfare Fund Website

Educational Scholarships

S.N	Financial Year	Scholarship (Rs. In Million)			
		Under-Matric		Post-Matric	
		No. of Cases	Amount	No. of Cases	Amount
1	2016-17	1072	118.669	359	18.984
2	2017-18	1944	936.78	689	93.860
3	2018-19	2622	141.806	861	121.401
4	2019-20	3335	183.439	942	126.227
5	2020-21	1347	76.114	116	13.596
6	2021-22	9681	264.139	1767	233.217
Total		**20,001**	**1720.947**	**4,734**	**607.285**

Source: Workers Welfare Fund Website



Source: Workers Welfare Fund Website

Development Projects

Project	Completed	Ongoing	ICT	Punjab	KP	Sindh	Balochistan
Houses	82	01	01	07	26	21	24
Barracks	08	-	-	-	-	-	08
Flats	39	05	01	10	07	24	02
Schools	157	06	01	45	37	18	62
Technical institutes	36	-	-	02	17	15	02
Hospitals / Dispensaries	89	02	01	07	17	24	42

Source: Workers Welfare Fund Website

Housing and Other Projects (On-going)

- Construction of 1008 Flats and 500 Houses at Workers Welfare Fund, Labor Colony (Phase-I), Zone-V, Islamabad.
- Construction of WWF Office / Commercial Building at F-6, Islamabad.
- Construction of 1200 Flats (Phase-I) and 1000 Flats (Phase-II) at Regilalma Peshawar.
- Construction of 720 Flats (Phase-I), Sundar Industrial Estate, Lahore.

Health Schemes (On-going)

- Construction of 50 Bed Hospital at Chundko, Sindh and will be handed over to Workers Welfare Board Sindh after completion.
- Construction and operationalization of 25 Bedded Hospital at Pishin, Nokundi, Muslim-Bagh, Dalbandin and Chamalang, Balochistan.

Educational Projects / Schemes (On-going)

S.N	Schemes	Fund	KPK	Punjab	Baluchistan
		01	01	02	02
1	On-going	High School Sanghar, Sindh	WFGS Bannu, KP	Girls & Boys High School Sunder complex, Lahore	Girls High School, Distt-Sibi Girls High School So-range, Quetta

Source: Workers Welfare Fund Website

New Proposed Projects for Newly Merged Areas (Fata)

- Establishment of 25 bedded hospitals at District Khurram and Kohat/
- Rescue Centre with ambulance at Orakzai
- Establishment of Vocational Training Centers at District, Khurram, Bajaur, Mohmand Waziristan and Shangla.

GLOBAL BEST PRACTICES

Bangladesh

Establishment of DWCP (Decent Work Country Program) in Collaboration with ILO and LIMA (Labor Inspection Management Application) Bangladesh is the second-largest garment exporter after China. The DWCP is a five-year plan (2017–2020) aimed at protecting the rights and interests of both workers and employers. It ensures decent working conditions based on the following predetermined priorities:

- Effective employment policies to enhance employability through skill development.
- Promotion of a safe and clean working environment as per ILO standards.
- Promotion of fundamental principles at work through social dialogue and tripartism (Government, Employers Federation, and National Coordination Committee for Workers' Education).
- Promotion of social protection for all workers and vulnerable groups, including protection against climate change.

LIMA Digital Platform

The LIMA Digital Platform is an implementation tool designed to improve working conditions and workers' welfare by facilitating and monitoring labor laws and regulations. It is linked to a central server in Bangladesh, allowing various stakeholders to access and interact on the platform. It also serves as a national complaint platform for workers to lodge their grievances. The platform has ensured transparency and discouraged data manipulation.

Implementation Proposal for Pakistan

LIMA can be tailored for Pakistan through the following actions:

- Linking the platform with NADRA's database, as highlighted in discussions with the Director of WWB, Peshawar.
- Conducting mass public awareness campaigns through billboards, electronic and print media, and social media via the Information Department.
- Engaging Islamic scholars and influential figures to educate stakeholders about labor rights and obligations, including fair wages.

Lifetime Employment Model and Worker Participation in Decision-Making in Japan

The lifetime employment model and worker participation in decision-making, as practiced in Japan, encourage workers to take ownership of their workplace. These approaches foster a conducive work environment, improve communication, build trust, and increase employee engagement and job satisfaction.

Recognition and Streamlining of the Construction Labor Force

In India, the construction labor force was streamlined after a landmark legislative move called "The Building and Other Construction Act," which imposes a 1% mandatory cess on the value of construction projects to be paid by the employer prior to the project's commencement. Given the mushrooming growth of the construction industry in Pakistan, with a significant labor force often referred to as "marginalized labor," similar measures could be adopted. This would streamline the labor force, create job opportunities, and ensure social security through a cost-effective mechanism.

The PRONAF Program in Brazil

As an agrarian country where 39% of the labor force is engaged in the agriculture sector, Pakistan's labor laws (nearly 100 laws related to labor) currently do not apply to agricultural workers. A similar model to Brazil's PRONAF (Programa Nacional de Fortalecimento da Agricultura Familiar) can be adopted. PRONAF aims to provide financing and technical assistance to small farmers and rural workers, promote sustainable agriculture practices, diversify production, and ensure access to markets. The PRONAF program has been instrumental in reducing poverty, promoting food security, and fostering rural development in Brazil. It has significantly increased the income and well-being of millions of rural families across the country.

SWOT Analysis

Strengths

- **Legal Framework**: Pakistan has a strong legal framework for labor protection, including minimum wage laws, occupational health and safety regulations, and social protection programs. It has approximately 100 labor laws.
- **Large Workforce**: Pakistan has 71.76 million workers, 54.92 million of whom are men and 16.84 million of whom are women.
- **Government Support**: The government has shown support for labor social protection programs, such as the establishment of the Benazir Income Support Program and other social protection schemes, including Poverty Alleviation Funds, to provide stipends aimed at increasing earnings and alleviating poverty.
- **Rising Labor Force Participation**: Pakistan's labor force participation rate is rising, creating opportunities to expand labor social protection programs.
- **Institutional Frameworks**: Institutional frameworks for workers' welfare are available in all provinces.

Weaknesses

- **Limited Coverage**: Pakistan's labor social protection programs are limited in scope, leaving many workers without access to social protection benefits.
- **Inadequate Funding**: Labor social protection programs in Pakistan receive insufficient funding, limiting their scope and effectiveness. Additionally, Pakistan's limited industrial base restricts the collection of funds.
- **Poor Implementation**: Labor social protection programs in Pakistan are often poorly implemented, with limited monitoring and enforcement mechanisms to ensure compliance with labor laws and social protection regulations.
- **Informal Sector**: A large proportion of Pakistan's labor force is employed in the informal sector, such as agriculture, which accounts for 47% of total labor and is not covered by labor social protection programs.

Opportunities

- **Economic Growth**: Pakistan's economy can expand through projects like CPEC, providing opportunities to broaden labor social protection programs and ensure workers benefit from economic growth.
- **Emerging Technologies**: Technologies such as mobile banking and biometric identification can be leveraged to enhance the delivery and targeting of labor social protection programs.
- **Globalization**: The globalization of labor markets provides Pakistan with an opportunity to improve labor standards and expand social protection programs.
- **Provincial Legislation**: With provinces empowered to enact localized legislation, there is potential for more tailored and effective labor laws.
- **Strengthening Unions**: Empowering labor unions can improve workers' representation and rights.

Threats

- **Political Instability**: Political instability in Pakistan can hinder the government's ability to effectively implement labor social protection programs.
- **Economic Downturns**: Economic downturns can reduce funding for labor social protection programs and increase unemployment, worsening poverty and inequality.
- **Limited Resources**: Pakistan's limited resources may prevent the government from expanding and improving labor social protection programs.
- **External Pressures**: Trade agreements and global economic trends can limit the government's ability to implement labor social protection programs that address the needs of Pakistani workers.

Pakistan has a strong legal framework for labor protection. However, labor social protection programs face challenges due to limited coverage, inadequate funding, poor implementation, and the dominance of the informal sector. While opportunities exist to expand and improve these programs, threats such as political instability, economic downturns, limited resources, and external pressures must be effectively addressed.

Conclusion

Pakistan has a significant labor force, with approximately 71.7 million people engaged in various economic activities. The country has enacted several labor laws to protect the rights of workers, including minimum wage regulations, child labor restrictions, and health and safety standards. Additionally, Pakistan has made efforts to improve social protection measures for workers through various welfare activities and programs.

However, despite these policies and regulations, the implementation of labor laws remains weak, and workers in Pakistan continue to face significant challenges. According to a report by the International Labor Organization, Pakistan ranks 146th out of 190 countries in terms of labor rights and protections. Furthermore, the informal sector employs a significant proportion of the labor force, leaving many workers without adequate protection and benefits.

Moreover, Pakistan faces significant challenges in terms of industrial development, which has limited employment opportunities for workers. The country's manufacturing sector has struggled to compete globally due to a lack of technological advancement and limited investment in infrastructure. The COVID-19 pandemic has further exacerbated the economic challenges faced by workers in Pakistan, with many losing their jobs and struggling to make ends meet.

Despite the existence of more than 100 labor laws, their implementation remains weak. There is a lack of monitoring and enforcement mechanisms, and violators are rarely held accountable, which undermines the effectiveness of labor regulations. Many workers, particularly those in the informal sector, are not covered by social protection measures, leaving them vulnerable to income shocks, illness, and injury. The industrial development of Pakistan has been slow, leading to limited employment opportunities for the growing labor force. This has resulted in high levels of underemployment and informal employment. Many workers in Pakistan work under poor and hazardous conditions, particularly in the informal sector, where safety regulations are not enforced.

In conclusion, Pakistan has made some efforts to protect workers' rights and provide social protection measures, but significant challenges remain. The country needs to strengthen its implementation of labor laws and regulations, promote industrial development to create more employment opportunities, and provide support for workers affected by economic shocks. By addressing these challenges, Pakistan can improve the lives of its workers and promote sustainable economic growth.

Recommendations

Information Communication Technology

Pakistan has enacted hundreds of laws for the labor market, ensuring the protection and welfare of workers and promoting the interests of employers for economic development. One of the basic problems is that the enforcement mechanism is replete with politics, administrative incompetence, corruption, data manipulation, etc. These problems can be solved by establishing IT platforms like MIS, LIMS, etc. Currently, only Punjab has this platform. Other provinces need to develop their own platforms under the supervision of a federal government body.

Develop a National Labor Market Information System (LMIS)

Pakistan needs a comprehensive LMIS that integrates data from multiple sources, including job portals, social media, and government databases. This system should be accessible to policymakers, researchers, and job seekers to help them make informed decisions.

Awareness Campaigns

In Pakistan, awareness campaigns can play a vital role in improving the workforce labor situation. According to the International Labour Organization (ILO), only 30% of the workforce in Pakistan has access to formal employment, while the rest are employed in the informal sector. Awareness campaigns can help educate workers about their rights, including minimum wage laws, child labor laws, and workplace safety regulations. The Pakistan Bureau of Statistics (PBS) reported that in 2020, the labor force participation rate in Pakistan was 53.7%, meaning more than 46% of the population was not actively participating in the workforce. Awareness campaigns can help address this issue by encouraging more people to join the labor force.

Counseling Services

Counseling services can help improve the mental health and well-being of the workforce in Pakistan. According to a survey conducted by the Pakistan Association for Mental Health (PAMH), more than 34% of the workforce in Pakistan suffers from stress and anxiety. This can lead to decreased productivity and absenteeism. Counseling services can help address these issues by providing support to workers and helping them cope with stress

and anxiety. Additionally, counseling services can also help address issues related to harassment and discrimination in the workplace.

Training Programs

Training programs can help improve the skills and productivity of the workforce in Pakistan. According to the World Economic Forum (WEF), Pakistan ranks 125th out of 140 countries in the Human Capital Index, which measures the knowledge and skills of the workforce. Training programs can help address this issue by providing workers with the necessary skills to succeed in the modern workforce. Additionally, training programs can help reduce the skills gap, which is a major issue in Pakistan's labor market.

Health and Safety Measures

Health and safety measures can help improve the working conditions of the workforce in Pakistan. According to the ILO, more than 15,000 workers die each year due to work-related accidents and illnesses in Pakistan. Additionally, the Pakistan Institute of Development Economics (PIDE) reported that in 2020, the incidence of workplace injuries in Pakistan was 8.3 per 100 workers. Health and safety measures can help address these issues by providing workers with safe working conditions and ensuring that they have access to medical care when needed.

Childcare

Childcare facilities can help improve the participation of women in the workforce in Pakistan. According to the PBS, the labor force participation rate for women in Pakistan is only 22%, which is one of the lowest rates in the world. This is primarily due to the lack of childcare facilities in the country. Childcare facilities can help address this issue by providing working mothers with a safe and secure place to leave their children while they work.

Fair Wages and Benefits

Fair wages and benefits can help improve the standard of living for the workforce in Pakistan. According to the ILO, more than 60% of the workforce in Pakistan earns less than the minimum wage, which is currently set at PKR 25,000 per month. Additionally, many workers in Pakistan do not receive any benefits, such as health insurance, sick leave, or paid vacation. Fair wages and benefits can help address these issues by providing workers with a decent standard of living and ensuring that they have access to basic necessities.

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Potential and Prospects of Defence Production in the Context of Industrial Development in Pakistan

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Abstract:

Pakistan's defense industry, established in 1951 under the Ministry of Defence Production (MoDP), plays a significant role in meeting domestic arms and ammunition needs. Despite its long history, the sector has not achieved substantial commercial growth. The defense production industry consists of 20 state-owned enterprises (SOEs) and 145 private sector organizations, producing a range of defense products, from small arms to UAVs. However, limited research and development (R&D) and continued reliance on foreign technology hinder its growth. The sector mainly depends on surplus production for export, but the current capacity is inadequate to meet global demand. Moreover, R&D efforts have not kept pace with technological advancements, resulting in outdated defense products. While Pakistan's defense sector contributes to the national economy, the lack of innovation, along with international financial restrictions (e.g., FATF), impedes its potential. This study assesses the challenges facing the sector and proposes strategies to enhance its capabilities and global competitiveness.

Key words:

Defense Industry, Pakistan, R&D, Technology Transfer, Commercial Growth

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Introduction

Pakistan inherited no ordnance factories after the partition; there were sixteen ordnance factories pre-partition, all located in present-day India. In 1951, Pakistan Ordnance Factories were established to meet domestic arms and ammunition requirements. To make domestic production more self-reliant, the Defence Production Division was created in 1972 to formulate procedures for production, procurement, technological development, growth of the public defense sector, and indigenous production by promoting R&D. The Defence Production Division was granted the status of a ministry, the Ministry of Defence Production (MoDP), in 2004. Under MoDP, there are 20 SOEs and 145 private sector organizations where defense-related equipment ranging from small arms and ammunition to UAVs, tanks, and aircraft are locally manufactured. These products are primarily used domestically, and the surplus is utilized for commercial purposes, contributing to the overall industrial sector of Pakistan. Although the defense production industry has been operational for the last seven decades, no visible commercial growth has been achieved. Reliance is still placed on the transfer of technology from foreign countries due to weak R&D. Furthermore, the involvement of the private sector in the defense industry remains a gray area, which is a huge setback.

Statement of Problem

The Defense Industry of Pakistan was established in 1951 under MoDP, and for the last seven decades, it has been producing a wide variety of defense-related equipment, which also contributes to the overall industrial sector of Pakistan. However, this part of the industrial sector contributes only a fraction to total industrial development, even though it has been in existence for decades. This situation warrants an analysis of the potential and prospects of the defense industry, diagnosing the fault lines, and proposing means for improvement.

Scope Of Research

This simulation exercise focuses on the production potential of the defense industry for domestic consumption and exports, the factors that are hampering its growth, an analysis from various perspectives, and providing viable solutions to enhance the contributions of this industry to the overall industrial development of Pakistan.

Research Methodology

A qualitative method of research was conducted after obtaining data from both primary and secondary sources. Relevant books, research papers, journals, and websites were consulted for data collection, and situational, stakeholder, comparative, critical, SWOT, and GAP analyses were conducted.

Literature Review

As this research is specific to armaments, secondary data availability is limited. Considering the research scope, secondary data was collected and analyzed through the study of limited available articles, reports published by SIPRI (Stockholm International Peace Research Institute), World Bank, IMF, and a variety of relevant material available on the World Wide Web, the official website of the Ministry of Defence Production (MoDP), and the Defence Exports Promotion Organization (DEPO). Due to the uniqueness of the study scope, specific articles, reports, and studies on the subject are not available for review. Efforts have been made to analyze the Defense Production Units of Pakistan, opportunities in the international market, challenges, and workable recommendations to enhance the substantial level of sales that ultimately contribute to the national economy. Political changes in the world, the core order of economic shaping, regionalism, the desire for control of energy and natural resources, nuclear proliferation, and the world order are continuing trends that have an influence on Pakistan's economy in a global context (Jochen Hippler et al., 2022). The double face of globalization presents both opportunities and threats for Pakistan. Pakistan has a location advantage and can link with South Asia, Central Asia, West Asia, or the Middle East through Gwadar Port. However, Pakistan remains exposed to the effects of globalization and has less influence on it compared to global economic giants like the USA, EU, and China. The Soviet Union substituted the changing world order with uncertainty, increasing pressure on governments to make adaptive national security decisions in light of changing social, political, and economic pressures. They focused on maintaining an appropriate national defense capability and emphasized the reduction of costs to maintain domestic industry through privatization, actively engaging private investors in international defense product trade. They formed alliances and pooled resources as vital components of national security.

The Defense Industry of Pakistan is a state-owned industry that deals with arms/ammunition, the purchasing and retailing of weapons, ammunition, and other military/defense products. Contrary to adaptive decisions in the changing environment of globalization, the development of the defense sector is dictated by the requirements of the armed forces.

The Defense Industry of Pakistan relies on technology transfer (ToT), even for a single product. Decisions on inducting any product are usually taken with strategic requirements in mind rather than market needs. Limited budget investment in R&D activities for product innovations has hindered the diversification of products. However, Pakistan's defense production units have potential for conventional arms and ammunition for the region. The geopolitical situation surrounding Pakistan has changed rapidly in the past few years, and this changing situation may continue at an even faster pace in the coming years. Many changes in the South Asian region, the interests of India and Europe in Afghanistan, and the collapse of several Middle Eastern states, as well as rampant sectarian and proxy civil wars, have altered the scenario and choices for countries. Pakistan is also facing the effects of conflicts and aggression from neighboring countries. The security situation, both internally and externally, is more complex compared to previous decades (Dr. Rasul Bakhsh Rais, 2022). The crisis between Russia and Ukraine has created both opportunities and threats for the countries in the region. Currently, the crisis is limited to Ukraine, but there are fears it may spill over and last longer than anticipated. If this happens, many countries, including Pakistan, will face grave challenges. This crisis has opened opportunities for the global market, including Pakistan, to trade and invest with neighboring and regional economies (Dawn, 2022). Pakistan cannot remain aloof from the changing world order, as it directly impacts its economic and security policies. Presently, Pakistan faces a major threat: the balance of payments crisis. Pakistan has not succeeded in securing oil from Russia at low prices, while India, China, and Bangladesh have successfully shielded their populations from rising prices. However, economic opportunities for Pakistan abound in the multipolar world order. In just a few months after the start of the crisis, both Russia and Ukraine exhausted their stocks of conventional weapons and are now looking for new supply sources. In this context, Pakistan has the opportunity to supply conventional weapons to Ukraine and escape the threat of defaulting on external debt payments. Pakistan is supplying weapons to Ukraine with the help of British Airways, according to a new report by Ashish Dangwal (October 7, 2022). Pakistan is capitalizing on the export opportunity for conventional defense products. However, diplomatically, Pakistan faces the challenge of maintaining ties with both Russia and the West, including the US and EU.

Legal and Institutional Framework

Legal Framework

The defense industry operates under the ambit of several legislations, which are essential for understanding this sector.

Rules of Business 1973

Rules 7 and 8 of the Rules of Business 1973 lay down policies or guidelines on all matters related to defense production, such as procurement of defense products, R&D of defense equipment and stores, indigenous production and manufacturing of defense equipment, MOUs for the purchase of military stores, transfer of technology, and so on.

POF Board Ordinance 1961

This ordinance governs the functioning of POF Wah, which operates in the form of a board consisting of three members: a chairman, a financial adviser, and a director of industrial and commercial relations. The main functions of this board are to run the factories, produce to meet domestic requirements, and export the surplus for commercial benefits, while also focusing on capacity building for R&D in production.

Heavy Industries Board Act 1997

HIT also functions as a board headed by a chairman (appointed by the Federal Government on the recommendation of the Chief of Army Staff) and five members. HIT has the mandate to manufacture products for national consumption and to utilize the surplus capacity to meet the requirements of the civilian population and friendly or brotherly countries.

Pakistan Aeronautical Complex Board Ordinance 2000

This is a five-member board with a chairman (appointed on the recommendation of the Chief of Air Staff). The main function of the board is to manage the affairs of the factories and operate them on sound commercial lines to meet domestic consumption needs and utilize surplus capacity for commercial gains. It also works to enhance the R&D capabilities of the factories in production.

Institutional Framework

The Ministry of Defence Production (MoDP) and Defence Exports Promotion Organization (DEPO) are two government-owned entities that play a key role in Pakistan's defense industry.

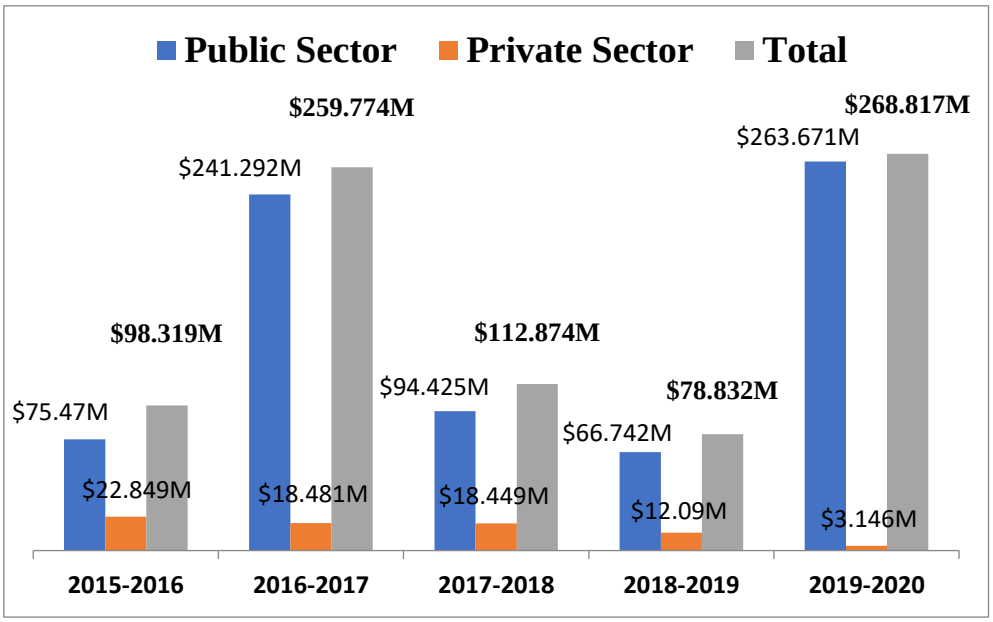
Role of MoDP

The defense production sector is regulated by the Ministry of Defence Production (MoDP), which was created in 1972 and is responsible for ensuring the manufacturing or procurement of arms, weapons, and ammunition for the three services. The main objectives and functions of the Ministry of Defence Production Division are:

- Import replacements through indigenization
- Achieving self-reliance
- Maintaining the current system with minimal imports
- Involving the local industry in defense production
- Producing cost-effective and competitive equipment
- Generating funds by exporting defense products
- Research and development of defense equipment
- Procuring equipment for defense purposes and securing foreign loans or assistance
- Achieving balance in the economy via optimal production and procurement

Role of Defence Exports Promotion Organization

The Defence Exports Promotion Organization (DEPO) is a government-owned organization. Its mandate is to ensure coordination with international customers' requirements for exporting high-quality products. Furthermore, it helps promote Pakistan's defense products globally in coordination with MoDP and ensures the presence of defense products at various national and international events. The Pakistan Naval Show was inaugurated by DEPO in 1999. The International Defence Exhibition and Seminars (IDEAS), which started in 2000, created an opportunity for the public and private sectors involved in the defense industry to access the international market and gain exposure to international trends and modern technology. DEPO is also tasked with organizing seminars and conferences where the defense sectors of participating embassies take part. The core objectives of these exercises are to introduce Pakistan's defense products and facilitate defense exports. The table below provides details of defense exports from Pakistan:



Source: (MODP & DEPO)

Heavy Industries Taxila (HIT)

HIT was established in 1971 and manufactures main battle tanks (MBT), armored recovery vehicles (ARV), and armored personnel carriers (APC). It also rebuilds and modernizes armored vehicles. HIT develops, markets, and undertakes heavy engineering works for Pakistan's military as well as for civilian law enforcement agencies. Surplus capacity is utilized to meet the demand of friendly countries. Prominent defense and commercial products of HIT are:

Defense Products:

- Tank Al-Khalid
- Tank Al-Zarrar
- APC Saad
- APC Talah
- Command Post Carrier (SKAB)

Commercial Products:

- Armored Land Rover Defender 110
- Armored Toyota Altis 1.8 VVTI
- Armored Toyota Land Cruiser
- Armored Toyota Hilux VIGO
- Mohafiz Hybrid

- Mohafiz-II
- Mohafiz-III
- Armored Guard Post 1 Man
- Armored Guard Post 2 Man
- Bomb Blanket
- Hifazat
- North Benz 6x4 Prime Mover

Institute of Optronics (IOP), Rawalpindi

IOP manufactures night vision devices and scopes essential for the night operations of the armed forces and law enforcement agencies of Pakistan.

Karachi Shipyard and Engineering Works (KS&EW), Karachi

KS&EW is the only shipyard in Pakistan, catering to shipbuilding, ship repair, and general heavy engineering works. It has played an important role in transferring technology and broadening the industrial base of the country. KS&EW develops a variety of ships that meet the quality and reliability requirements of national and international clients. KS&EW performs complete construction, erection, painting and blasting, outfitting equipment tests, and trials, adhering to major classification societies such as Lloyd's Register for Shipping, Bureau Veritas, and China. The following are some of the services and projects of KS&EW:

Services:

- Shipbuilding
- Ship repair
- Material testing laboratory
- Shipyard Institute of Technology

Projects:

- F22P Frigate
- Small Tanker Cum Utility Ships (STUS)
- GOSTA 90B Submarine
- Jalalat Class Missile Boat
- Fleet Tankers
- Coastal Oil Tanker Floating Dock

National Radio Telecommunication Corporation (NRTC), Haripur

NRTC produces stable and reliable high-tech communication equipment and solutions. NRTC develops and manufactures military and commercial telecommunication equipment, electronic systems, and IT solutions through indigenous R&D.

Global Industrial & Defence Solution (GIDS)

GIDS is a state-owned corporation and an emerging industry with vast potential in developing high-tech export-quality products for air, land, naval, and security sectors. GIDS is involved in the export and marketing of military, industrial, and technological products and services. A list of products manufactured by GIDS includes:

Air Systems:

- Shahpar UAV
- Uqab UAV
- Huma Tactical UAV
- Scout Mini-UAV

Land Systems:

- PAKFIRE - Artillery Fire Control System
- PAKSIM - Artillery Forward Observer Simulator
- Negahbaan Day/Night Surveillance System
- NOD Night Observation Device
- Baktar Shikan - Anti-tank Guided Missile Weapon System

Naval Systems:

- Slim Line Towed Array-Sonar for Naval Application
- Bridge Pilotage Simulator (BPS)
- Action Speed Tactical Trainer (ASTT)
- Naval Police Boat

Nuclear Biological and Chemical (NBC) Systems:

- NBC Defense Suit
- Individual Protective Equipment
- HEADS: High Efficiency Advanced Decontamination System

Security Systems:

- Ballistic Helmets
- Metallic Mine Detector
- Non-metallic Mine Detector
- Explosive Detector
- Stun Grenade
- Tear Gas Shell
- Walk-through Scanning Gate

Pakistan Aeronautical Complex (PAC), Kamra

PAC manufactures, repairs, and maintains radar and avionics systems. The premier product manufactured by PAC is the JF-17 Thunder, along with Mushshak and Super Mushshak. PAC also manufactures the Karakorum-8 (K-8), a joint venture aircraft with the Nanchang Aircraft Manufacturing Company (CNMC) of China, used for basic operational jet training for newly inducted pilots.

Pakistan Machine Tool Factory (PMTF), Karachi

PMTF is engaged in the manufacturing of precision and high-tech engineering goods. The product range includes conventional and CNC machines, various automotive products, and defense products such as launchers for light, medium, and heavy mortars.

Pakistan Ordnance Factories (POF)

POF consists of 14 ordnance factories and three commercial subsidiaries. POF manufactures various types of explosives and ammunition and also has facilities for the manufacture of brass, copper, and aluminum ingots and extrusions. The list of products manufactured at POF Wah includes:

- Infantry Weapons
- Small Arms Ammunition
- Artillery Ammunition
- Mortar Bombs
- Aircraft & Anti-aircraft Ammunition
- Tank and Anti-tank Ammunition
- Military Explosives & Propellants
- Rockets
- Grenades
- Commercial Explosives

People Steel Mills Ltd, Karachi

People Steel Mills Ltd in Karachi, Pakistan, is a world-class alloy and special steel manufacturing plant. This plant has the capability to produce steel that meets international military standards. A diverse base of customers includes high-profile end users in automotive, defense, machinery, construction, special/high-rise buildings, transportation, and engineering sectors. Components manufactured at this plant are supplied to renowned European and Japanese automobile manufacturers.

Precision Engineering Complex (PEC), Karachi

PEC manufactures high-precision parts for the aerospace industry, which are used for the cohesion of various engine parts and in other industries. PEC works with world-renowned companies such as General Electric, Airbus Industries, and Boeing.

The services of PEC also include cutting a wide range of basic and exotic materials, including hard steels and aluminum alloys, as well as machining a variety of castings, forgings, and extrusions.

Private Sector Defense Production Companies in Pakistan

There are 145 private sector defense production companies in Pakistan. Some of the notable ones include:

Integrated Dynamics

ID is a privately owned company that develops high-tech unmanned aerial vehicles (UAVs) and has greater potential than state-owned enterprises to broaden Pakistan's industrial base in defense production. A list of UAVs developed by ID is given below:

- Military UAVs
- Civilian UAVs
- Aerial target UAVs
- Multicopters
- Unmanned marine vehicles
- Unmanned ground vehicles
- Flight control
- Telecommand
- Ground control stations
- Antenna tracking systems
- Video and data downlinks

Daud Sons Armory (Pvt) Ltd

A private defense production company specializing in small firearms, mortars, parts, and ammunition for tanks and aircraft.

Sysverve Aerospace

Sysverve Aerospace is a leading provider of unmanned air target systems for live-fire training and weapon system tests and evaluations in Pakistan. Sysverve designs and develops surveillance and combat UAVs. The total annual capacity is 500 drones.

BSF Associates

BSF Associates is a private defense production company producing ballistic protection products and providing ballistic body armor tailored to customers' needs and comfort. It also produces bomb suppression blankets and letter bomb containment bags.

Role of Universities and Research Institutions

To provide a research base for the defense industry of Pakistan, several universities and research organizations are working as discussed below:

National Defence University

This university has several defense research centers, such as the Center for Aerospace and Security Studies (CASS), which focuses on topics like aerospace technology, defense production, and economic diplomacy. The Center for International Maritime Affairs (CIMA) is involved in research on maritime security and the blue economy.

Pakistan Defence Engineering Council (PDEC)

PDEC focuses on the design and development of defense systems and equipment.

Pakistan Council of Scientific and Industrial Research (PCSIR)

This center conducts research in various fields related to the defense industry. The Materials Research Division conducts material research on composites, ceramics, and polymers that can be used in defense systems. Similarly, the Applied Chemistry Research Center (ACRC) focuses on research in explosives, propellants, and chemical warfare. In addition, the Precision Systems Training Center (PSTC) is involved in the development of precision systems for defense applications and provides training in areas such as electronics, optics, and mechanical engineering relevant to the development of precision systems. Another unit, the Technology Development Fund (TDF), provides financial support for research and development in projects that have the potential to be incorporated into defense production. Finally, the Center for Applied Molecular Biology (CAMB) conducts research in molecular biology and biotechnology, which helps in the defense-related field of biodefense.

Potential Defense Products for Industrial Growth

The products of the defense industry include a wide range of small arms, artillery, ammunition, missiles, military vehicles, night-vision devices, ships, and more. The defense industry also provides other operational and logistical support. Pakistan's exportable defense products can be categorized as follows:

- Small Arms and Ammunition
- Artillery Ammunition
- Tank and Anti-Tank Ammunition
- Mortars and Launchers
- Aircraft and Anti-Aircraft Ammunition
- Military Telecommunication
- Naval Ships
- Fighter Jets
- Unmanned Vehicles/Drones
- Missile Technology
- Military-Grade Raw Materials and SKDs of Ammunition
- Military Uniforms and Personnel Load Carrying Equipment

Situational Analysis of the Legal & Institutional Framework

Almost 95% of defense production is manufactured by state-owned enterprises (SOEs), with only 5% contributed by private organizations. All the legal frameworks are designed to facilitate SOEs, which has led to a monopoly in the defense industry that hampers the growth of the private sector. Moreover, the cumbersome legal procedures pose a significant threat to the private sector's growth, as it is nearly impossible for private organizations to obtain a license from MoDP to independently manufacture tanks, aircraft, UAVs, etc., due to the prevailing security situation in the country.

As outlined in the legal frameworks of POF, PAC, HIT, etc., it is the mandate and responsibility of these bodies to carry out research and development to broaden the capabilities of defense production in Pakistan, but little to no efforts have been witnessed in this regard in the last seven decades. Furthermore, Pakistan's defense industry relies heavily on technology transferred by friendly countries like China and Turkey. The end products of these technologies cannot be used unilaterally by Pakistan for commercial purposes, which hampers the industrial prospects of the country. Institutes working in defense production have exclusive rights for the production of heavy machinery like aircraft, tanks, and heavy ammunition. Except for Integrated Dynamics (a private organization producing various AI systems), there is little visibility of the private sector in Pakistan's defense industry. Additionally, these institutions are reluctant to involve private entities and are not expanding their operations to other parts of the country.

Stakeholder Analysis of Organizations in Defense Production in Pakistan

The main stakeholders in Pakistan's defense industry include the federal government, armed forces, SOEs, private organizations, universities, and research institutes.

Federal Government

The federal government is the primary stakeholder in the defense industry, working to promote overall industrial growth in the country. All legislation related to the growth of the defense industry originates from it. However, the legal framework provided by the federal government favors SOEs, with no supportive legislation allowing private sector involvement in the defense industry.

Armed Forces of Pakistan

The majority of defense production is consumed locally by the armed forces of Pakistan, and the surplus is utilized for commercial growth. The heads of SOEs are appointed from the armed forces to manage the defense requirements of the armed forces.

State-Owned Enterprises

SOEs account for 95% of the total defense-related production. These organizations are primarily focused on meeting the defense needs of Pakistan's armed services, with some efforts directed toward reaching international markets for industrial growth. This suggests that SOEs lack the potential to significantly contribute to the broader industrial sector in Pakistan. The involvement of private organizations in the defense industry is minimal.

Private Sector

The private sector has significant potential to contribute to Pakistan's industrial growth. However, it faces numerous barriers, including the lack of a specific legal framework for private sector involvement, the monopoly of SOEs, a lack of technology transfer from the state, limited government incentives, and the security situation over the past five decades.

Universities and Research Institutions

Research plays a vital role in the development of any industry, including the defense industry of Pakistan. Several research and development centers are operating at various institutes to support the growth of the defense industry. However, this side of the industry has failed to integrate innovative technology for commercial viability and domestic excellence. Consequently, Pakistan's defense production remains heavily reliant on the transfer of technology from foreign countries.

Comparative Analysis Of The Defense Industry Of Pakistan, Turkey, And Israel

Defense Industry of Pakistan

Pakistan is a major player in the defense industry, with a well-established defense production base. The country has various facilities that produce advanced defense equipment, including aircraft, naval vessels, and missiles. Pakistan has a strong aerospace industry, with several companies specializing in aircraft production, such as the Pakistan Aeronautical Complex (PAC). Additionally, Pakistan has a robust nuclear program that contributes to its overall defense production capacity.

Defense Industry of Turkey

Turkey is another significant player in the defense industry, with a rapidly growing defense production base. The country has made substantial investments in the defense sector in recent years, leading to the establishment of several defense companies. The Turkish arms industry grew from $1 billion in 2002 to $11 billion in 2020, with more than $3 billion in exports, making Turkey the 14th largest global defense exporter. These companies produce a wide range of defense equipment, including aircraft, naval vessels, and missiles. Turkey focuses strongly on developing its own defense technologies, with several initiatives aimed at fostering indigenous defense capabilities.

Defense Industry of Israel

Israel is considered to have one of the most advanced defense industries in the world, with a well-established defense production base. The country has several companies specializing in advanced defense equipment, including aircraft, naval vessels, and missiles. Israel is also a world leader in the development of unmanned aerial vehicles (UAVs) and has developed several advanced systems in this field. Additionally, Israel has a robust nuclear program, which contributes to its overall defense production capacity.

Comparison Of Incentives and Financial Support To Defense Production Industry

S.No	Support	Pakistan	Turkey	Israel
1	Research and development support:	✓	✓	✓
2	Financial support:	✓	✓	✓
3	Export support:	✓	✓	✓
4	Collaboration support:	✓	✓	✓
5	Tax incentives:	✓	✓	✓

These measures are intended to stimulate investment, innovation, and growth in the defense industry, while also enhancing the country's overall defense capabilities.

Comparison of the Regulatory Framework for Defense Production

The following is a comparison of the regulatory framework for the defense production industry in these three countries:

S.#	Pakistan	Turkey	Israel
	The Ministry of Defense Production (MoDP) is responsible for regulating the defense production industry in Pakistan. The MoDP regulates the import, export, and production of defense products and services. The Pakistan Defense Export Promotion Organization (DEPO) is responsible for promoting and facilitating defense exports. The MoDP also provides licenses for the manufacturing of defense products.	The Under secretariat for Defense Industries (SSM) is responsible for regulating the defense production industry in Turkey. The SSM regulates the procurement, production, and export of defense products and services. The SSM also provides licenses for the manufacturing of defense products.	The Israeli defense industry is regulated by several government bodies, including the Ministry of Defense, the Ministry of Economy, and the Israel Defense Export Control Agency (DECA). The Ministry of Defense regulates the import and export of defense products, while DECA regulates the export of defense-related products and technologies. The Ministry of Economy is responsible for promoting and supporting the Israeli defense industry.

Overall comparative Analysis of Defence Industry of Pakistan, Turkiye and Israel

s.#	Pakistan	Tukey	Israel
CONTRIBUTION IN DEFENCE PRODUCTION			
1	90% state owned 10 % private sector	30 % state owned 70 %private sector	20% state owned 80% private sector
PRODUCTION CAPACITY OF TANKS, UAVs and Aircrafts			
2	50 (max) Tanks per year	250 (max) Tanks per year	Israel manufactures one of the top tanks of the world, i.e. Merkava-V. However, no record of annual production capacity is available publically.
	Pakistan has a relatively young UAV program. The country has developed and produced several UAVs for military and civilian applications, but its capabilities are generally considered to be less advanced. Some of the most well-known Pakistani UAVs include the Burraq, the Shahpar, and the Uqab	TAI Aksungur: The TAI Aksungur is a MALE UAV developed by Turkey. It has a maximum speed of 230 km/h and a range of up to 6,000 km. The TAI Aksungur is primarily used for surveillance and reconnaissance, but can also carry payloads such as communications and electronic warfare equipment.	Israel has been at the forefront of UAV development for many years, and its defense companies have produced some of the most advanced UAVs in the world. Israeli UAVs are known for their high quality, reliability, and advanced capabilities. Some of the most well-known Israeli UAVs include the Heron, the Hermes, and the Skylark.
	Pakistan Aeronautical Complex has annual Aircraft production capacity of 25 number JF-17 Thunder. Additionally, it also manufactures Mushak/Super Mushak trainer Aircrafts	Turkish Aerospace Industry manufactures 48 number of (F-16 Fighting Falcon) and 50 – 60 number of TF-X Aircrafts annually.	Israel manufactures 20-24 F-16 Fighting Falcon aircrafts annually. While it also manufactures 5th generation F-35 Lightening II (stealth technology) Aircrafts
RESEARCH & DEVELOPMENT			
3	2.6 % of total Defence Budget	5% of Total Defence Budget	4.5 % of Total defence budget
EXPORTS OF DEFENCE PRODUCTIONS			
4	268 Million US $ in 2020	2.7 Billion US $ in 2020`	8.3 Billion US $ in 2020`

CONTRIBUTION IN GLOBAL MARKET (1.9 TRILLION US$)			
5	0.051%	0.9 %	2.4 %
COST EFFECTIVE (LABOR CHARGE PER DAY)			
6.	2.94 US$	15 US$	50 US$

Analysis of the Growth of the Turkish Defence Industry

Turkey has implemented various policies to promote public-private partnerships (PPPs) in the defense industry, aimed at increasing domestic production and reducing dependency on foreign suppliers. Some of these policies include:

1. **Legislative Framework**: Turkey has enacted laws and regulations to establish a legal framework for PPPs in the defense industry. The Public Procurement Law and the Law on the Promotion of Private Sector Investment are examples of laws that support PPPs in the defense industry.

2. **Technology Transfer**: Turkey has encouraged technology transfer from foreign defense companies to local partners. This is aimed at building local capacity and promoting knowledge transfer to Turkish companies.

3. **Local Content Requirements**: Turkey has implemented local content requirements in defense procurement contracts. This means that a certain percentage of the value of the contract must be produced locally, which encourages the involvement of Turkish companies in the defense industry.

4. **Incentives**: Turkey has introduced various incentives to encourage private sector participation in the defense industry. These include tax incentives, financial support, and preferential treatment in government procurement.

5. **R&D Support**: Turkey has provided support for research and development (R&D) activities in the defense industry. This includes funding for R&D projects and the establishment of research centers to support innovation and technology development.

Overall, these policies have helped to promote PPPs in the defense industry in Turkey, which has led to increased domestic production and a reduction in dependency on foreign suppliers.

Comparative Analysis of Pakistan Ordnance Factories (POF) Working with the Private Sector

Pakistan Ordnance Factory

Pakistan Ordnance Factories (POF) is a government-owned defense production organization in Pakistan. POF was established in 1951 and currently comprises 14 defense production units. POF manufactures conventional arms and ammunition primarily for the Armed Forces of Pakistan, law enforcement agencies, and additionally for commercial use and export.

Comparative Analysis with the Private Sector

Private sector companies in Pakistan also engage in defense production. There are 145 private sector defense production companies in Pakistan. Some of the notable ones include:

a. **Daud Sons Armory (Pvt) Ltd.**: A private defense production company specializing in small firearms, mortars, parts, and ammunition for tanks and aircraft.

b. **Integrated Dynamics**: A defense production company that develops and manufactures unmanned aerial vehicles (UAVs) for surveillance, reconnaissance, and intelligence gathering.

c. **Sysverve Aerospace**: Sysverve Aerospace is a leading provider of unmanned air target systems for live-fire training and weapon system test and evaluation in Pakistan. Sysverve designs and develops surveillance and combat UAVs. The total annual capacity is 500 drones.

d. **BSF Associates**: BSF Associates is a private defense production company producing ballistic protection products and providing ballistic body armor as per customer needs and comfort. It also manufactures bomb suppression blankets and letter bomb containment bags.

Following is a comparative analysis of POF's best practices with the private sector (Daud Sons Armory) in Pakistan:

S.No	Category	POF (SOE)	Private sector
1	Quality control compliance	✓	✓
2	Collaboration with international companies and organizations	✓	X
3	Investment in capacity building of employees	✓	✓
4	Production capacity	Large scale	Small scale
5	Export	Globally (Large scale)	Globally(Small scale)
6	Relaxations/Benefits	access to certain	private sector

		resources and benefits	companies do not have access to benefits.
7	Innovation	Innovative defense products	private sector companies have more flexibility in experimenting with new ideas and technologies.
8	Multiple productions	112 products	DSA has now expanded its line of production from Sporting Arms, Rifles, and Pistols to the International Standard Pump Action shotguns **"SHOOTER"** and also to sophisticated **Airborne Armaments**

Critical Analysis of The Defence Industry of Pakistan

Product Quality

Pakistan's defence industry faces various challenges and limitations, along with opportunities. The primary factors responsible for these difficulties are the lack of institutional interest in defence exports, inadequate focus on marketing quality, absence of coherent product development and prioritization, insufficient private sector efforts for defence production modernization, and a narrow concentration on manufacturing small arms for the armed forces without considering the needs of the international market. Furthermore, Pakistan's Defence Production Units manufacture arms and ammunition that are unable to compete with more responsive international market competitors. Additionally, the armed forces generally lack interest in research and development, and joint ventures with other countries may potentially hinder Pakistan's domestic industry. The solution to these issues is closely related to the leadership and management of these organizations and can be addressed by prioritizing product quality development, innovation, and effective marketing strategies to cater to the international defence market. Pakistan's defence industry is not yet self-sufficient in developing new or innovative products that meet international standards, due to weak research and development, reliance on foreign countries for technology transfer, and the need for sophisticated plant and machinery to meet military standards.

Non-Involvement of the Private Sector

Globally, the defence industries of countries are typically operated through a public-private partnership, with most defence industries being private or independent entities regulated by the government. These entities operate on purely commercial lines and are driven by market needs. In contrast, the majority of Pakistan's defence industry is owned by the government and lacks the necessary funding for investing in research and development for introducing new products. While the public sector receives budgets to meet the requirements of the armed forces, it must divert resources for the export of defence products. In Pakistan, the defence industry does not have the required level of independence due to the fact that most defence production is governed by state-owned entities (SOEs), which are directly controlled by the armed forces. These SOEs function like armories that only produce new weapons or products as per the requirements of the armed forces. The Defence Production Units in Pakistan, such as Heavy Industries Taxila (HIT), Pakistan Ordnance Factories (POF), Pakistan Aeronautical Complex (PAC), and Karachi Shipyards & Engineering Works (KSEW), are directed by the armed forces on processes and product innovation at all times. However, Pakistan's defence industry is making efforts to expand the exports of defence-related products despite financial constraints and by reviewing other export-related policies.

International Restrictions

Pakistan has faced significant bans and restrictions on international trade and imports of various plants and machines since 9/11, and especially after becoming a nuclear power. The United States and the European Union have been strict about the non-proliferation treaty and have consequently imposed bans on defence-related Pakistani trade, imports of specialized plants and machinery, and transfers of technology. International treaties on arms trade, as well as India's dominance in falsely convincing the world that Pakistan is a source of terrorist activities, have not only damaged Pakistan's image internationally but also resulted in a decline in defence-related exports and under-utilization of its potential. From June 2018 to October 2022, Pakistan was placed on the FATF grey list, which is a jurisdiction under increased control. Pakistan was forced to resolve the identified strategic deficiencies within FATF's timeframes. Research has shown that FATF restrictions have resulted in losses of over $38 billion to Pakistan's GDP (Aziz, 2022). The adverse economic effects of being on the grey list are increasingly evident, and they have an impact on foreign direct investment (FDI) and the ease of doing business. Hostile states have also used Pakistan's status to damage its reputation as a responsible member of the international community.

Raw Material

To maintain the quality of conventional arms and ammunition in defence products during manufacturing, it is crucial to have a reliable supply of specified standard raw materials. Unfortunately, the defence industry of Pakistan faces challenges in this area, as it relies on foreign countries for the supply of necessary raw materials. Since the 9/11 terror attacks, due to the threat of terrorism, there have been shortages of specified raw materials in the international market, especially for a Muslim third-world country, which is a growing concern for Pakistan and its defence industry's quality standards. While China has become one of the major suppliers of raw materials to Pakistan's defence industry in recent years, the quality of its materials has been compromised, affecting the country's defence output. As a result, Pakistan's defence industry has limited regional options for potential exports, primarily in the Middle East and African countries. The use of low-grade steels has led to compromised quality of defence products, making it difficult for the country to compete with the quality of competitors' products in the international market.

Since steel makes up nearly 90% of the raw materials required in the defence industry, the underdeveloped steel industry in Pakistan has forced its defence industry to rely on private steel suppliers or China as an alternative. This reliance on these sources has raised serious concerns about the quality of the materials used in Pakistan's defence industry. In the past decade, People Steel Mills in Karachi was one of the main beneficiaries of steel requirements for the defence industry in Pakistan.

Internal Security Challenges

In the past two decades, internal security challenges in Pakistan have been a significant concern, reducing international interest in the country's defence industry. The primary focus of the defence industry has been to serve the armed forces, resulting in a decrease in surplus production capacities and a reduction in defence exports. Despite minor fluctuations, defence exports have increased in recent years, mainly due to improved internal security and events like the IDEAS trade expo, which have attracted more international companies to approach Pakistan for defence exports. The improved internal security situation in the country is expected to have a positive impact on Pakistan's defence exports in the future.

Monopoly in the International Defence Market

The major players in the global defence export industry are the USA, Russia, the EU, France, and China. In recent years, the trend in the industry has been towards public-private partnership models.

The USA has been leading the way in this regard by encouraging private manufacturing units to produce conventional arms for the military while also contributing to the country's defence exports. Private companies now handle most of the conventional arms production within the USA. However, the production of strategic-level industries with non-conventional arms remains under public control. These global giants enjoy a dominant position in the market due to their high-tech defence products, which have created a monopolistic situation.

Swot Analysis of the Defence Industry of Pakistan and International Best Practices

Swot Analysis of the Legal Framework

Strengths	Weaknesses
• Adequate legal framework for SOEs • Laws encourage growth of defence industry • R&D made integral part of legal system	• Designed specifically for SOEs only • No room for growth of private sector or PPP as laws are silent • Cumbersome process for obtaining NOC for private sector • little to no efforts to enhance indigenous R&D by research institutes • adhocism is promoted
Opportunities	**Threats**
• Incorporation of laws for private sector for growth of defence industry (like Turkey) • PPP and joint venture of private sector and foreign defence industry (like Israel-USA for F-35) • Laws needed to transfer technology to private sector for growth in defence industry (like JV of Turkey and Singapore)	• Vested interests of "stake holders" to amend laws • Ever prevailing security situation in Pakistan

Swot Analysis Of Institutional Framework

Strengths	Weaknesses
• Well-structured SOEs boards constituted like HIT, POF, PAC etc • POF capacity to build wide range arms and ammunitions adding to GDP • Foreign technology of JF-17	• Limited foreign technology available for hi-tech production, foreign countries reluctant to share technology • SOEs leading the way, private sector and PPP are not institutionalized

Thunder with PAC having commercial value • HIT manufacturing export quality MBTs and armoured vehicles • GIDS showing progress in making UAVs, land and naval systems • ID(Private) achieving excellence in making UAVs for military, civilian and naval utilities • Daudsons producing high quality arms and ammunitions • Export quality conventional produced by SOEs at lower cost due to low-cost labour	• SOEs only headed by military personnel instead of business savvy heads • Growth of SOEs only in few cities like Wah, Taxila, Kamra etc, institutes are not extended to other cities for commercial growth • SOEs primarily concerned for domestic consumption • No private sector is allowed to collaborate or work with institutes of SOEs • Public sector apprehensions that private sector might take over this industry • Defence industry not considered as an industry in Pakistan
Opportunities	**Threats**
• Low-cost labour for increased production in SOEs and Private sector (like investing of POF in Egypt) • Every war (Russia Ukraine war) is an opportunity for defence sector growth • ID, Daudsons etc showed that private sector can grow and has great potential despite unconducive environment • Technology transfer from China and Turkey for increased production of commercial value	• Pakistan under security threat since forever • Restrictions like FATF • Dollar rate fluctuation • Unavailability of raw material • Reliance on imports • Changing world order, friendly countries to share technology, Pakistan has to align with one

International Best Practices

There are several best practices in the defense industry that are recognized worldwide. Here are some of them:

1. **Research and Development**: The defense industry requires a constant focus on research and development to create new technologies and improve existing ones. The best defense companies invest significant resources in R&D to maintain their competitive advantage.

2. **Public-Private Partnership**: Collaboration between the government and private companies can help promote innovation, reduce costs, and increase the effectiveness of the defense industry. Public-private partnerships have been successful in many countries worldwide.
3. **International Collaboration**: Collaboration between defense companies from different countries can help promote the sharing of technology, expertise, and resources, leading to cost savings and improved capabilities.
4. **Flexibility and Adaptability**: The best defense companies are flexible and adaptable to changes in the market and to the evolving needs of their customers. This enables them to quickly adjust to new situations and continue to provide high-quality products and services.
5. **Quality Control**: Quality control is critical in the defense industry, where products and services need to meet high standards to ensure they are reliable and effective. Best practices include rigorous testing, compliance with international standards, and certification.
6. **Ethics and Compliance**: The defense industry must adhere to ethical and legal standards. Best practices include transparency, accountability, and compliance with international laws and regulations.
7. **Sustainability**: The defense industry has an impact on the environment and communities where it operates. Best practices include sustainable manufacturing processes, resource conservation, and responsible waste management.

Overall, the best practices in the defense industry focus on innovation, collaboration, quality, ethics, and sustainability. These practices can help promote the growth and success of the industry while ensuring that the products and services produced meet the needs of customers.

Best Practices **of Israel**

There are several best practices that have contributed to Israel's success. Here are some of them:

1. **Government Support**: The Israeli government has been a major supporter of the defense industry, providing funding and incentives for research and development. The government has also created a favorable regulatory environment, allowing defense companies to operate more efficiently.

2. **Collaboration**: Israeli defense companies have a strong tradition of collaboration, working closely with each other and with the military to develop innovative technologies. This collaboration has enabled the industry to develop cutting-edge solutions quickly and efficiently.

3. **Innovation**: The Israeli defense industry is known for its innovative spirit. Companies are encouraged to think outside the box and develop novel solutions to complex problems. This focus on innovation has helped the industry to stay ahead of the curve and maintain its competitive edge.

4. **Skilled Workforce**: Israel has a highly educated and skilled workforce, with many engineers and scientists working in the defense industry. This talent pool has enabled the industry to develop and produce sophisticated technologies.

5. **Export Orientation**: The Israeli defense industry is highly export-oriented, with a focus on developing products that can be sold to other countries. This has helped to generate revenue for the industry and boost the Israeli economy.

6. **Public-Private Partnerships (PPPs)**: PPPs have played a significant role in the Israeli defense industry. The Israeli government and private companies have been collaborating to develop and produce cutting-edge defense technology for many years.

   One notable example is the Iron Dome missile defense system, which is a joint project of the Israeli government and the defense company Rafael Advanced Defense Systems. The Iron Dome has proven to be highly effective in intercepting incoming rockets and missiles, saving countless lives in Israel.
   Another example is the development of the F-35 fighter jet, which involved a partnership between the Israeli government and the US defense contractor Lockheed Martin. Israel is the only country outside of the US to have the F-35, and its involvement in the project has helped to strengthen the relationship between the two countries.

7. In addition to these examples, there are many other instances where the Israeli government and private companies have collaborated on defense projects. These partnerships have helped to ensure that Israel remains at the forefront of defense technology and can maintain its security in a volatile region.

Overall, the Israeli defense industry's success can be attributed to a combination of government support, collaboration, innovation, a skilled workforce, and an export-oriented focus.

Best Practices of Turkey

1. **Domestic Production**: Turkey has focused on developing its own defense industry and reducing dependence on foreign suppliers. The country has been investing heavily in research and development, which has enabled it to produce a wide range of defense equipment, including tanks, missiles, and aircraft.

2. **Collaboration with International Partners**: While Turkey is working towards self-reliance, it recognizes the value of partnerships. The country has established collaborations with several international partners, including the United States, Europe, and Asia, to develop advanced defense technologies.

3. **Investment in Human Capital**: The Turkish government has invested in education and training to develop a highly skilled workforce. The country has also established several research and development centers, universities, and technology parks to support the growth of the defense industry.

4. **Innovation and Technology Transfer**: Turkey has focused on innovation and technology transfer to develop its defense industry. The country has established partnerships with leading defense companies worldwide to transfer knowledge and technologies.

5. **Export-Oriented Strategy**: Turkey's defense industry is export-oriented, and the country is one of the world's top defense exporters. Turkish defense companies have been successful in exporting their products to several countries, including the Middle East, North Africa, and Asia. It is also exporting to Pakistan, Indonesia, and Azerbaijan.

In conclusion, the Turkish defense industry has been successful in developing its capabilities through domestic production, collaborations with international partners, investment in human capital, innovation, and technology transfer, as well as an export-oriented strategy.

Gap Analysis

S.No	Current State	Desired State	Remedies
1	Weak legal framework that supports SOEs only	Favorable regulatory environment, allowing defense companies to operate more efficiently	Legal framework that supports growth of private sector, PPP and Joint ventures of private firms with foreign industries (short to midterm solution)
2	Defence industry is	Profitable	Considerable contribution is

	not a profit earning industry and contributes only in fractions in the overall industrial sector	Defence Industry which contributes to the economy	expected from this sector in the industrial sector if private sector is involved (mid to long term solution)
3	Prevailing ad-hocism is hampering growth of defence industry as heads of SOEs	Technically and operationally sound and experienced individuals at the top.	Business savvy Chairman needed to head SOEs (needs policy and paradigm shift from the stakeholders)
4	Although decision of boards of SOEs are taken by a majority vote, at times it is dictated by sitting chairmen, consequently unilateral decisions imposed (primary source)	Think outside the box and develop novel solutions to complex problems	Boards must be constituted of technocrat members having functional specialization that can lead this industry towards progression (needs policy change from stakeholders)
5	Limited capacity of R&D in all SOEs and government research centers	Research and development centers, universities, and technology parks to support the growth of the defense industry	Enhancement of capacity of R&D and that can be done by sending research scientists in bulk to leading and renowned institutes/universities. Budget allocation shall be made so that the research scientist when return to Pakistan must be capable of reverse engineering (Long term measure)
6	SOEs are not giving any room to private sector to collaborate in their existing setups. And SOEs are not growing to other parts of Pakistan	Collaboration between the government and private companies promote innovation, reduce costs, and increase the effectiveness of the defense industry	There is dire need that SOEs involve private sector for production growth that needs amendment in the legal framework and policy (midterm to long term). Furthermore, SOEs need to make their branches in other cities in collaboration with private sector for production growth (needs policy change and is a long-term measure)

ISSUES AND CHALLENGES

The above-mentioned analysis reveals that there are certain challenges involved in the optimum utilization of Pakistan's Defense Industry in overall industrial development. These can be summarized as follows:

i) **State-Owned Enterprise**: Due to a strict legal and regulatory framework, private investors have not been encouraged in defense production. Defense production has not been given the status of an industry, where the private sector could contribute and invest freely.

ii) **No Public-Private Partnership**: Defense production in Pakistan is mainly state-owned and is primarily managed by the Armed Forces of Pakistan. The management of these organizations does not encourage entering into public-private partnerships, which could not only enhance the capacity of private partners but also help introduce new ideas in defense production.

iii) **Limited Focus on Research & Development**: The defense production sector of Pakistan has never focused on research and development. Pakistan has mostly relied on foreign technology.

iv) **International Sanctions on Pakistan**: Restrictions on Pakistan due to its nuclear tests and FATF restrictions limit its capacity to collaborate with international partners and enhance its defense production.

v) **Products Not as per International Standards**: Due to numerous reasons, including the non-availability of raw materials, lack of technology, and technical expertise, the defense equipment produced by Pakistan does not meet the standards of those available in the international market.

vi) **Total Reliance on Foreign Technology for Production**: Pakistan lacks indigenous technology for defense production and relies on foreign technology from China, the USA, the UK, and Europe. Due to non-indigenous technology, the products cannot be exported until a certain time.

vii) **Raw Material Import**: Ninety percent of the raw material for defense production consists of steel. Although Pakistan's defense production industry obtains steel from People's Steel Mill, its limited capacity cannot meet the overall requirements of the industry. Therefore, most of the raw materials for defense production are imported.

Conclusion

Following a thorough review of literature and qualitative analysis of the data, the following conclusions can be drawn:

i. Throughout the world, defense sectors are mostly private and run purely on commercial lines, based on market needs, but regulated by the government. However, Pakistan's defense sector is based on state-owned defense production units, which are dictated by the Armed Forces of Pakistan.

ii. Pakistan's defense production units contribute to the national economy through the export of conventional ammunition, based on surplus capacities. However, the existing capacity is not sufficient to meet the demand for conventional weapons in the changing global scenario.

iii. R&D activities in Pakistan's defense production units are not sufficient to introduce innovative and advanced products that meet the demand of the international market. Pakistan is producing defense products relying on technologies from the late seventies and early eighties, which do not meet the standards of the international defense market. Pakistan relies on technology transfer from foreign developed countries to meet required military standards.

iv. Due to restrictions on Pakistan from FATF between June 2018 and October 2022, as well as the impact of nuclear tests, international money transactions and the import of raw materials and technology have been restricted, which has resulted in Pakistan lagging behind in defense production.

Recommendations

i. **Legislation**: Legislation is urgently needed that allows private sector and PPP involvement in the defense industry (an Act of Parliament is required as a mid-term measure).

ii. **Recognition of Defense Industry**: The defense industry should be recognized as a proper industry. The heads of state-owned enterprises (SOEs) must be business-savvy individuals based on functional specialization, and the board members must be technocrats from the same field (an Act of Parliament is required as a short- to mid-term measure).

iii. **Technology Transfer**: Transfer of technology from friendly countries directly to the private sector is essential for the survival of Pakistan's defense industry (consensus of stakeholders is required as a short-term measure).

iv. **Strengthening R&D**: The R&D base needs to be strengthened. This can be achieved by selecting and sending research scientists to developed countries with advanced defense production for research purposes.

v. These scientists, upon return, can strengthen the R&D capacity of Pakistan's defense sector (Finance Division, HEC consent, and budgetary allocations are required as a mid- to long-term measure).

vi. **Investments in Steel Industry**: Investments in the steel industry should be encouraged, as steel constitutes 90% of the raw material in defense production. This will help ensure the availability of raw material for defense production and will also assist in the development of an allied industry (consensus of the Ministry of Industries and Production and BOI is required as a mid- to long-term measure).

vii. **Expansion of SOEs**: SOEs must extend their workstations to other areas in collaboration with PPPs to increase the production capacity of SOEs and enhance commercial gains (consensus of stakeholders with relevant amendments in the legal framework is required as a mid- to long-term measure).

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Hi-Tech and Emerging Innovative Industries and Pakistan's Policies and Regulations Towards Adaptation in the Light of China's Strategies of Reverse

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Abstract:

High-tech and innovative emerging industries are critical drivers of economic growth and transformation, with applications in fields such as artificial intelligence, renewable energy, electric vehicles, and biotechnology. This paper explores the potential for Pakistan to adapt to these industries by learning from China's reverse engineering strategies and implementing policies that foster innovation and technological development. Key recommendations include increasing investment in research and development (R&D), improving access to STEM talent, upgrading infrastructure, creating a supportive regulatory framework, and enhancing intellectual property protection. By fostering a vibrant entrepreneurial ecosystem and collaborating with global leaders like China, Pakistan can position itself as a competitive player in the global high-tech market. These strategies will help Pakistan leverage its resources and workforce to promote innovation and become a technological hub in the region.

Key words:

High-Tech Industries, Innovation, Reverse Engineering, Research and Development, Pakistan's Economic Growth

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Introduction

High-tech and innovative emerging industries have become increasingly important drivers of economic growth and societal advancement. These industries are characterized by the application of cutting-edge technologies, such as artificial intelligence, electric vehicles (EVs), renewable energy, blockchain technology, and biotechnology, among others, to create new products, services, and business models that transform traditional industries and create entirely new markets. From fintech and e-commerce to clean energy and space exploration, high-tech and innovative emerging industries are reshaping the global economy and offering exciting opportunities for entrepreneurs, investors, and skilled professionals alike. In this context, staying informed about the latest trends, challenges, and opportunities in these industries is essential for anyone interested in innovation, entrepreneurship, and the future of work. According to the World Economic Forum[8], faster digital connections, powered by 5G and the IoT, have the potential to unlock economic activity. So much so that implementing faster connections in "mobility, healthcare, manufacturing, and retail could increase global GDP by $1.2 trillion to $2 trillion by 2030." 5G and IoT will be among the most-watched tech trends for the next decade. Pakistan's policies and regulations regarding the adaptation of high-tech and innovative emerging industries are crucial for the country's economic growth and development. With China's and Japan's strategies of reverse engineering, it is essential for Pakistan to develop a comprehensive plan for adapting emerging technologies while safeguarding its intellectual property rights.

Pakistan can learn from China's strategies of reverse engineering and adapt them to its own needs. One possible approach is to establish research and development centers in collaboration with Chinese universities and research institutions. These centers can provide training and research opportunities for Pakistani scientists and engineers to gain hands-on experience with emerging technologies. Another approach is to provide incentives for local companies to invest in research and development. This can be achieved by offering tax breaks, subsidies, and other forms of financial support to encourage innovation and entrepreneurship. This will help to create a more favorable environment for foreign companies to invest in Pakistan's emerging industries.

Overall, Pakistan needs to adopt a proactive approach to adapt to high-tech and innovative emerging industries by learning from China's and Japan's strategies of reverse engineering and developing its own policies and

[8] *Top 10 tech trends for next 10 years (according to McKinsey) | World Economic Forum (weforum.org) https://www.weforum.org/agenda/2021/10/technology-trends-top-10-mckinsey/*

regulations, which will help position Pakistan as a major player in the global economy.

WHAT ARE HIGH-TECH INDUSTRIES?

High-tech industries are those that involve the use of advanced technology and innovative techniques to create or develop new products, processes, or services. These industries typically focus on cutting-edge technologies and products, such as software, semiconductors, electronics, biotechnology, nanotechnology, renewable energy, and advanced manufacturing. High-tech industries often require significant investment in research and development, as well as highly skilled workers with specialized knowledge in science, engineering, and computer programming. They are often associated with rapid innovation, high growth potential, and high profit margins. Gartner[9] lists five impactful emerging technologies for 2022, such as smart spaces, homomorphic encryption, generative AI, graph technologies, and the metaverse, that will disrupt and transform entire markets.

Examples of high-tech industries include:

- Software development
- Defense
- Biotechnology
- Telecommunications
- Clean technology
- Nanotechnology

WHAT ARE INNOVATIVE INDUSTRIES?

Innovative industries refer to sectors of the economy that are characterized by a high level of technological innovation, creativity, and new product development. These industries are typically at the forefront of research and development, and they often create new products, processes, or services that revolutionize the way we live and work. Forbes[10] lists some of the top six emerging industries to invest in for 2022, such as biotechnology, cybersecurity, e-commerce, renewable energy, virtual reality, and more. Some examples of innovative industries include:

1. Information Technology: This includes companies that produce hardware, software, and services related to computers, mobile devices, and other digital technologies.
2. Life Sciences: This encompasses companies that work with genetics, pharmaceuticals, medical devices, and other healthcare-related technologies.

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[9] *5 Impactful Emerging Technologies for 2022 (gartner.com)*
https://www.gartner.com/en/articles/5-impactful-technologies-from-the-gartner-emerging-technologies-and-trends-impact-radar-for-2022

[10] *2021's Top Six Emerging Industries To Invest In (forbes.com)*
https://www.forbes.com/sites/forbesbusinesscouncil/2021/04/19/2021s-top-six-emerging-industries-to-invest-in/

3. Renewable Energy: This includes companies that produce solar, wind, and other clean energy technologies.
4. Aerospace: This encompasses companies that produce aircraft, spacecraft, and other advanced defense technologies.
5. Robotics: This encompasses companies that produce robotics and automation technologies that can improve efficiency, safety, and productivity in various industries.

Overall, innovative industries are critical to driving economic growth and improving our quality of life by introducing new technologies and products that make our lives easier, more productive, and more enjoyable.

WHAT ARE EMERGING INDUSTRIES?

Emerging industries are industries that are in their early stages of development and are expected to grow rapidly in the near future. These industries are typically characterized by innovative technologies, new business models, and changing consumer behavior. Emerging industries often offer new products or services that meet evolving consumer needs and preferences. According to Investopedia,[11] emerging industries are a group of companies in a line of business formed around a new product or idea that is in the early stages of development.

Examples of emerging industries include:

1. Artificial intelligence and machine learning: These technologies are being used to develop intelligent systems and devices that can perform tasks without human intervention.
2. Virtual and augmented reality: These technologies are being used to create immersive experiences in gaming, entertainment, and education.
3. E-commerce: This industry is rapidly growing due to the increasing number of consumers shopping online and the growing number of businesses moving their operations online. Overall, emerging industries are typically seen as promising areas for investment and growth, as they have the potential to create new jobs, drive innovation, and generate economic value.

WHAT IS REVERSE ENGINEERING?

Reverse engineering is the process of analyzing a product, system, or technology in order to understand how it works, often with the goal of creating a replica or improving upon the original design. It involves breaking down a product or system into its component parts, studying how

[11] *2021's Top Six Emerging Industries To Invest In (forbes.com) https://www.forbes.com/sites/forbesbusinesscouncil/2021/04/19/2021s-top-six-emerging-industries-to-invest-in/*

they are interconnected and how they work together, and then creating a blueprint or design based on that information.

Reverse engineering can be used in a variety of fields, including software engineering, mechanical engineering, and electronics. It is often employed by companies to gain a competitive advantage by learning how their competitors' products work or to improve upon existing designs. It can also be used by researchers and academia to study and understand complex systems. However, reverse engineering can also be used for malicious purposes, such as stealing intellectual property or creating counterfeit products.

Pakistan's policies and regulations towards emerging innovative industries:

Pakistan has implemented various policies and regulations to promote innovation and entrepreneurship in the country. The government launched the "National ICT Policy 2015" to promote the growth of the information and communication technology (ICT) sector. This policy aimed to enhance the competitiveness of the ICT industry by providing a conducive environment for research and development, investment, and innovation. Furthermore, the government launched the "National Industrial Policy 2019" to promote industrialization and increase the contribution of the manufacturing sector to the GDP.

However, despite these policies and regulations, Pakistan lags behind in adapting to emerging innovative industries. The lack of research and development and the absence of a robust intellectual property regime are the primary factors contributing to this gap. Additionally, the absence of skilled labor and weak infrastructure further hinder the growth of high-tech industries in the country.

CHINA'S STRATEGIES OF REVERSE ENGINEERING:

China's strategies of reverse engineering have played a significant role in promoting the growth of its high-tech industries. Reverse engineering involves analyzing and replicating existing products to develop new and improved versions. China has mastered this technique and has been able to produce high-quality products at a lower cost. The Chinese government has implemented various policies to promote reverse engineering, such as providing subsidies for research and development and offering tax incentives for innovative products.

IMPLICATIONS FOR PAKISTAN:

Pakistan can learn from China's strategies of reverse engineering and implement similar policies to promote the growth of its high-tech industries. Pakistan needs to focus on research and development, and its government

should provide incentives for innovative products. Additionally, Pakistan needs to strengthen its intellectual property regime to protect the rights of inventors and promote innovation.

Statement of the Problem

The rapid development of hi-tech and emerging innovative industries has presented a significant challenge for Pakistan in terms of policy and regulation adaptation, particularly in the face of China's successful strategies of reverse engineering. However, while Pakistan has made some efforts to encourage innovation and technology development, its policies and regulations may not be adequately suited to foster growth and competitiveness in these industries, potentially hindering the country's economic progress. Therefore, there is a need to examine and evaluate Pakistan's current policies and regulations towards hi-tech and emerging innovative industries, particularly in comparison to China's successful strategies, in order to identify areas for improvement and suggest potential policy reforms to support the growth of these industries in Pakistan. This study aims to explore the problem of inadequate policies and regulations in Pakistan's emerging industries and their impact on the country's competitiveness, with a focus on the role of China's reverse engineering strategies as a potential benchmark for Pakistan to adapt to.

Situational Analysis of Capacity, Preparedness, and Output of the Hi-Tech Industry and its Contribution to National Economic Development in Pakistan

The hi-tech industry in Pakistan is still in its nascent stage; however, it has shown significant growth potential over the past few years. The industry primarily comprises software development, telecommunications, and IT-enabled services. To conduct a situational analysis of the capacity, preparedness, and output of the hi-tech industry and its contribution to national economic development in Pakistan, we need to analyze the following factors:

1. **Capacity**:
   The capacity of the hi-tech industry in Pakistan is growing, and the government is taking various measures to promote the industry. The number of companies in the sector has increased over the years, and there has been a significant rise in the number of IT graduates. However, there is still a need to develop the skills of the workforce to meet the increasing demand for hi-tech services. Additionally, there is a need to increase investment in the sector to enhance its capacity. According to McKinsey[12], based on demographics alone, Pakistan's start-up ecosystem should already have been thriving for many

[12] *Start-ups in Pakistan: The ecosystem (finally) takes off | McKinsey*

years. It has, for starters, the fifth-largest population in the world, approaching 230 million. That population is overwhelmingly young, with a median age of 22, and bilingual, with the fourth-largest number of English speakers in the world. Add to that one of the fastest-growing middle classes, more than 100 million mobile broadband subscribers, and hundreds of thousands of tech professionals, and you have all the makings of a fertile market for new enterprises and digital services.

Yet, until recently, venture or growth funding in Pakistan was barely a trickle compared to similar countries in the Middle East/North Africa region or other parts of Asia. In the last couple of years, however, global VCs and other foreign investors have begun making significant bets on local start-ups as many regulatory and cultural barriers have started to soften.[13]

2. **Preparedness**:
   The preparedness of the hi-tech industry in Pakistan is moderate. The government has launched various initiatives to promote the industry, such as the establishment of IT parks and incubators, and the provision of tax incentives for IT companies. However, the industry still faces challenges in terms of infrastructure, regulations, and security. The infrastructure in the country needs to be improved, particularly regarding electricity and internet connectivity. There is also a need to develop a regulatory framework that encourages investment and protects intellectual property rights. Moreover, security concerns, particularly cybercrime, are also challenges that need to be addressed. Pakistan is banking on the new tech zones to create employment for its masses of young people – nearly two-thirds of its population is below 30.[14] Similarly, according to a report by a renowned science website,[15] a comprehensive program has been launched to build a knowledge-based economy by integrating science and technology with economic development programs. The government has raised its financial commitment to the ministry to more than Rs. 7 billion (US$120 million; a 6000% increase).

3. **Output**:
   The output of the hi-tech industry in Pakistan is growing steadily. The industry has contributed significantly to the country's economy and has the potential to contribute even more in the future. According to the Pakistan Software Export Board, the software and IT-enabled services sector in Pakistan has grown at a compound

[13] *Start-ups in Pakistan: The ecosystem (finally) takes off | McKinsey*
[14] *https://www.bloomberg.com/news/articles/2021-06-23/pakistan-aims-to-double-it-industry-in-two-years-with-tech-zones*
[15] *https://www.science.org/content/article/science-and-technology-pakistan-way-forward*

annual growth rate of 16.5% over the last five years, and exports have grown at a rate of 23% per year over the same period. In addition, the industry has created employment opportunities for a large number of people, particularly in urban areas. According to a report by Forbes, Pakistan has 300 IT/ITeS organizations and 13,000 registered companies.[16] The "State of Manufacturing in Pakistan" report by ResearchGate shows that Pakistan's manufactured exports in high-tech industries enjoyed higher growth in 2011–22 than in 2000–2010.[17] The World Intellectual Property Organization (WIPO) report shows that Pakistan performs above the regional average in four pillars: Institutions; Business sophistication; Knowledge and technology outputs; and Creative outputs.[18]

4. **Contribution to National Economic Development**:

   Despite its limited capacity and preparedness, the hi-tech industry in Pakistan has the potential to make a significant contribution to the country's economic development. The industry can create high-paying jobs, generate foreign exchange earnings, and attract investment. Additionally, the hi-tech industry can play a crucial role in improving the country's overall competitiveness and promoting innovation across different sectors. The hi-tech industry is part of the industrial sector in Pakistan, which contributes nearly Rs. 50 billion (US$220 million) to the national exchequer. The sector as a whole provides employment to 3.5 million people and plays a pivotal role in promoting the growth of the vendor industry.[19]

Overall, the hi-tech industry in Pakistan has the potential to make a significant contribution to the country's economic development. However, there is a need to address the challenges faced by the industry and to invest in infrastructure and skills development to enhance the capacity of the sector. The government needs to develop a comprehensive strategy that addresses the challenges faced by the industry and provides a conducive environment for investment and growth.

[16] *What Special Technology Zones Mean For Pakistan's Tech Industry (forbes.com)*
https://www.forbes.com/sites/forbestechcouncil/2022/05/31/what-special-technology-zones-mean-for-pakistans-tech-industry/
[17] *The State of Manufacturing in Pakistan (researchgate.net)*
https://www.researchgate.net/publication/308618484_The_State_of_Manufacturing_in_Pakistan
[18] *PAKISTAN (wipo.int)*
https://www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2021/pk.pdf
[19] *https://en.wikipedia.org/wiki/Industry_of_Pakistan*

Situational Analysis of Capacity, Preparedness, and Output of the Hi-Tech Industry and its Contribution to National Economic Development in the Context of China

A situational analysis of the hi-tech industry in China involves assessing its capacity, preparedness, and output, as well as its contribution to national economic development.

1. **Capacity**:
   China has a strong capacity in the hi-tech industry, backed by a large pool of skilled labor, research and development facilities, and advanced technology infrastructure. The country has a vast network of universities, research institutions, and industrial parks that specialize in different areas of the hi-tech industry, such as electronics, biotechnology, and software development. China has also invested heavily in science and technology, with the government allocating significant resources to support research and development in key sectors. According to ScienceDirect,[20] the technological innovation capability of China's high-tech industries over 2010–2019 was measured using factor analysis. Moreover, the spatial pattern and evolution characteristics of the technological innovation capability of high-tech industries were analyzed using the Moran index. According to the World Bank,[21] promoting innovation and market competition are key to China's future growth. China's economy is shifting from high-speed growth to high-quality development. It needs to rely on deeper reform, a higher level of opening up, and more integrated and efficient innovation to boost productivity and build a modern economic system. In the 2022 edition of the Global Innovation Index, China ranks 14th in innovation capacity.[22]

2. **Preparedness**:
   The Chinese government has shown strong commitment to developing the hi-tech industry and promoting innovation. The government has implemented various policies and initiatives, such as the "Made in China 2025" plan, which aims to transform China into a leading hi-tech manufacturing powerhouse. Additionally, China has set up several national innovation centers and established partnerships with international companies to foster innovation and technology transfer. The country has also prioritized intellectual property protection and enacted laws and regulations to safeguard

[20] *https://www.sciencedirect.com/science/article/pii/S2444569X22001226*
[21] *https://www.worldbank.org/en/news/press-release/2019/09/17/promoting-innovation-and-market-competition-are-key-to-chinas-future-growth*
[22] *http://www.china.org.cn/business/2023-03/31/content_85203146.htm*

against technology theft and infringement. According to the World Economic Forum,[23] China is investing heavily in research and development, with spending in the area 70% higher in 2017 than in 2012. It's also investing in high-tech industrial parks and incubators focusing on technologies such as artificial intelligence, robotics, and big data. Another article by the World Economic Forum[24] discusses how China is the second-largest spender on research and development (R&D) after the US, accounting for 21% of the world's total of nearly $2 trillion in 2019. China's spending on R&D grew by an average of 18% per year between 2010 and 2015 – more than four times faster than US spending.

An article by UC San Diego[25] discusses how the Chinese have a new science and technology 2030 innovation plan as well, with a range of innovation-driven development strategies being rolled out under the innovation umbrella. According to the Harvard Business[26] Review, China is now on the global frontier of AI in terms of technological development and market applications. The unique technological, market, and policy environments that have emerged in China have enabled it to become a leader in AI.

3. **Output**:
   The hi-tech industry is a significant contributor to China's economic growth, accounting for a considerable share of the country's GDP. China has emerged as a global leader in several areas of the hi-tech industry, such as telecommunications equipment, computers, and consumer electronics. The country is also making significant strides in emerging technologies, such as artificial intelligence and biotechnology. The hi-tech industry has created millions of jobs, and its output has helped to drive economic development across the country. According to WIPO,[27] China's high-tech trade exports amounted to USD 733.4 billion in 2020, up by 2.3% from USD 716.6 billion in 2019, and more than 20 times the value of its shipments in 2000, which were USD 31.9 billion. An article by JSTOR[28] discusses how a high-tech industrial base has been established in China over the past four decades, during which the cumulative investment in high-tech fields and their industries has exceeded RMB 100 billion. In 1987, the gross value of high-tech industrial output accounted for more than RMB 76 billion and amounted to 4.8% of GNP for that

[23] *https://www.weforum.org/agenda/2019/10/china-economy-anniversary/*
[24] *https://www.weforum.org/agenda/2018/02/these-charts-show-how-china-is-becoming-an-innovation-superpower/*
[25] *https://chinafocus.ucsd.edu/2020/12/14/a-new-era-of-chinese-technology-and-innovation/*
[26] *https://hbr.org/2021/02/is-china-emerging-as-the-global-leader-in-ai*
[27] *https://www.wipo.int/pressroom/en/news/2021/news_0001.html*
[28] *https://www.jstor.org/stable/2645042*

year. Similarly, an article by Statista[29] shows that in 2021, the sales revenue of electronics and communication high-tech companies in China amounted to over RMB 5.48 trillion. In the same year, over 224.6 thousand new products were launched by high-tech companies in China.

4. **Contribution to National Economic Development**:

   The hi-tech industry plays a critical role in China's national economic development. It has helped to drive economic growth, create jobs, and enhance the country's global competitiveness. The industry has contributed to China's transition from a low-cost manufacturing hub to a high-tech innovation hub. It has also supported the country's efforts to move up the value chain and reduce its reliance on exports of low-end products. The government has recognized the importance of the hi-tech industry to the country's economic development and has made it a top priority in its development plans. According to McKinsey,[30] digital China is powering the economy to global competitiveness. The impact of digital China on the global economy has been increasing. China ran an annual surplus in digital services of $10 billion to $15 billion over the past five years.

In conclusion, China's hi-tech industry has a strong capacity, preparedness, and output, which have contributed significantly to the country's economic development. The government's commitment to innovation and technology transfer has helped to build a vibrant hi-tech ecosystem that has attracted both domestic and international investments. As the industry continues to grow and evolve, it is likely to play an even more prominent role in China's economic development in the coming years.

SITUATIONAL ANALYSIS OF REVERSE ENGINEERING STRATEGIES IN THE SIX MOST IMPORTANT SECTORS OF CHINA AND JAPAN FOR THE DEVELOPMENT OF THE HI-TECH INDUSTRY IN THEIR COUNTRIES AND LESSONS FOR PAKISTAN

Reverse engineering is a process of analyzing and dissecting an existing product or system to understand its design and functionality. This information can then be used to improve or develop similar products or systems. Reverse engineering has played a significant role in the development of the hi-tech industry in China and Japan. According to the *Georgetown Journal of International Affairs*,[31] Chinese planners outlined

[29] *https://www.statista.com/statistics/234389/high-tech-industry-revenue-in-china-by-branch/*

[30] *https://www.mckinsey.com/featured-insights/china/digital-china-powering-the-economy-to-global-competitiveness*

[31] *https://gjia.georgetown.edu/2021/06/22/rethinking-chinas-strategy-of-technological-independence/*

strategies to boost the country's technological capacity; the Made in China 2025 plan, unveiled in 2015, entailed an array of industrial policies to facilitate the development of Chinese firms' competencies in ten strategic industries. Similarly, according to *McKinsey*,[32] China's digital development has massive scope for efficiency gains, as the industrial internet of things (IIoT) is deployed at scale to transform digital manufacturing, digital supply chain development, and blockchain-based inventory management.

Here is a situational analysis of reverse engineering strategies in six important sectors of these countries and lessons for Pakistan:

1. **Electronics Sector**:

   China: China has become the world's largest electronics producer, with a focus on reverse engineering strategies. The country has a vast pool of low-cost labor, enabling the mass production of electronics. The government also provides incentives to foreign companies to transfer technology to China. In the electronics sector, China has been focusing on developing its domestic industry through a combination of investment in R&D, acquisitions of foreign technology, and reverse engineering. The country has become a major producer of consumer electronics and has developed a significant semiconductor industry. China's electronic information industry includes computer-related goods (including software), communication equipment, electronic parts, and household entertainment equipment. Major Chinese electronics companies include BOE, Changhong, DJI, Haier, Hisense, Huawei, Konka, Lenovo (Hong Kong based), Meizu, Panda Electronics, Skyworth, SVA, TCL, Xiaomi, Oppo, and ZTE. China's production recorded the largest world market share for its electronics exports in 2016. In 2020, the revenue of consumer electronics in China amounted to over 150 billion U.S. dollars.[33]

   Japan: Japan, on the other hand, has a strong focus on R&D, which has enabled it to develop high-quality electronic products. Both countries have invested heavily in education and research institutions, which have created a talent pool for the industry. Japan's electronics industry has historically been a leader in innovation and has developed many of the technologies that are now used worldwide. The country has a strong focus on R&D, which has helped to maintain its position as a leading producer of high-tech electronics. Japan has a many-faceted electronics industry ranging from consumer electronics and computer-guided machine tools in

[32] *https://www.mckinsey.com/featured-insights/china/the-future-of-digital-innovation-in-china-megatrends-*

[32.] *https://www.statista.com/forecasts/1240303/china-consumer-electronics-market-revenue*

the 1970s and 1980s to semiconductors, computers, and computer peripherals in the 1990s and beyond.[34] Major Japanese electronics companies include Akai, Brother, Canon, Casio, Citizen, Fujifilm, Fujitsu, Hitachi, JVCKenwood, Konica Minolta, Kyocera, Mitsubishi Electric, NEC, Nikon, Nintendo, Olympus, Onkyo, Panasonic, Pioneer, Ricoh, Seiko Group, Sharp, Sony, TDK, Toshiba, and Yamaha.[35] Japan has become the largest exporting country of electronics goods to the rest of the world.[36] The Japanese consumer electronics industry experienced rapid economic growth in the 1950s. In the decades that followed, Japan was one of the leading nations both in terms of patent applications and technological innovation.[37]
Lessons for Pakistan: Pakistan can learn from China and Japan's success in the electronics sector by investing in R&D and encouraging the development of a domestic industry through partnerships with foreign companies. Japanese electronics were the first products to enter the Pakistani market since the very inception of Pakistan, and later on, the same market was captured by cheap Chinese products. In this way, our engineers are quite familiar with these technologies and they can easily reverse engineer Japanese and Chinese electronics.

2. **Automotive Sector**:

China: In the automotive sector, China has focused on reverse engineering foreign models to develop its domestic industry. The country has become the world's largest producer of electric vehicles and is a major exporter of automobiles. China is the largest automotive market in the world by both annual sales and manufacturing output.[38] The automotive industry in China has been the largest in the world measured by automobile unit production since 2008.[39] The total volume of automobile industry sales in China reached 26.2 million units in 2021.[40] China remains the world's largest automotive manufacturing country and automotive market since 2009.[41]

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[34] *http://crosscurrents.hawaii.edu/content.aspx?lang=eng&site=japan&theme=work&subtheme=INDUS&unit=JWORK063*
[35] *https://en.wikipedia.org/wiki/Electronics_industry_in_Japan*
[36] *https://www.eubusinessinjapan.eu/library/publication/report-japanese-electronics-sector*
[37] *https://www.statista.com/topics/6624/consumer-electronics-industry-in-japan/*
[38] *https://en.wikipedia.org/wiki/Automotive_industry_in_China*
[39] *https://en.wikipedia.org/wiki/Automotive_industry_in_China*
[40] *https://www.statista.com/topics/1100/automobile-sales-in-china/*
[41] *https://www.statista.com/topics/1050/automobile-manufacturing-in-china/*

Japan: Japan has been a leader in the automotive industry for decades and has developed a strong reputation for quality and innovation. The country's focus on R&D and investment in new technologies has helped it maintain its position as a leader in the industry. The automotive industry in Japan is an essential pillar of Japan's economy. Companies like Toyota, Honda, and Nissan are industry leaders not only domestically but also globally.[42] The automotive sector in Japan is the third-largest automotive producing industry in the world, with 78 factories in 22 prefectures and employing over 5.5 million people.[43] The industry is worth some 47.3 trillion yen.[44] State-of-the-art engineering and technology make Japanese cars a desired commodity throughout the world.[45]

Lessons for Pakistan: Pakistan can learn from China's success in the automotive sector by investing in the development of electric vehicles and partnering with foreign companies to develop its domestic industry. Japan's focus on R&D and innovation can also serve as a model for Pakistan to develop its own automotive industry. Pakistan's roads are flooded with Japanese vehicles, and our mechanics have been involved in rectifying their faults for decades. In this way, it's quite easy for Pakistan to reverse engineer Japanese vehicles.

3. **Biotechnology Sector**:

China: China has been investing heavily in the biotechnology sector and has made significant progress in developing its domestic industry. The country has focused on reverse engineering foreign technology to develop its own capabilities, including the development of its own large domestic biotech industry by replicating foreign drugs' designs and modifying them to suit local needs. China has seen double-digit growth in its biotechnology industry and has gone from being one of the slowest to one of the fastest nations in the adoption of new biotechnologies.[46] Biotechnology companies originating in China accounted for $180 billion.[47] China's biotechnology sector is still too nascent to have produced true giants on the scale of Huawei or Alibaba. Nonetheless, it plays host to several leading global biotechnology firms.

[42] *https://www.statista.com/topics/3764/automotive-industry-in-japan/*
[43] *https://tokyoesque.com/japanese-automotive-market/*
[44] *https://www.eubusinessinjapan.eu/sectors/automotive*
[45] *https://www.statista.com/topics/3764/automotive-industry-in-japan/*
[46] *https://en.wikipedia.org/wiki/Biotechnology_industry_in_China*
[47] *https://www.mckinsey.com/industries/life-sciences/our-insights/the-dawn-of-china-biopharma-innovation*

Japan: Japan, on the other hand, has focused on developing cutting-edge technologies and products for the biotech industry. The country has invested in R&D and built partnerships with international players to enhance its biotech industry. Japan has a significant biotechnology industry and has developed its own international market for its biotech products. Japan has a strong biotechnology sector with a market value of about 615 billion yen in 2020. The biotechnology industry in Japan is expected to grow at a CAGR of 6.5% during the forecast period (2020-2025). The Japanese government has been promoting biotechnology as a key industry for economic growth and has been investing heavily in research and development.

Lessons for Pakistan: Pakistan can learn from China's success in the biotech sector by investing in existing R&D institutions and reverse engineering foreign technology to develop its own capabilities. Japan's focus on innovation and new technologies can also serve as a model for Pakistan to develop its own biotech industry.

4. **Pharmaceuticals Sector**:

China: China has become a major producer of generic drugs and has focused on reverse engineering foreign drugs to develop its own products. The country has also invested heavily in R&D to develop new drugs and treatments. The pharmaceutical industry is one of the leading industries in China. It covers synthetic chemicals and drugs, prepared Chinese medicines, medical devices, apparatus and instruments, hygiene materials, packing materials, and pharmaceutical machinery. China's government has promoted biopharmaceuticals as a key industry since 2015. China-based biopharmas have historically pursued a fast-follower strategy, developing a risk-balanced portfolio heavily weighted in favor of clinically validated targets pioneered overseas.

Japan: Japan has a significant pharmaceuticals industry and has developed many new drugs and treatments. The country's focus on R&D and innovation has helped it maintain its position as a leader in the industry. The pharmaceutical market in Japan has shown small growth rates in recent years. The Japan Pharmaceutical Market is segmented by ATC/Therapeutic Class, Drug Type (Branded and Generic), and Prescription Type (Prescription Drugs (Rx) and OTC). Japan is the third-largest pharmaceutical market in the world and a critical export market for U.S. pharmaceuticals. Since 2013, the Government of Japan ("GOJ") has promoted the healthcare industry as an important growth engine under the country's economic revitalization and growth strategy.

Lessons for Pakistan: Pakistan can learn from China's success in the pharmaceuticals sector by investing in R&D and reverse engineering

foreign drugs to develop its own products. Japan's focus on innovation and new technologies can also serve as a model for Pakistan to develop its own pharmaceuticals industry. There are many pharmaceutical companies working in Pakistan that could reverse engineer Chinese and Japanese medicines quite easily. Similarly, there are many informal sectors involved in making spurious drugs. If the Pakistan government regulates this informal sector and brings them into the mainstream, they can become potential market leaders in reverse engineering.

5. **Robotics Sector**:

China: China has been investing heavily in robotics and has developed its own domestic industry through a combination of investment in R&D and reverse engineering foreign technology. The country has become a major producer of industrial robots and has developed its own humanoid robots. China has been the world's largest market for industrial robotics for almost a decade. In 2020 alone, it installed 140,500 robots, accounting for as much as 44 percent of all installations globally. The sector is expected to grow at a capitalized annual growth rate (CAGR) of 20 percent in the future. Last year, China made robotic industry development a national strategic priority in its 14th Five-Year Plan. The crown jewel of the robotic industry in China today is the intelligent electric vehicle (IEV) industry, which is booming.

Japan: Japan has a significant robotics industry and has developed many new robots for a variety of industries. The country's focus on R&D and innovation has helped it maintain its position as a leader in the industry. Japan is a leader in robotics and uses cutting-edge robotic technologies in various fields besides manufacturing, including service and care-giving robots for the older generation. By 2020, Japan was manufacturing 47% of global robots. Japan employs over a quarter of a million industrial robot workers. In recent years, Japan's robot suppliers have increased their production capacity considerably: Their export ratio rose to 78% in 2020 when 136,069 industrial robots were shipped.

Lessons for Pakistan: Pakistan can learn from China's success in the robotics sector by investing in R&D and reverse engineering foreign technology to develop its own capabilities. Japan's focus on innovation and new technologies can also serve as a model for Pakistan to develop its own robotics industry. Our tech students are already very involved in robot manufacturing and have won certain prizes in global competitions. In this way, Pakistan can easily reverse engineer Japanese and Chinese-manufactured robots and design robots for its domestic as well as foreign use.

6. **Renewable Energy Sector**:

China: China has become a global leader in the renewable energy sector by using reverse engineering to develop solar panels and wind turbines. Companies like Trina Solar have reverse-engineered foreign-made solar panels and developed their own, leading to lower costs and greater efficiency. China's renewable energy sector is growing faster than its fossil fuels and nuclear power capacity, and is expected to contribute 43 percent of global renewable capacity growth. China is also the world's largest investor in renewable energy, with the country's companies accounting for four of the world's five biggest renewable energy deals made in 2016. In 2017, investments in renewable energy amounted to US$279.8 billion worldwide, with China accounting for US$126.6 billion or 45% of global investments. China is set to install a record 156 gigawatts of wind turbines and solar panels this year. Chinese solar-panel manufacturers are estimated to have a 20% cost advantage over their U.S. peers, owing to economies of scale and more advanced supply-chain development.

Japan: Japan has also used reverse engineering to develop renewable energy technologies. Japan has set an ambitious target for renewable energy in the nation's electricity mix by 2030 as it aims to tackle climate change and achieve its 2050 carbon neutrality goal. The country aims for 36-38% of energy to come from renewables by 2030. Hydroelectricity is Japan's main renewable energy source, with an installed capacity of about 27 GW, or 16% of the total generation capacity, of which about half is pumped-storage. The production was 73 TWh in 2010. Japan has seen rapid expansion of solar photovoltaic in recent years, driven by generous feed-in-tariffs. More efforts are needed to develop other renewable technologies, including wind and geothermal, for which Japan's energy potential is large.

Lessons for Pakistan: Pakistan can learn from these examples by investing in renewable

energy and using reverse engineering to develop its own technologies. Pakistan has a huge wind corridor along its coastline, which could be used for the production of renewable energy. We are already using that corridor, and foreign wind turbines are already in place. We just need to reverse engineer that.

Pakistan can learn several lessons from the reverse engineering strategies of China and Japan. The key takeaway is that investing in research and development is critical to fostering innovation in the hi-tech industry. Additionally, developing affordable and efficient products for the domestic market is crucial to developing a thriving hi-tech industry. Finally, using

reverse engineering to analyze and improve existing technologies can lead to lower costs, greater efficiency, and increased competitiveness in the global market.

LEGAL AND INSTITUTIONAL FRAMEWORK OF THE HI-TECH INDUSTRY IN PAKISTAN

Legal Framework

Pakistan has several legal frameworks in place to support and regulate innovative industries. Some of the key legal frameworks are:

1. **Intellectual Property Laws**: Pakistan has strong intellectual property laws in place to protect innovations, inventions, trademarks, copyrights, and patents. The relevant laws include the Patents Ordinance 2000, the Trademarks Ordinance 2001, and the Copyright Ordinance 1962.

2. **Company Law**: Pakistan has a comprehensive company law framework that governs the incorporation, management, and operation of companies. The relevant laws include the Companies Act 2017, which provides a legal framework for the registration, governance, and winding up of companies in Pakistan.

3. **Tax Incentives**: The government of Pakistan offers tax incentives to encourage innovation and entrepreneurship. These incentives include tax holidays, tax exemptions, and tax credits for businesses engaged in research and development. The government is offering a 10-year waiver on corporate tax and imports of any equipment or building material needed for these areas.

4. **Startup Policy**: The government of Pakistan has recently launched a Startup Policy to provide a framework for the development of the startup ecosystem in the country. The policy includes measures to support the creation and growth of startups, including access to finance, mentorship, and incubation services. Pakistan has introduced amendments to the Companies Act and the Private Fund Regulations to facilitate startups and improve their access to finance.

5. **Competition Law**: The Competition Act, 2010 regulates competition in the market and prohibits anticompetitive practices, such as the abuse of dominant positions and mergers and acquisitions that may lead to a significant reduction in competition.

6. **Cyber Laws**: Pakistan has recently amended the Prevention of Electronic Crimes Act, 2016, which addresses cybercrime and provides for the punishment of various offences, such as unauthorized access to data, cyberstalking, and cyberterrorism.

7. **Securities Laws**: The Securities and Exchange Commission of Pakistan (SECP) regulates capital markets and public companies in Pakistan under the Securities Act, 2015.

8. **Labour Laws**: The Industrial Relations Act, 2012 governs the relationship between employers and workers and regulates matters such as collective bargaining and trade unions.

9. **Environmental Laws**: The Environmental Protection Act, 1997, and the Pakistan Environmental Protection Agency (PEPA) regulate the protection of the environment and the conservation of natural resources.

10. **Personal Data Protection**: Additionally, there is a bill being enacted to regulate controllers and processors of personal data in Pakistan. The Personal Data Protection Bill will be the main legislation regulating controllers and processors of personal data in Pakistan. Although the Personal Data Protection Bill (PDPB) has not yet been enacted, it shares similarities and differences with the General Data Protection Regulation (GDPR) of the European Union.

Overall, Pakistan has a range of legal frameworks in place to support and regulate innovative industries, including intellectual property laws, company law, technology parks, tax incentives, and a startup policy. These frameworks provide a supportive environment for businesses engaged in innovation and entrepreneurship in Pakistan.

Institutional Framework

Pakistan has an institutional framework for the hi-tech industry that aims to provide a conducive environment for its development. Here are the key elements of this framework:

1. **Ministry of Industries and Production**: The Ministry of Industries and Production is a federal-level government ministry in Pakistan. Its primary responsibility is to promote industrial development and growth in the country. The ministry is responsible for formulating policies, regulations, and laws related to industry and production, as well as overseeing the implementation of these policies.

2. **Ministry of Science and Technology**: The Ministry of Science and Technology is responsible for promoting scientific research and technological development in Pakistan. The ministry has several institutions under its control, such as the Pakistan Council for Scientific and Industrial Research (PCSIR), which provides R&D services to the industry. The Pakistani government has allowed for the creation of special technology zones, which aim to boost the IT economy of the country. The goal is to double Pakistan's IT industry in two years by setting up dedicated tech zones across the country.

According to an article by Forbes, these special technology zones will provide a legal and institutional framework for hi-tech industries in Pakistan.

3. **Pakistan Engineering Council (PEC)**: PEC is a regulatory body that oversees the engineering profession in Pakistan. It is responsible for maintaining the standards of engineering education and professional conduct of engineers.

4. **Pakistan Software Export Board (PSEB)**: PSEB is a government agency responsible for promoting and developing the software industry in Pakistan. It provides support to software companies by offering incentives and facilitating access to resources. According to Bloomberg, Pakistan is looking to double its IT industry in two years by setting up dedicated tech zones across the country, after missing out on tech booms that helped nations like India and the Philippines. Pakistan's industrial sector (in FY21) accounts for 28.11% of the GDP. Of this, manufacturing makes up 12.52%, mining constitutes 2.18%, construction makes up 2.05%, and electricity and gas 1.36%.

5. **Securities and Exchange Commission of Pakistan (SECP)**: SECP is the regulatory authority that oversees the securities market in Pakistan. It regulates the initial public offerings (IPOs) of hi-tech companies and ensures compliance with regulations.

6. **Pakistan Telecommunication Authority (PTA)**: PTA is a regulatory authority that oversees the telecommunication sector in Pakistan. It ensures compliance with regulations and promotes competition in the industry.

7. **National ICT R&D Fund**: The National ICT R&D Fund is a government organization that funds R&D projects in the ICT sector. It provides funding for the development of new technologies and innovative products. Additionally, Pakistan has more than 2,500 registered IT organizations in the country, with more than 20,000 computer science majors entering the market every year.

8. **Technology Parks**: The government of Pakistan has established several technology parks to provide infrastructure and support for innovative industries. The technology parks are designed to provide a conducive environment for research and development, as well as for the commercialization of new technologies. Pakistan has also developed an innovation management framework for the ICT sector, which identifies the factors affecting innovation and provides guidelines for enhancing innovation performance. The legal framework for the hi-tech industry in Pakistan includes government-sponsored initiatives that have allowed for the creation of special

technology zones. These zones aim to boost the IT economy of the country by incentivizing tech companies to open their operations within the country through tax-exempt programs.

In conclusion, Pakistan has a legal and institutional framework for the hi-tech industry that provides protection to inventors, innovators, and creators of original works. The government has established institutions and regulatory bodies to promote and regulate the industry. The National ICT R&D Fund provides funding for R&D projects in the ICT sector. However, there is room for improvement in the implementation of the legal and institutional framework to ensure a more conducive environment for the development of the hi-tech industry.

Comparative Analysis of the Role of the Hi-Tech Industry in Pakistan with the Best Practices Around the World

HI-TECH EMERGING INNOVATIVE INDUSTRIES AND WORLD BEST PRACTICES

Before making a comparative analysis between Pakistan and the rest of the world, we need to enumerate hi-tech and emerging innovative industries across the globe. Here are some emerging technologies around the world that could revolutionize agriculture, health, and the environment, according to experts convened by the World Economic Forum:

1. **Artificial Intelligence (AI) and Machine Learning**: AI and machine learning are becoming increasingly important in various industries, such as healthcare, finance, and transportation. Companies are investing heavily in AI to improve efficiency and productivity. According to a September 2018 report by the McKinsey Global Institute on the impact of AI on the world economy, artificial intelligence has the potential to incrementally add 16 percent, or around $13 trillion, by 2030 to current global economic output. This is an annual average contribution to productivity growth of about 1.2 percent between now and 2030. Another report by PwC suggests that AI could contribute up to $15.7 trillion to the global economy in 2030, more than the current output of China and India combined. Of this, $6.6 trillion is likely to come from increased productivity, and $9.1 trillion is likely to come from consumption-side effects.
2. **Renewable Energy**: As concerns about climate change continue to grow, the demand for renewable energy sources such as solar and wind power is increasing. This industry is expected to continue to grow rapidly in the coming years. According to a report by Allied Market Research, the global renewable energy market was valued at $881.7 billion in 2020 and is projected to reach $1,977.6 billion by 2030, growing at a CAGR of 8.4% from 2021 to 2030. Another report

by Business Wire suggests that the global renewable energy market had total revenues of $692.8 billion in 2020, representing a compound annual growth rate (CAGR) of 8.9% between 2016 and 2020.

3. **Electric Vehicles (EVs)**: The demand for electric vehicles is growing as consumers become more concerned about the environment and the cost of traditional gasoline-powered vehicles. Companies such as Tesla, Volkswagen, and General Motors are investing heavily in this industry. According to a report by Allied Market Research, the global electric vehicle market was valued at $163.01 billion in 2020 and is projected to reach $823.75 billion by 2030, registering a CAGR of 18.2% from 2021 to 2030. The near-term outlook for EV sales is bright. In the first quarter of 2021, global electric car sales rose by around 140% compared to the same period in 2020.
4. **Biotechnology**: Biotechnology is an emerging field that focuses on using living organisms and biological processes to develop new products and technologies. This industry has the potential to revolutionize healthcare, agriculture, and environmental sustainability. According to a report by Grand View Research, the global biotechnology market size was estimated at USD 1,023.92 billion in 2021 and is expected to grow at a compound annual growth rate (CAGR) of 13.9% from 2022 to 2030. The global biotechnology market was estimated at USD 859.94 billion in 2022 and is expected to be worth around USD 1,683.52 billion by 2030 with a noteworthy CAGR of 8.7% from 2023 to 2030.
5. **Blockchain Technology**: Blockchain technology is a distributed database that allows secure, transparent, and tamper-proof transactions. This technology has the potential to disrupt various industries, including finance, healthcare, and supply chain management. According to a report by Future Market Insights, blockchain technology accounted for around 5% share of the global digital transformation market in 2022. The blockchain technology market is predicted to surge at an exemplary CAGR of 44.3% through 2033, reaching US$ 181.1 billion in valuation, up from just US$ 4.6 billion in 2023.
6. **Cybersecurity**: With the rise of digital technology, cybersecurity has become an increasingly important concern. Companies are investing in cybersecurity to protect their sensitive information from cyber threats. According to a report by Allied Market Research, the global cybersecurity market size was valued at $197.36 billion in 2020 and is projected to reach $478.68 billion by 2030, growing at a CAGR of 9.5% from 2021 to 2030. The global cybersecurity market was valued at USD 150.37 billion in 2021, and it is expected to reach a value of USD 317.02 billion by 2027, registering a CAGR of 13.37% during the forecast period 2022-2027.

7. **Virtual Reality (VR) and Augmented Reality (AR)**: VR and AR are emerging technologies that have the potential to revolutionize various industries such as gaming, entertainment, education, and healthcare. According to Statista, the revenue in the AR & VR market is projected to reach US$31.12bn in 2023. Revenue is expected to show an annual growth rate (CAGR 2023-2027) of 13.72%, resulting in a projected market volume. The global extended reality (XR) market that includes augmented reality (AR), virtual reality (VR), and mixed reality (MR) reached 29.26 billion U.S. dollars in 2022.
8. **Internet of Things (IoT)**: The IoT involves connecting everyday devices such as cars, appliances, and wearable technology to the internet. This allows for better data collection and analysis, leading to improved efficiency and productivity in various industries. According to Fortune Business Insights, the global internet of things (IoT) market size was valued at USD 384.70 billion in 2021 and is projected to grow from USD 478.36 billion in 2022 to USD 2,465.26 billion by 2029, at a CAGR of 26.4% during the forecast period. The total IoT market worldwide was worth around 182 billion U.S. dollars in 2020 and is forecast to rise to more than 621 billion U.S. dollars in 2030.
9. **Nanotechnology**: Nanotechnology involves the manipulation of matter at the atomic and molecular level and has applications in medicine, electronics, and other industries. According to Allied Market Research, the global nanotechnology market size was valued at USD 1.76 billion in 2020 and is projected to reach USD 33.63 billion by 2030, registering a CAGR of 36.4% from 2021 to 2030. The nanotechnology market in the U.S. was worth US$16 billion in 2020. The country currently accounts for a 29.53% share of the global market.
10. **Robotics**: Robotics technology has a wide range of applications in manufacturing, healthcare, and other industries. According to Fortune Business Insights, the global industrial robots market size was valued at USD 15.60 billion in 2021 and is projected to grow to USD 35.68 billion by 2029, exhibiting a CAGR of 11.4% during the forecast period. The robotics market is anticipated to register a CAGR of 17.6% during the forecast period. We expect the global robotics market to climb from about USD 25 billion this year to between USD 160 billion and USD 260 billion by 2030, with market share for professional services robots hitting up to USD 170 billion and industrial and logistics robot sales topping off at about USD 80 billion.

POTENTIAL SECTORS FOR HI-TECH, INNOVATIVE, AND EMERGING INDUSTRIES IN PAKISTAN

Pakistan has a diverse economy with opportunities in a variety of sectors. Some potential sectors for high, innovative, and emerging industries in Pakistan are:

1. **Information Technology (IT)**: Pakistan has a rapidly growing IT industry with a large pool of talented software developers and IT professionals. The government is also investing in IT infrastructure, making Pakistan an attractive destination for IT outsourcing and software development. Pakistan's IT sector is one of the fastest-growing sectors in the country. The country has a large pool of young, educated, and tech-savvy talent, which makes it an attractive destination for IT companies. Pakistani IT companies have begun developing software for use in different types of businesses and services. Locally made software packages are available for implementation in schools, hospitals, supermarkets, and other businesses at low cost. According to data released by the State Bank of Pakistan, remittances under IT and IT-enabled services surged to $1.119 billion from July 2020 to January 2021 compared to $812 million recorded previously. The IT minister has set forth an ambitious target of $5 billion in IT exports for FY 2023 and $15 billion in the next five years. Pakistan has already posted an export growth of 150% in IT exports during FY 2019 – FY 2022.
2. **Agriculture and Agribusiness**: Pakistan has a vast agricultural sector and is known for its production of rice, wheat, and cotton. With the right investments and modernization, the agriculture sector can become more productive, efficient, and innovative. Agribusiness and food processing are also potential areas for growth and innovation. Agriculture is the foundation of Pakistan's economy. It accounts for over a third of export earnings, and that sector is struggling. The annual agricultural growth rate averaged just 2.8 percent from 2010 to 2014, a significant drop from the growth rates experienced during the previous two decades. Pakistan's traditional, subsistence agriculture is becoming commercial, albeit slowly. Directly and indirectly, the sector is the main source of income for about 66 percent of the rural population. Agriculture contributes about 18.5% to GDP, provides livelihood to 64% of rural inhabitants, and employs 38.5% of the total national labor force.
3. **Renewable Energy**: Pakistan has enormous potential for renewable energy, including solar, wind, and hydropower. The government is actively encouraging investment in this sector to reduce the country's reliance on fossil fuels and to meet its growing energy needs. Around 10.57% of Pakistan's total installed power generation

capacity (in 2020) comes from renewable (wind, solar, and biogas). Most of Pakistan's renewable energy comes from hydroelectricity. As per the vision of the Prime Minister, there is an aim to "induct 20% of RE by the year 2025 and 30% of RE by the year 2030." Utilizing just 0.071 percent of Pakistan's area for solar photovoltaic (solar PV) power generation would meet Pakistan's current electricity demand. Wind is also an abundant resource.

4. **Healthcare**: Pakistan has a large population with significant healthcare needs. There is a growing demand for high-quality medical services and products, including pharmaceuticals, medical devices, and telemedicine. The healthcare sector in Pakistan is in need of innovation and investment. There is a growing demand for healthcare services, and there is a need to develop new technologies and solutions to address the country's health challenges. The Government of Pakistan (GOP) spent about $785 million on healthcare in the fiscal year ending June 2021. The medical devices market in Pakistan is estimated at $500 - $600 million with an estimated growth rate of 15 percent CAGR over the next five years (2019-2023). The National Health Vision Pakistan 2016-2025 aims to provide universal health coverage and access to quality health services for all citizens of Pakistan.
5. **Textiles and Apparel**: Pakistan is a major producer and exporter of textiles and apparel, with a highly skilled workforce and a competitive cost structure. There is potential for innovation in textile manufacturing, such as the use of sustainable and eco-friendly materials. The textile and apparel sector of Pakistan is one of the most energetic, dynamic, and export-oriented sectors in the country. It encompasses a unique distinction of having intensive backward and forward linkages, which translates into an extended value chain starting from cotton ginning to a finished product marked by modern fashion. It contributes around 60% of total exports and provides a platform for large, medium, and small-scale manufacturing and employment. The textile and apparel sector holds a 60% share in total exports and contributes 8.5% to the gross domestic product (GDP). The industry provides direct employment for about 40% of the country's total industrial workforce.
6. **Construction and Real Estate**: Pakistan is experiencing rapid urbanization, with a growing demand for housing, commercial buildings, and infrastructure. There are opportunities for innovation in sustainable construction, affordable housing, and smart cities. The construction sector provides up to 380 billion PKR in GDP and has been declared an industry. The real estate market capitalization of Pakistan is valued at over $1 trillion, which is more than three times that of Pakistan's GDP. According to the World Bank estimate, the size of a country's real estate assets constitutes between 60 and 70%

of the country's total wealth. If these estimates are applied to Pakistan, the estimated size of the real estate sector would be $300 to $400 billion.

7. **Biotechnology**: Pakistan has a rich biodiversity, which makes it an ideal location for biotech research and development. The biotech industry has the potential to create new drugs, improve agricultural productivity, and address health challenges in the country. Biotechnology has considerable potential for promoting the efficiency of crop improvement, food production, and poverty reduction in Pakistan. The use of modern biotechnology began in Pakistan in 1985, and there are currently 29 biotech centers/institutes in the country. Biotechnology offers a strong role in the environmental, medical, energy, and manufacturing industries. Additionally, biotechnologists are in high demand in Pakistan as well as abroad.
8. **E-commerce**: The e-commerce sector is rapidly growing in Pakistan as more people are using smartphones and the internet. The sector has the potential to transform the retail industry and create new jobs. According to a report by the Pakistan Institute of Development Economics (PIDE), the year 2023 could see Pakistan's e-commerce market reach a revenue of US$6.4 billion, growing annually at 6.23 percent. By 2021, the market had hit US$4.2 billion, ranking Pakistan 46th globally in this field. The News International reports that with a population of 208 million and several financial inclusion solutions, Pakistan is one of the largest unrealized markets of e-commerce in the world.
9. **Aerospace**: Pakistan has a long history of aerospace research and development, and there is a growing interest in the commercialization of space-related technologies. The government has established the Space and Upper Atmosphere Research Commission (SUPARCO) to promote space-related activities in the country. Pakistan Aeronautical Complex (PAC) is a major aerospace company in Pakistan that produces aircraft for both military and civilian use. The Pakistani Senate's Standing Committee has directed PAC to focus on five prime goals to boost the potential of Pakistan's aerospace industry. According to a report by Jattala, Pakistan's aerospace & defense market size is $8.7 billion.
10. **Robotics**: Robotics is an emerging field in Pakistan, and there is a growing interest in the development of autonomous systems and drones. The country has the potential to become a hub for the development of robotics and automation technologies. According to an article by Daily Times, the potential of robots in businesses is not yet fully utilized in Pakistan.

Overall, Pakistan has significant opportunities in the emerging sectors mentioned above. However, to compete with the best global practices, it needs to invest heavily in R&D, improve its infrastructure, strengthen governance frameworks, and enhance collaboration with global players to foster innovation and technological advancement.

COMPARATIVE ANALYSIS OF THE ROLE OF THE HI-TECH INDUSTRY IN PAKISTAN WITH THE BEST PRACTICES AROUND THE WORLD

Pakistan's hi-tech industry is relatively nascent compared to other countries around the world. The industry has seen significant growth in recent years due to increased investment in infrastructure, education, and technology, but it still lags behind many other countries. In this comparative analysis, we will examine the role of Pakistan's hi-tech industry compared to best practices around the world.

1. **Investment in Research and Development (R&D)**: Pakistan's government has invested in the hi-tech industry in recent years, with a particular focus on R&D. However, the investment in R&D is still relatively low compared to other countries around the world. According to the World Intellectual Property Organization (WIPO), Pakistan ranked 103rd in the world for R&D spending in 2019. In comparison, countries such as the United States, China, and Japan spend significantly more on R&D each year. According to an article in *The Express Tribune*, Pakistan's R&D expenditure as a percentage of GDP is less than that of India, Thailand, and Singapore. It averaged a meager 0.38% from 2005 to 2017 compared to 0.76% in India, 0.44% in Thailand, and 2.1% in Singapore.

2. **Access to Talent**: Access to talent is a critical factor in the success of a hi-tech industry. Pakistan has a large population, which provides a significant pool of potential talent. However, the quality of education and training available in Pakistan is not always up to international standards. Many tech companies in Pakistan have to invest heavily in training their employees to bring them up to speed with the latest technologies and practices. In contrast, countries like the United States, Canada, and Australia have world-class universities and training programs that produce a steady stream of highly skilled workers. According to *Rest of World*, Pakistan's startup boom has triggered a "war for talent." Flush with venture funding, tech companies are offering staggering salaries and perks, while recruiters struggle to retain candidates eager for the best deals.

3. **Infrastructure and Connectivity**: Infrastructure and connectivity are essential for the hi-tech industry to thrive. Pakistan has made significant progress in recent years in terms of improving its infrastructure, including the construction of new roads, bridges, and

airports. However, the country still faces significant challenges in terms of electricity shortages, slow internet speeds, and outdated technology. In contrast, countries like South Korea, Japan, and Singapore have world-class infrastructure and connectivity, which has helped them become leaders in the hi-tech industry. According to *Bloomberg*, Pakistan plans to boost spending on large infrastructure projects by as much as 40% to create jobs and foster productivity in an economy crippled by the coronavirus pandemic.

4. **Government Support and Policies**: Government support and policies play a significant role in the success of the hi-tech industry. Pakistan has taken steps in recent years to create a more business-friendly environment, including tax incentives and other support programs. However, there are still many bureaucratic hurdles that tech companies have to navigate. In contrast, countries like Singapore and South Korea have created favorable policies and incentives that have helped them become leaders in the hi-tech industry. Pakistan's tech industry is changing. Government-sponsored initiatives have allowed for the creation of special technology zones, which aim to boost the IT economy of the country. The government is offering a 10-year waiver on corporate tax and imports of any equipment or building material needed for these areas, which will give Pakistan's IT industry a "catapult push" that could double its size in two years.

5. **Entrepreneurship and Start-up Culture**: Entrepreneurship and start-up culture are essential for innovation and growth in the hi-tech industry. Pakistan has a growing start-up scene, but it still lags behind many other countries. In contrast, countries like the United States, Israel, and Singapore have vibrant start-up ecosystems that attract talent and investment from around the world. According to McKinsey, Pakistan is one of the youngest countries in the world, with 140 million people below the age of 30 and one of the fastest-growing economies in Asia. The country has a thriving start-up ecosystem, with an average of $10 million a year in VC funding between 2016 and 2018. Shell Tameer is an entrepreneurship development program by Shell Pakistan that aims to encourage the development of entrepreneurial skills among the youth of Pakistan (ages 18-35).

In conclusion, Pakistan's hi-tech industry has made significant progress in recent years, but it still lags behind many other countries around the world. To catch up with the best practices in the world, Pakistan needs to focus on increasing its investment in R&D, improving the quality of education and training, improving its infrastructure and connectivity, creating more favorable government policies, and fostering a vibrant start-up culture.

SWOT ANALYSIS

SWOT analysis is a comprehensive tool used to identify the strengths, weaknesses, opportunities, and threats of a given industry or sector. It also includes an assessment of ethical, environmental, technological, and human factors that can impact the industry's growth and development. In this analysis, we will apply the SWOT-EETH framework to the hi-tech industry in Pakistan to identify areas for improvement and promote its growth.

Strengths:

- Low labor costs compared to other countries
- Growing pool of skilled workers
- Favorable government policies to promote investment in the tech industry
- Availability of tax incentives for tech companies
- Growing entrepreneurial culture and start-up ecosystem

Weaknesses:

- Poor infrastructure and connectivity
- Electricity shortages
- Limited access to funding and venture capital
- Limited support for R&D and innovation
- Inadequate regulatory framework for the hi-tech, innovative, and emerging industry
- Insufficient collaboration between academia and industry

Opportunities:

- Growing demand for technology products and services in Pakistan
- Increasing number of mobile and internet users
- Emerging markets for e-commerce and digital payments
- Potential for collaboration with international companies and investors
- Potential for greater government investment in infrastructure and R&D

Threats:

- Political instability and security concerns
- High competition from other countries with established hi-tech industries
- Limited availability of raw materials and resources due to financial constraints
- Environmental concerns related to electronic waste and energy consumption
- Ethical issues related to data privacy and cybersecurity

In conclusion, the SWOT analysis highlights the need for significant improvements in infrastructure, funding, and the regulatory framework to promote the growth of the hi-tech industry in Pakistan. The government

needs to invest in infrastructure, R&D, and human capital development. Additionally, laws and policies need to be developed to address ethical, environmental, technological, and human factors. Collaboration between academia and industry is also critical to promoting innovation and growth in the tech industry.

GAP ANALYSIS

GAP analysis is a useful tool for assessing the current state of a particular industry or sector, identifying areas where it falls short of expectations or benchmarks, and determining what steps need to be taken to bridge those gaps. In the case of the hi-tech, innovative, and emerging industry of Pakistan, we can carry out a GAP analysis as follows:

1. **Current state of the industry**: The hi-tech industry in Pakistan is still in its early stages and has a lot of potential for growth. However, it faces several challenges, including a lack of infrastructure, inadequate funding, and a shortage of skilled workers.
2. **Desired state of the industry**: The desired state of the hi-tech industry in Pakistan is to become a globally competitive sector that drives economic growth and innovation. This would involve creating an environment that fosters innovation, attracting investment, and nurturing a skilled workforce.
3. **Identifying the gaps**: Based on the current state of the industry and the desired state, we can identify several gaps that need to be addressed:
    - **Infrastructure**: The hi-tech industry in Pakistan requires significant investment in infrastructure, including high-speed internet connectivity, reliable power supply, and modern office spaces.
    - **Funding**: Access to funding is a critical issue for hi-tech startups in Pakistan. There is a need to develop a robust ecosystem of investors, venture capitalists, and angel investors who can provide the necessary funding for startups to grow and scale.
    - **Skilled workforce**: The availability of a skilled workforce is essential for the growth of the hi-tech industry. However, there is a significant skills gap in Pakistan, and there is a need to invest in education and training programs to develop the necessary skills in the workforce.
    - **Regulatory environment**: The regulatory environment in Pakistan can be challenging for hi-tech startups, with issues such as bureaucracy, corruption, and lack of transparency. There is a need to streamline the regulatory process and create a more supportive environment for startups.

4. **Developing a plan to bridge the gaps**: To bridge the gaps identified above, a comprehensive plan needs to be developed that addresses each of these issues. This could involve initiatives such as:
    - **Investing in infrastructure**: The government and private sector need to invest in the necessary infrastructure to support the hi-tech industry, including high-speed internet connectivity, reliable power supply, and modern office spaces.
    - Creating a robust funding ecosystem: The government and private sector need to work together to create a robust funding ecosystem that includes venture capitalists, angel investors, and other sources of funding.
    - Investing in education and training programs: The government and private sector need to invest in education and training programs to develop the necessary skills in the workforce. This could involve initiatives such as creating specialized universities or training programs for the hi-tech industry.
    - Streamlining the regulatory process: The government needs to streamline the regulatory process to make it easier for startups to operate in Pakistan. This could involve simplifying the regulatory process, reducing bureaucracy, and increasing transparency.

In conclusion, the hi-tech, innovative, and emerging industry of Pakistan has a lot of potential for growth but faces several challenges. By carrying out a GAP analysis and identifying the gaps that need to be addressed, we can develop a comprehensive plan to bridge those gaps and create a more supportive environment for the hi-tech industry to thrive.

Conclusion

In conclusion, Pakistan's policies and regulations regarding adaptation to emerging innovative industries and hi-tech are crucial for its economic growth and development. With China's successful strategy of reverse engineering, Pakistan has an opportunity to learn from and implement similar strategies to become a leading player in these industries. However, this requires a comprehensive approach that involves collaboration between the government, private sector, and academia to create an ecosystem that fosters innovation, entrepreneurship, and technology transfer. Furthermore, Pakistan needs to prioritize investment in research and development, intellectual property protection, and regulatory reforms to attract foreign investment and promote domestic innovation. By doing so, Pakistan can leverage its strategic location, talented workforce, and abundant natural resources to become a hub of innovation and technological excellence in the region.

Recommendations

After conducting a SWOT analysis of Pakistan's hi-tech industry, it is clear that there are both strengths and weaknesses that need to be addressed. Furthermore, ethical, environmental, technological, and human resource factors also play a significant role in the industry's growth and success. Additionally, there is a need to learn from the Chinese strategy of reverse engineering to adapt and improve the policy and regulatory framework for the hi-tech industry in Pakistan. Here are some pragmatic recommendations to tackle the issues and challenges:

1. **Increase investment in research and development**: The government should focus on increasing investment in research and development to encourage innovation and the development of new technologies. This can be done through a combination of tax incentives, grants, and other support programs.

2. **Improve access to talent**: The government should focus on improving the quality of education and training available in the country, particularly in STEM fields. This can be done through partnerships with universities and training programs in other countries, as well as investment in local institutions.

3. **Improve infrastructure and connectivity**: The government should focus on improving the country's infrastructure and connectivity, particularly in terms of electricity supply, internet speed, and other critical infrastructure needs. This can be done through public-private partnerships and increased investment in infrastructure projects.

4. **Foster a vibrant start-up culture**: The government should focus on creating a more business-friendly environment, including tax incentives and other support programs that encourage entrepreneurship and innovation. Additionally, the government should work to reduce bureaucratic hurdles that make it difficult for start-ups to get off the ground.

5. **Develop a regulatory framework that encourages innovation**: The government should develop a regulatory framework that encourages innovation and experimentation while still protecting consumers and ensuring public safety. This can be done through partnerships with industry experts and other stakeholders.

6. **Intellectual Property Protection**: Intellectual property protection is crucial to prevent reverse engineering of products. Pakistan should develop and enforce strict laws to safeguard the intellectual property rights of companies investing in Pakistan's technology sector.

7. **Create an innovation ecosystem**: Developing an ecosystem that supports innovation is essential for emerging hi-tech industries. This

includes creating incubation centers, accelerators, and co-working spaces that help startups grow and access resources.

8. **Collaboration with China**: Collaboration with China could be beneficial for Pakistan's hi-tech industry. Pakistan can learn from China's experience in reverse engineering technology and innovation while working with Chinese companies to develop new technologies.

9. **Focus on niche industries**: To prevent direct competition with China, Pakistan could focus on developing niche industries that require specialized knowledge and cannot be easily replicated.

10. **Implement quality control measures**: Pakistan can implement strict quality control measures to ensure that its products are of a high standard and cannot be easily replicated by competitors.

In conclusion, Pakistan's hi-tech industry has significant potential for growth and success. However, there are several challenges and issues that need to be addressed, including investment in research and development, access to talent, infrastructure and connectivity, and regulatory frameworks that encourage innovation. By implementing the pragmatic

recommendations above, Pakistan can overcome these challenges and position itself as a leading player in the global hi-tech industry.

LOG FRAME MATRIX

The Logical Framework Approach (LFA) or Log Frame Matrix is a widely-used tool to plan and monitor development projects. It can also be used to devise a practical plan to address issues and problems related to Hi-Tech and Emerging Innovative Industries and Pakistan's Policies and Regulations Towards Adaptation in the Light of China's Strategies of Reverse Engineering. Here's a step-by-step guide on how to use the LFA:

Step 1: Identify the problem: The first step is to identify the problem or issue that needs to be addressed. In this case, the problem is that Pakistan is facing challenges in adapting to China's strategies of reverse engineering in the hi-tech and emerging innovative industries due to inadequate policies and regulations.

Step 2: Develop the problem tree: Once the problem is identified, develop a problem tree to identify the root causes of the problem. The problem tree will help identify the underlying causes of the problem and highlight areas that need attention. The problem tree for this issue may look like:

Problem: Pakistan faces challenges in adapting to China's strategies of reverse engineering in hi-tech and emerging innovative industries. **Causes:**

- Inadequate policies and regulations
- Lack of skilled workforce
- Insufficient investment in research and development
- Limited access to technology
- Lack of collaboration between industry and academia

Step 3: Develop the objectives tree: Based on the problem tree, develop an objectives tree that outlines the desired outcomes of addressing the root causes of the problem. The objectives tree may look like:

Overall Objective: To improve Pakistan's adaptation to China's strategies of reverse engineering in hi-tech and emerging innovative industries
Intermediate Objectives:

- Improved policies and regulations for hi-tech
- Increased availability of skilled workforce
- Increased investment in R&D
- Improved access to technology
- Enhanced collaboration between industry and academia

Step 4: Develop the log frame matrix: The next step is to develop the log frame matrix, which outlines the project's goals, objectives, activities, and indicators. The log frame matrix may look like:

Goal: To improve Pakistan's adaptation to China's strategies of reverse engineering in hi-tech and emerging innovative industries
Objectives:
Outputs:

- 1.1: Policy and regulatory framework for hi-tech and emerging innovative industries developed
- 1.2: Stakeholder consultations conducted for policy development
- 2.1: Skilled workforce development programs implemented
- 2.2: Industry-academia collaboration programs established
- 3.1: Research and development investment increased
- 3.2: Technology transfer and adoption programs implemented

Indicators:

- 1.1.1: Number of policy and regulatory frameworks developed
- 1.2.1: Number of stakeholder consultations conducted
- 2.1.1: Number of skilled workers trained
- 2.2.1: Number of industry-academia collaboration programs established
- 3.1.1: Increase in research and development investment
- 3.2.1: Number of technology transfer and adoption programs implemented

Step 5: Implementation and monitoring: The final step is to implement the project activities and monitor progress toward achieving the desired

outcomes. The log frame matrix can be used to track progress and identify areas where adjustments are needed.

In summary, using the LFA and log frame matrix can help devise a practical plan to address the issues and problems related to Hi-Tech and Emerging Innovative Industries and Pakistan's Policies and Regulations Towards Adaptation in the Light of China's Strategies of Reverse Engineering. The plan focuses on improving policies and regulations, increasing investment in research and development, enhancing collaboration between industry and academia, and increasing the availability of skilled workforce and access to technology.

ACTION PLAN STEPS

To devise a practical action plan to find solutions to issues and problems of hi-tech, innovative emerging industries in Pakistan, we will have to follow these steps:

1. **Identify the issues and problems:** Start by identifying the issues and problems faced by the hi-tech, innovative emerging industries in Pakistan. This could be done through research, surveys, and interviews with industry experts and stakeholders.
2. **Prioritize the issues:** Once you have identified the issues, prioritize them based on their impact on the industry and the urgency of the solution.
3. **Formulate a task force:** Form a task force consisting of experts from relevant industries, academia, government, and other stakeholders to find practical and viable solutions.
4. **Set up a framework:** Set up a framework for the task force, defining its objectives, scope, roles, and responsibilities.
5. **Brainstorm and research:** The task force should conduct brainstorming sessions and research to come up with innovative solutions to the identified issues.
6. **Evaluate and select solutions:** Evaluate the proposed solutions based on their feasibility, cost-effectiveness, and impact. Select the most practical and viable solutions to the issues.
7. **Develop an action plan:** Develop an action plan to implement the selected solutions, including timelines, budgets, and responsible parties.
8. **Implementation:** Implement the action plan, keeping track of progress and making adjustments as necessary.
9. **Monitor and evaluate:** Monitor and evaluate the effectiveness of the solutions implemented and make necessary adjustments to improve their impact.
10. **Communicate the solutions:** Communicate the solutions and their impact to relevant stakeholders to raise awareness and encourage

further collaboration to promote hi-tech, innovative emerging industries in Pakistan.

PRACTICAL ACTION PLAN

Establishing a hi-tech, innovative emerging industry in Pakistan while considering China's reverse engineering strategies would require a multi-faceted approach. Here is a practical action plan that can be adopted:

1. **Identify potential industries:** Conduct a thorough analysis of the current market trends and identify potential industries that can benefit from hi-tech and innovative solutions, keeping in view Chinese reverse engineering strategies. We have already identified potential sectors for Pakistan, including biotechnology, artificial intelligence, renewable energy, etc. The Ministry of Industries and Production should start working on tapping the potential in these identified sectors. Pakistan Industrial Technical Assistance Centre (PITAC) is responsible for providing technical assistance and consultancy services to small and medium-sized industries in Pakistan, so this task should be assigned to PITAC. Identifying potential hi-tech industries in Pakistan requires a systematic approach that involves analyzing various factors. Some of the ways to identify potential hi-tech industries in Pakistan are:
    - **Market Analysis**
    - **Technology Landscape Analysis**
    - **Workforce Analysis**
    - **Government Priorities**
    - **Existing Industry Analysis**
    - **Global Trends**
2. **Create partnerships:** Establish strategic partnerships with universities, research institutions, and companies from around the world that have experience in the chosen industry. This will help in sharing knowledge, expertise, and technology transfer. Creating partnerships for the establishment of hi-tech and innovative industries in Pakistan can be beneficial for several reasons. It can help in leveraging the expertise of global players, technology transfer, and access to new markets. Here are some ways to create partnerships for the establishment of hi-tech and innovative industries in Pakistan:
    - **Attend Trade Shows and Conferences**
    - **Establish Business Incubators and Accelerators**
    - **Collaborate with Universities and Research Institutions**
    - **Engage with Diplomatic Missions**
    - **Establish Public-Private Partnerships (PPP)**
    - **Leverage Industry Associations**

3. **Focus on R&D:** Invest in research and development to create innovative solutions that have the potential for patenting. This will help protect intellectual property rights and prevent reverse engineering. Pakistan Institute of Development Economics (PIDE) is a research institute that provides policy advice to the government on economic development and industrial growth. To focus on research and development (R&D) for the establishment of hi-tech and innovative industries in Pakistan, the following steps can be taken:
    - **Create a Comprehensive R&D Strategy**
    - **Increase Funding for R&D**
    - **Establish R&D Clusters**
4. **Develop a strong legal framework:** Develop a strong legal framework that protects intellectual property rights and makes it difficult for reverse engineering. It should include patent protection, trademark protection, and copyrights. National Productivity Organization (NPO) aims to enhance productivity in the industrial sector by promoting the adoption of best practices and modern technologies, so this task could be assigned to them. Steps to develop a strong legal framework:
    - **Study Best Practices**
    - **Consult Industry Experts**
    - **Create Specialized Courts**
    - **Monitor and Update**
    - **Capacity Building**
5. **Invest in workforce development:** Invest in workforce development and provide training programs to create a skilled workforce that can help in the growth of the emerging industry. The training should focus on the latest technologies and innovative solutions. The National Vocational and Technical Training Commission (NAVTTC) is the ideal body to assign this task.
6. **Provide government incentives:** The government should provide incentives for businesses that invest in the hi-tech and innovative emerging industry, such as tax breaks, subsidies, or other financial incentives.
7. **Build infrastructure:** Build the necessary infrastructure, such as research and development centers, incubators, and technology parks that support the emerging industry.
8. **Foster an innovation ecosystem:** Foster an innovation ecosystem that encourages collaboration, creativity, and innovation. This can be achieved by organizing innovation competitions, events, and workshops. The Trade Development Authority of Pakistan (TDAP) should be assigned this task.

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Critical Evaluation of Textile Sector Pakistan and Way Forward

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Abstract:

The textile industry plays a crucial role in the global economy, with a contribution of approximately US$ 2.6 trillion to global GDP and employing 60 million people worldwide. In Pakistan, the textile sector is the backbone of the economy, accounting for 60% of exports and employing 40% of the industrial workforce. Despite this, the sector's performance remains suboptimal due to challenges such as high production costs, energy inefficiencies, and limited access to finance. Pakistan's textile exports have fluctuated, and though they reached US$ 19.33 billion in FY 2022, the potential for growth remains untapped. This paper aims to analyze the sector's capacity, legal framework, global competitiveness, and identify gaps through SWOT analysis. Recommendations focus on sustainable practices, technological advancements, skills development, diversification, and improvements in the regulatory and financial landscape. Strategic reforms are crucial for realizing the full potential of Pakistan's textile sector and driving sustainable economic growth.

Key words:

Textile Industry, Pakistan, Export Growth, Sustainability, Economic Development.

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Introduction

The contribution of the textile industry to the global economy remains vital. The estimated value of its contribution to global Gross Domestic Product (GDP) is around US$ 2.6 trillion, with employment of 60 million people in various textile-related jobs worldwide. Today, textiles constitute 4.62% of total world trade (Sattar, 2023). The World Trade Organization (WTO), in its latest report titled "Textiles World 2021" for the year 2020, ranked Pakistan as the 6th largest textile exporter, alongside China, India, Bangladesh, Vietnam, Turkey, Indonesia, Germany, Italy, and the United States. These countries accounted for 77.5% of the world's textile exports in 2020 (Textile World, 2021).

The textile sector in Pakistan is considered the backbone of the country's economy, with the most intensive backward and forward linkages compared to any other sector. It is the largest manufacturing industry, contributing to around 60% of the country's exports. The sector also employs around 40% of the industrial labor force and provides employment opportunities for millions of people, including skilled and unskilled workers (Sattar, 2023). The sector holds immense growth potential as the country is abundantly endowed with raw materials, including the world's best-quality cotton.

Despite the existence of an elaborate legal, institutional, and administrative framework and active private sector participation, textile exports have never exceeded US$ 19.33 billion per annum. Furthermore, an ambitious target of promoting textile exports to US$ 40 billion/year was set under the Government of Pakistan's current Textile Policy (Textile and Apparel Policy 2020-25). This target is likely unattainable due to several challenges, including power outages, expensive energy, poor infrastructure, limited access to finance for SMEs and exporters, high production costs, and high dependence on cotton and its price fluctuations. Additionally, the textile sector faces challenges such as a lack of focus on research and development, innovation, and human resource development to compete globally. The graph below shows the trends of textile exports from 2006 to 2021, which fluctuated between US$ 10 billion and US$ 16 billion during this period, with the exception of the lowest exports of US$ 9 billion in FY-2009.

Textile exports witnessed a remarkable increase of 25.5% during FY-2022, amounting to US$ 19.33 billion, compared to US$ 15.40 billion during FY-2021 (Annual Analytical Report on External Trade FY 2021-22, Pakistan Bureau of Statistics). However, this is still far below the sector's actual potential. According to the latest data from PBS, Pakistan's overall exports declined by 7% to US$ 16.5 billion in the first seven months of FY 2022-23, compared to US$ 17.7 billion in the same period of the previous year, despite massive currency depreciation and a relief package for export-oriented sectors.

To ensure sustainable growth of the textile sector, necessary reforms need to be undertaken, along with the adoption of an implementation strategy for the expeditious execution of previous initiatives and measures to promote textile exports. Moreover, diversification of textile exports (in terms of commodities and destinations), with a focus on value addition, attracting foreign direct investment, and reducing the cost of doing business, could play an important role in this regard.

Pakistan Textile Exports FY 2006-2021. Source: APTMA

Statement of the Problem

The textile industry has significantly contributed to the economic growth and development of various countries. However, the performance of Pakistan's textile sector has remained suboptimal over the years, despite the government's enhanced focus and priority. Therefore, the situation warrants an in-depth analysis to identify the gaps and bottlenecks hampering its progress and to provide concrete recommendations for achieving sustainable growth in Pakistan's textile sector.

The paper will:

a) Carry out a situational analysis of the capacity, preparedness, and output of the textile industry in Pakistan, and its contribution to national economic development.

b) Analyze the legal and institutional framework of the textile industry in Pakistan.
c) Conduct a comparative analysis of the role of Pakistan's textile industry with best practices around the globe.

c) Perform a SWOT–EETH analysis of the textile industry in order to promote a high-tech industry in Pakistan for each related policy, legal, and institutional framework separately.

d) Carry out a gap analysis in the areas described in a), b), c), and d) above.

e) After making a plausible conclusion, provide pertinent and pragmatic recommendations to tackle the issues and challenges identified during a) to e).

f) Develop a plan using the Log Frame Matrix to find practical and viable solutions to the issues and problems identified in a) to f).

Significance and Scope

This research aims to analyze the development of the textile sector in Pakistan over the years, particularly from 2018 to 2022. The study examines the factors that have hampered the growth of the textile sector in Pakistan, as well as the efforts and initiatives by the government to promote the sector. The study also provides recommendations for the sustainable growth of the textile sector in Pakistan.

Literature Review

The textile sector is the most important manufacturing industry in Pakistan. It has the longest production chain, with inherent potential for value addition at each stage of processing, from cotton to ginning, spinning, fabric, dyeing and finishing, made-ups, and garments. The sector contributes nearly one-fourth of industrial value-added and provides employment to about 40% of the industrial labor force. Barring seasonal and cyclical fluctuations, textile products have maintained an average share of about 61.24% in national exports (Pakistan Economic Survey 2021-22). This policy research paper for the simulation exercise of the 36th MCMC at NIM Peshawar has been undertaken as a narrative review with qualitative and quantitative analyses of primary and secondary data, including data from the Ministry of Commerce, research articles, journals, and newspaper articles. Some of the research articles, papers, and reports consulted included *Textile World 2021*, *Textile Policy of Pakistan 2020-25*, *The Falling Textile Exports* (Abdul Sattar, 2023), *Encyclopedia Britannica*, *Global Value Chain (GVC) Development Report 2021*, *Beyond Production* by the Asian Development Bank, and *The Annual Analytical Report on the External Trade of Pakistan for the Financial Year 2021-22* by the Pakistan Bureau of Statistics. Websites of the Ministry of Commerce, TDAP, BOI, PBS, and WTO were also visited to collect data.

Methodology

This research employs a qualitative approach, utilizing both primary and secondary data. Primary data has been collected through interviews and discussions with officials at the Textile Division, Ministry of Commerce & Textile, Islamabad. Secondary data has been gathered from a variety of sources, including research papers, news articles, journals, business reports,

and online platforms. Key secondary data sources include publications from the Ministry of Commerce, Pakistan Bureau of Statistics, TDAP, BOI, WTO, and various academic and industry reports. The data collection process has been designed to provide a comprehensive understanding of the textile sector's current state, its challenges, and the efforts made to promote its growth. The methodology incorporates both qualitative analysis of expert opinions and quantitative data to ensure a thorough examination of the issues facing Pakistan's textile industry.

Situational Analysis

Overview of the Development of the Textile Sector in Pakistan

The World Trade Organization (WTO) in its 2020 report titled "Textile World 2021" ranked Pakistan among the top ten textile exporters in the world. The top textile exporters globally are China, India, Bangladesh, Vietnam, Turkey, Pakistan, Indonesia, Germany, Italy, and the United States. They accounted for 77.5% of the world's textile exports in 2020 (Textile World, 2021).

The history of the textile industry in Pakistan dates back to the early 1950s, with the establishment of the first textile mill in Faisalabad (formerly Lyallpur). Over the years, the industry has grown significantly, and it is now the largest manufacturing sector in Pakistan, contributing around 60% to the country's total exports.

During the 1950s and 1960s, several textile mills were established in the country, mainly in the Punjab and Sindh provinces, as a result of government policies and incentives aimed at promoting the textile sector. The industry's growth received a boost in the 1970s with the nationalization of the textile sector, which led to the establishment of several state-owned textile mills. In the 1980s, the government encouraged the private sector's participation in the industry, and several private textile mills were established.

In the 1990s, the textile sector witnessed rapid growth due to liberalization policies and trade agreements with other countries. The industry became one of the largest employers in the country, with a significant contribution to Pakistan's exports.

However, the industry faced challenges in the 2000s due to the global economic slowdown, increased competition, and energy shortages. Despite these challenges, the sector continued to grow, with the introduction of modern technologies and the development of value-added products such as garments and home textiles.

Today, Pakistan's textile industry is one of the largest in the world, contributing significantly to the country's exports and employment. The textile sector contributes 8.5% to GDP and employs 15 million people out of the 49 million-strong workforce, which is almost 30% of the total workforce.

The industry has diversified into various sub-sectors, including spinning, ginning, weaving, knitting, dyeing, printing, and finishing.

Pakistan's textile sector is fragmented into sub-divisions, with 80% being small industries, 15% moderate production, and only 5% large-scale processing installations. The government continues to support the industry through various policies and incentives to ensure its continued growth and competitiveness in the global market.

Prior to the outbreak of the COVID-19 pandemic, the textile industry was flourishing, and the sector was expected to grow. However, with the onset of the pandemic in early 2020, the industry was hit hard as the demand for textiles decreased due to global lockdowns and disruptions in supply chains. The industry faced a shortage of raw materials, such as cotton, and a decrease in orders from international buyers. The pandemic had a significant impact on the textile sector in Pakistan, and the industry suffered losses. However, the Government of Pakistan took several measures to support the industry, including providing financial assistance and facilitating the export of essential goods.

In the post-pandemic period, the textile sector is slowly regaining its footing while complying with the requirements of the new normal by implementing safety measures and focusing on online marketing and e-commerce. Textile exports witnessed a remarkable increase of 25.5% during FY2022, amounting to US$ 19.33 billion compared to US$ 15.40 billion during FY2021. The future of the textile sector in Pakistan remains promising, as the country has significant potential for growth and innovation in this field.

Significance of the Textile Sector to Pakistan's Economy

The sector is considered the backbone of the country's economy as it employs around 40% of the industrial labor, particularly in rural areas where textile mills are located. Moreover, the textile industry is a major source of foreign exchange earnings for Pakistan. The industry exports a wide range of products, including cotton yarn, fabric, and garments, to various countries across the world. The sector is particularly important for Pakistan's trade with countries in the European Union and the United States.

The textiles and apparel sector of Pakistan is the most energetic, dynamic, and export-oriented, encompassing a unique distinction of having intensive backward and forward linkages. This translates into an extended value

chain, starting from cotton ginning to finished products marked by a great reflection of modern fashion. It provides a platform for large, medium, and small-scale manufacturing and employment, which are hallmarks of modern, progressive industrialization. More emphatically, the paramount importance of the sector can be gauged by the fact that its total exports have crossed the threshold of US$ 19.3 billion during the fiscal year 2021-22, despite numerous challenges.

Overall, the textile sector is a vital pillar of Pakistan's economy, providing employment opportunities, contributing to GDP, and earning foreign exchange. The growth and development of the industry are crucial for the country's economic progress and development.

Comparison of Textile Sector Contribution to GDP

Country	%age Contribution
Bangladesh	13.0%
Pakistan	8.5%
China	4.0%
India	2.0%
Vietnam	6.2%

Ancillary Textile Industries

The performance of various ancillary textile industries, as per the Economic Survey of Pakistan, 2021-22, is as follows:

a) Cotton Spinning Sector

The spinning sector is the backbone of textile production. At present, there are 517 textile units (40 composite units and 477 spinning units) with 13 million spindles and 198,801 rotors installed. Of these, 11 million spindles and 126,583 rotors are in operation, with a capacity utilization of 85% and 64%, respectively.

b) Cloth Sector

This sector produces comparatively low value-added grey cloth, mostly of inferior quality. Problems in the power loom sector primarily arise from poor technology and a scarcity of quality yarn. The production of cotton cloth by the mill sector has slightly increased by 0.29%, while non-mill performance remained subdued, recording a negative growth of 0.01% during July-March FY-2022.

c) Textile Made-Up Sector

As a value-added segment of the textile industry, the made-up sector comprises different subgroups, including towels, tents & canvas, cotton bags, bedwear, hosiery, knitwear, and ready-made garments, including fashion apparel. The total export of the sector in the financial year 2021-22 was USD 61 million, which is about 12% higher than the preceding year.

d) Synthetic Textile Fabrics

Artificial silk, such as synthetic fibers like Nylon, Polyester, Acrylic, and Polyolefin, dominate the market. Currently, there are five major producers of synthetic fibers in Pakistan, with a total capacity of 636,000 tons per annum. Synthetic textile fabrics worth US$ 344 million were exported in FY 2021-22, compared to US$ 269.20 million the previous year, showing an increase of 28%. In quantitative terms, the exports of synthetic textiles decreased by 34%.

e) Woolen Industry

The main products manufactured by the woolen industry are carpets and rugs. The exports of carpets during the period July-March FY-2022 totaled USD 7 million.

Major Export Destinations for Pakistani Textiles

From 2019 to 2023, the following are the top export destinations for Pakistani textiles:

Values in US$ Million				
Destination	**2019-20**	**2020-21**	**2021-22**	**2022-23**
United States	3,103.91	4,383.23	5,846.71	3,026.73
United Kingdom	1,218.10	1,637.71	1,785.23	1,063.22
Germany	963.33	1,135.19	1,371.19	866.70
Netherlands	816.99	1,000.15	1,354.59	835.85
Spain	696.88	743.68	1,080.77	771.57
Italy	501.65	563.28	788.28	522.53
Bangladesh	507.07	514.87	813.06	418.69
Belgium	426.43	479.85	642.78	377.44
China	821.06	827.29	763.43	323.73
France	279.95	308.22	391.16	262.02

Source: FBR, 2021

Textile Sector Export ***of Pakistan in Different Years (in US$ million)***

Product	**2018-19**	**2019-20**	**2020-21**	**2021-22**

Cotton & cotton Textile	13031.000	12211.703	15028.852	13890.824
Synthetic Textile	297.809	314.768	370.421	373.591
Sub-total Textile	13328.807	15526.471	15400.071	14234.415
Wool and Woollen Textile	67.265	54.211	74.201	60.993
Total Textile	13396.140	12580.682	15474.278	19339.408
Total Export	22979.325	21393.860	25304.441	23354.901
Textile as %age of export	58.30%	58.81%	61.15%	61.24%

Source: Economic Survey of Pakistan 2021-22

Private Sector Contribution in Development of Textile Sector

The private sector has played a significant role in the development and growth of the textile sector in Pakistan. Major contributions include:

i) Heavy investments in the development of textile mills and manufacturing facilities, which helped to increase production capacity and improve the quality of textile products. This investment has also created employment opportunities for millions of people in the country.

ii) Private companies have invested in the latest machinery and equipment, which has helped to improve efficiency and productivity in the industry. This has also enabled the industry to produce high-quality textile products that are competitive in the global market.

iii) Private companies have played a major role in promoting and marketing Pakistan's textile products in international markets, which has helped to increase exports and generate foreign exchange for the country.

iv) The private sector has played a role in research and development, training and education, and environmental sustainability in the textile industry.

v) Private companies have taken steps to ensure that their operations are environmentally sustainable, by adopting eco-friendly production methods and implementing waste management practices.

Overall, the private sector has been a driving force in the development of the textile sector in Pakistan and has contributed significantly to the growth and success of the industry.

Years	Series	Total Numbers

2015-16	CMI Listed Textiles Large Scale Manufacturing	7503
2021-22	No of Textile Exporters	8051
2021-22	PSX* Listed Textiles Exporters	90
Sr. No	**Name of Exporter**	**Export Value (Billion Rs.)**
1	M/S Style Textile (Pvt) Ltd.	112.80
2	Nishat Mills Limited	75.38
3	Artistic Milliners (Private) Limited	73.58
4	Interloop Limited	69.86
5	Soorty Enterprises (Private) Limited	63.31
6	Yunus Textile Mills Limited	63.18
7	Gul Ahmed Textile Mills Limited	54.66
8	Feroze1888 Mills Limited	47.24
9	Masood Textile Mills Limited	46.72
10	Liberty Mills Limited	46.17

Pakistan Stock Exchange

Top Exporters and Export Values (Billion Rs.)

1. M/S Style Textile (Pvt) Ltd. – 112.80
2. Nishat Mills Limited – 75.38
3. Artistic Milliners (Private) Limited – 73.58
4. Interloop Limited – 69.86
5. Soorty Enterprises (Private) Limited – 63.31
6. Yunus Textile Mills Limited – 63.18
7. Gul Ahmed Textile Mills Limited – 54.66
8. Feroze1888 Mills Limited – 47.24
9. Masood Textile Mills Limited – 46.72
10. Liberty Mills Limited – 46.17

Product-Specific Associations of the Textile Sector

There are over twenty product-specific associations in the textile sector, including:

1. All Pakistan Textiles Mills Associations (APTMA)
2. Pakistan Cloth Merchants' Association
3. Pak Readymade Garments Manufacturers & Exporters Association
4. Pakistan Cotton Fashion Apparel Manufacturers & Exporters Assn

5. Pakistan Bedwear Exporters Association
6. Pakistan Gloves Manufacturers & Exporters Association
7. Pakistan Silk & Rayon Mills Association
8. Towel Manufacturers' Association of Pak
9. Pakistan Yarn Merchants' Association
10. Pakistan Sports Goods Manufacturers & Exporters Association
11. Pakistan Canvas and Tents Manufacturers And Exporters Association
12. Pakistan Footwear Manufacturers Assn
13. Pakistan Hosiery Manufacturers Assn
14. Pakistan Knitwear & Sweaters Exporters Association
15. Pakistan Commercial Exporters of Towels Association
16. Pakistan Textile Exporters Association
17. All Pakistan Cotton Power Looms Assn
18. All Pakistan Textile Processing Mills Association
19. All Pakistan Bedsheets & Upholstery Manufacturers Association
20. All Pakistan Handloom & Traditional Textiles Manufacturers & Exporters Association
21. Pakistan Leather Garments Manufacturers & Exporters Association and Pakistan Denim Manufacturers & Exporters Association

Regulatory/Legal and Institutional Framework Analysis of Pakistan's Textile Sector

The regulatory framework for the textile sector in Pakistan is primarily governed by the following laws and regulations:

1. **The Ministry of Commerce & Textile** is responsible for the development and regulation of the textile sector in Pakistan. Under Rule 3(3) of the Rules of Business 1973, the Ministry of Commerce has been assigned textile-sector-related functions of formulating policies, implementing programmes, and ensuring compliance with relevant laws and regulations.
2. **Textile Policy 2020-25:** The Textile Policy 2020-25 provides a comprehensive framework for the development of the textile sector in

Pakistan. The policy aims to promote investment, increase exports, and enhance productivity in the sector.

3. **Trade Policy:** Pakistan's trade policy regulates imports and exports of textile products. The policy sets out rules and regulations for the import and export of textile goods and provides incentives for exports.
4. **Quality Control:** The Pakistan Standards and Quality Control Authority (PSQCA) is responsible for ensuring that all textile products meet the required quality standards. The PSQCA has established testing facilities and certification processes for textile products.
5. **Labor Laws:** The labor laws in Pakistan regulate employment practices in the textile sector. These laws cover issues such as minimum wage, working conditions, and safety standards.
6. **Environmental Regulations:** The environmental regulations in Pakistan aim to reduce the environmental impact of the textile sector. The regulations cover issues such as wastewater treatment, air pollution, and waste management.
7. **Intellectual Property Rights:** The Intellectual Property Organization of Pakistan (IPO-Pakistan) is responsible for the protection of intellectual property rights in the textile sector. The IPO-Pakistan registers trademarks, patents, and designs related to textile products.
8. The Ministry of Commerce is also administratively responsible for:
   i. Federal Textile Board, Lahore
   ii. Textile Commissioner's Organization, Karachi
   iii. Textile City Projects in Karachi/Faisalabad
   iv. National Textile University, Faisalabad
   v. All textiles-related TDAP/EDF funded institutes concerned with skill development in various sub-sectors of the textile industry
   vi. Garment City Projects at Lahore, Faisalabad, and Karachi
   vii. Pakistan Cotton Standards Institute, Karachi
   viii. Pakistan Textile Testing Laboratory, Faisalabad

Hierarchy of the Textile Division

The Minister for Commerce and Textile is the political head, while the Secretary of Commerce & Textile Division is the administrative head of the organization. The Textile Division comprises four wings, namely:

i. Administrative Wing, headed by Senior Joint Secretary

ii. Training Wing, headed by Joint Secretary

iii. Development & Innovation Wing, headed by Joint Secretary

iv. Textile Research Wing, headed by Director General/Director

The Wings are assisted by an Advisory Cell with textile professionals.

In addition to the Ministry of Commerce and Textile, several other ministries and departments are part of this regulatory framework. They include: Ministries of Finance, National Food Security & Research (MNFS&R), Energy (Power Division), Foreign Affairs, Federal Education & Technical Education, Industries & Production, NAVTEC/TEVTA, Board of Investment, State Bank of Pakistan, Federal Board of Revenue.

Textile Policies

The first-ever Textile Policy 2009-14 was launched in 2009. The second Textile Policy 2014-19 was approved in 2015. These policies not only laid down a plan for five years (each) but also brought coherence among various support measures and development initiatives of the government aimed at promoting and uplifting the country's largest industrial sector in the post-quota scenario. During this period, several budgetary support schemes were introduced to provide a level playing field to the textile industry of Pakistan.

Previous textile policies were formulated to enhance textiles and apparel exports to US$ 25 billion and US$ 26 billion, respectively, and set ambitious targets required to be met through support of fiscal measures. However, these targets were not fully achieved due to delayed/non-payments under the respective facilitation schemes and non-allocation of funds for infrastructure development, vocational training, productivity, and compliance-related programs.

The latest Textile & Apparel Policy 2020-25 was launched in 2022. It is a comprehensive policy framework that outlines the government's strategy for promoting the growth and development of the country's textile and apparel industry. The policy aims to promote the growth and competitiveness of the country's textile and apparel industry. Some of the salient features of the policy are:

- **Promotion of exports:** The policy aims to increase the country's textile and apparel exports to US$ 40 billion by 2025. To achieve this, the policy focuses on enhancing the competitiveness of the industry by improving productivity, reducing costs, and promoting innovation.

- **Investment in technology:** The policy encourages the adoption of advanced technologies such as digital printing, artificial intelligence, and automation to increase efficiency and reduce production costs.
- **Development of human resources:** The policy emphasizes the need to improve the skills of the workforce in the textile and apparel industry. This includes training programs for workers and managers, as well as initiatives to attract and retain talent.
- **Support for SMEs:** The policy recognizes the important role that small and medium-sized enterprises (SMEs) play in the industry and aims to provide them with support through incentives and access to finance.
- **Sustainability:** The policy includes measures to promote sustainable practices in the industry, such as reducing water consumption, increasing the use of renewable energy, and promoting recycling and reuse of materials.
- **Cluster development:** The policy promotes the development of textile and apparel clusters in different regions of the country to promote collaboration and cooperation among industry stakeholders.
- **Market diversification:** The policy aims to diversify Pakistan's textile and apparel exports by targeting new markets, including Africa, Latin America, and Southeast Asia.

In short, the following are the salient features:

- Competitive energy tariffs for export-oriented units/sectors during all the policy years
- Amid unusual fluctuations in regional energy prices, tariffs may be revised according to the average energy prices of regional competitors like Vietnam and Bangladesh.
- Revision of Duty Drawback Tax rates (DDT) – these will only be available for value-adding exports such as apparel, technical textiles, made-ups, and carpets.
- Automation of the duty drawback mechanism; payments will be made directly into the accounts of exporters through the State Bank of Pakistan.
- Long-Term Financing Facility and Export Financing Scheme rates are to be continued at 5% and 3%, respectively, while the SBP can review the markup rates in view of the monetary policy.

- Competitive pricing of raw materials for value-adding exporters
- E-commerce policy to be implemented
- Revitalization of Karachi Garments City Company (KGCC)
- Launch of a mass-level training program for industrial stitching

Overall, the **Textiles and Apparel Policy 2020-25** aims to transform Pakistan's textile and apparel industry into a modern, efficient, and sustainable industry that can compete in the global market.

Comparative Analysis and International Best Practices

The textile sector is a crucial industry for many countries, including China, India, Bangladesh, and Turkey. Here are some best practices adopted by these countries to boost their textile industry:

China:

1. China has adopted mass production techniques to lower costs and increase efficiency in the textile sector.
2. China has invested in advanced technology, such as automation and artificial intelligence, to enhance productivity and reduce labour costs.
3. China has a large pool of skilled workers who are trained to operate advanced machinery and specialize in different textile production processes.
4. China's government provides various incentives and subsidies to textile manufacturers, such as tax exemptions and loans.
5. China has established vertically integrated supply chains, where different stages of the production process are carried out in-house, allowing for better quality control and cost savings.
6. China has implemented export-oriented policies to promote its textile exports, such as offering tax refunds for exports and establishing export processing zones.
7. China has invested heavily in infrastructure development, such as ports, highways, and railways, to facilitate the movement of goods.
8. Chinese textile manufacturers have established strong brands and marketed their products globally to increase their market share.

9. China has diversified its textile production by producing a wide range of products, such as clothing, accessories, and home textiles, to cater to different markets.
10. China has emphasized innovation in textile production by investing in research and development, such as developing eco-friendly textiles.

India:

1. India's government provides various incentives and subsidies to textile manufacturers, such as tax exemptions, investment subsidies, and credit guarantees.
2. India has a large pool of skilled workers who are trained in traditional textile production techniques.
3. India has a thriving handloom sector, where textiles are produced using traditional techniques, providing employment opportunities for rural communities and promoting India's cultural heritage.
4. India is a major producer of cotton, which is a key raw material for the textile industry.
5. India has established textile clusters, where manufacturers are located in close proximity to each other, allowing for the sharing of resources and expertise.
6. India has invested in advanced technology, such as digital printing and 3D printing, to enhance productivity and improve product quality.
7. India has implemented various export-oriented policies, such as the Merchandise Exports from India Scheme (MEIS) and the Export Promotion Capital Goods (EPCG) scheme, to promote its textile exports.
8. India has emphasized sustainability in textile production by promoting the use of eco-friendly materials and production techniques.
9. Indian textile manufacturers have established strong brands and marketed their products globally to increase their market share.
10. India has diversified its textile production by producing a wide range of products, such as clothing, home textiles, and technical textiles, to cater to different markets.

Bangladesh:

1. Bangladesh has a cost advantage over other countries due to its low labour costs and energy costs.
2. Bangladesh's government provides various incentives and subsidies to textile manufacturers, such as tax exemptions and low-interest loans.
3. Bangladesh has a large pool of skilled workers who are trained in textile production processes.
4. Bangladesh has established vertically integrated supply chains, where different stages of the production process are carried out in-house, allowing for better quality control and cost savings.
5. Bangladesh has implemented various export-oriented policies, such as offering tax incentives for exports and establishing export processing zones.
6. Bangladesh has invested in infrastructure development, such as ports, highways, and railways, to facilitate the movement of goods.
7. Bangladesh has emphasized sustainability in textile production by promoting the use of eco-friendly materials and production techniques.
8. Bangladesh has diversified its textile production by producing a wide range of products, such as clothing, home textiles, and technical textiles, to cater to different markets.
9. Bangladeshi textile manufacturers have established strong brands and marketed their products globally to increase their market share.
10. Bangladesh has emphasized innovation in textile production by investing in research and development, such as developing new production techniques and improving product quality.

Export Incentives and Institutions in Different Countries

A comparison of exports and institutions prevailing in major competitor countries and Pakistan is provided below:

Sr. No.	**Export Incentives**	**India**	**Pakistan**	**Bangladesh**	**China**	**Vietnam**
1	Duty Drawbacks	Yes	Yes	Yes	Yes	Yes
2	Concessionary Export Finance	Yes	No	Yes	Yes	Yes

3	Exports Insurance & Guarantees	Yes	No	Yes	Yes	Yes
4	Export Quality Management	Yes	No	No	Yes	Yes
5	Export Processing Zones	Yes	Yes	Yes	Yes	Yes
6	Export Performance Requirement	Yes	No	Yes	Yes	Yes
7	Lower Income Tax	Yes	Yes	Yes	Yes	Yes
8	Export Promotion Agency	Yes	Yes	Yes	Yes	Yes
9	Export Cash Subsidy	Yes	No	Yes	Yes	Yes

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Bangladesh:

1. Bangladesh has a cost advantage over other countries due to its low labor and energy costs.
2. Bangladesh's government provides various incentives and subsidies to textile manufacturers, such as tax exemptions and low-interest loans.

3. Bangladesh has a large pool of skilled workers who are trained in textile production processes.
4. Bangladesh has established vertically integrated supply chains, where different stages of the production process are carried out in-house, allowing for better quality control and cost savings.
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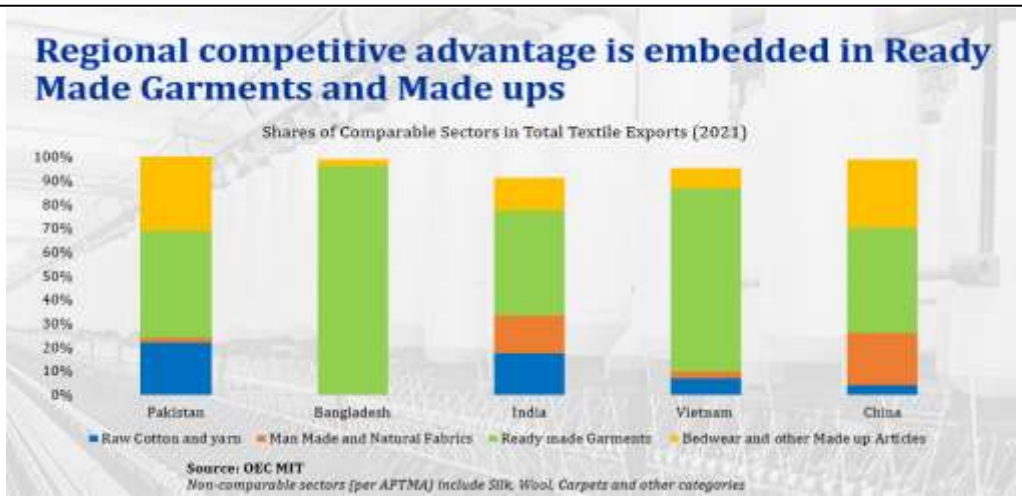
Regional Competitiveness

Ready-made garments and made-ups industries are among the largest and most competitive in the world. Each country has its own unique regional competitive advantage in this industry based on factors such as labor cost, quality of raw materials, availability of skilled workers, infrastructure, government policies, and access to markets.

- **Pakistan's** regional competitive advantage in the ready-made garments and made-ups industry lies in its low labor costs and availability of skilled workers. The country has a large pool of skilled and semi-skilled workers who can produce high-quality garments at a low cost. Additionally, Pakistan's government has introduced policies to promote the textile industry, such as offering tax incentives and subsidies to exporters.
- **Bangladesh's** regional competitive advantage lies in its low labor costs and its position as one of the largest garment exporters in the world. The country has a large and efficient garment manufacturing sector that can produce high-quality garments at a low cost. Additionally, Bangladesh has preferential access to many markets due to its status as a Least Developed Country (LDC).
- **India's** regional competitive advantage lies in its diverse range of fabrics, designs, and embroidery work. India has a long history of textile production and has developed a reputation for producing high-quality fabrics and intricate embroidery work. Additionally, the country has a large and growing domestic market for ready-made garments and made-ups.
- **China's** regional competitive advantage lies in its large-scale manufacturing capabilities, extensive infrastructure, and advanced technology. China has a highly developed textile industry with advanced machinery and a large pool of skilled workers. The country also has extensive transportation and logistics networks that enable it to export its products to markets around the world.
- **Vietnam's** regional competitive advantage lies in its low labor costs and its position as a rapidly growing textile exporter. The country has a large and efficient garment manufacturing sector that can produce high-quality garments at a low cost. Additionally, Vietnam has signed numerous free trade agreements that provide preferential access to many markets around the world.



Electricity and Gas Consumption Across Sectors in Pakistan and Region

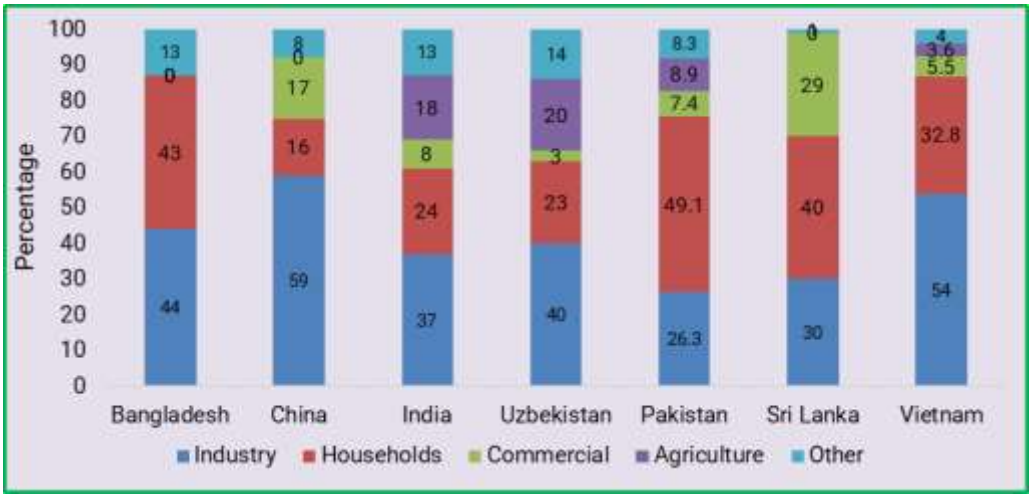
Pakistan's industry share in electricity consumption is the lowest in the region at only 26%, compared with 60% in China and even 53% in Vietnam. The low industry share in electricity consumption in Pakistan, compared to China and Vietnam, can be attributed to various factors, such as a relatively smaller industrial base, lower electricity demand from industries, and a higher share of other sectors, particularly households, in overall electricity consumption.

Pakistan's industrial sector is smaller compared to China and Vietnam, which have larger manufacturing bases and more diversified industrial activities. This difference in the size of the industrial sector explains the lower share of electricity consumption by the industry in Pakistan.

Moreover, Pakistan's industry is relatively less energy-intensive compared to China and Vietnam. The country's industrial activities are mostly concentrated in low-energy-consuming sectors such as textiles, leather, and food processing, which require less electricity compared to heavy industries such as steel, cement, and chemicals.

On the other hand, the higher share of household electricity consumption in Pakistan, compared to China and India, can be attributed to various factors, such as lower household income levels, lower energy efficiency of buildings and appliances, and inadequate electricity supply to meet the growing demand from households.

In conclusion, the lower industry share in electricity consumption in Pakistan, compared to China and Vietnam, reflects the size and composition of the industrial sector, while the higher share of household electricity consumption in Pakistan, compared to China and India, reflects the need to improve energy efficiency and expand access to electricity in households.



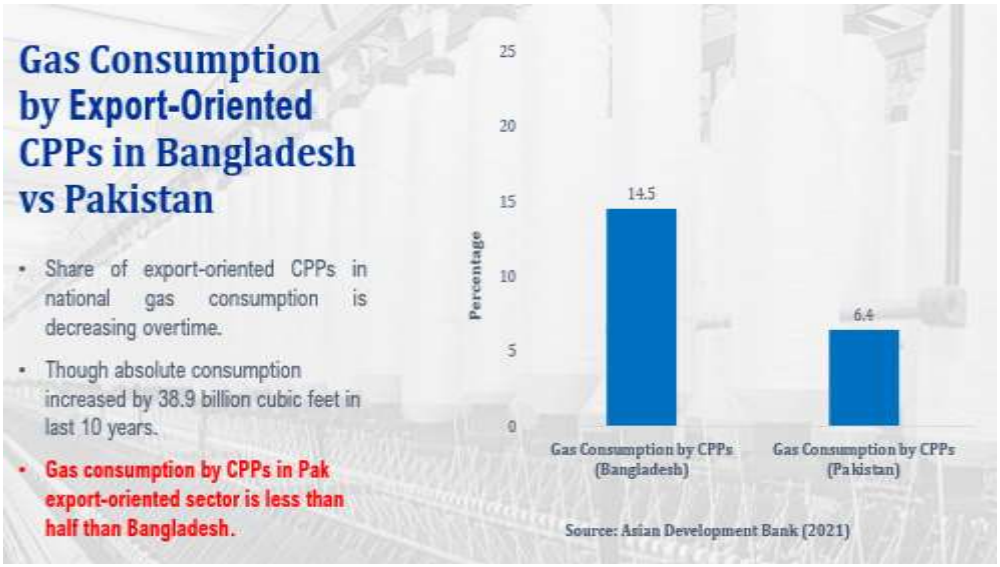
Sources: IEA, ADB, MoF Pakistan, Forbes, and Light Castle Bangladesh

Gas Tariff for Industry Across the Region (2021)

The gas tariff for industry varies across the region and depends on various factors such as the availability of gas reserves, transportation infrastructure, government policies, and competition among gas suppliers.

In **Pakistan**, the gas tariff for industry varies based on the size of the industrial connection and the type of gas used. The tariff ranges from PKR 115 per MMBtu for small industrial connections to PKR 600 per MMBtu for large industrial connections using natural gas. For industries using RLNG (Re-gasified Liquefied Natural Gas), the tariff ranges from PKR 1145 to PKR 1435 per MMBtu, depending on the price of RLNG in the international market.

In **Bangladesh**, the gas tariff for industry is regulated by the Bangladesh Energy Regulatory Commission (BERC) and is based on a slab system. The tariff ranges from BDT 7.03 per MMBtu for small industries to BDT 18.35 per MMBtu for large industries.



In **China**, the gas tariff for industry is also regulated by the government and varies based on the type of industry and location. The tariff ranges from CNY 1.3 per MMBtu to CNY 3.5 per MMBtu for industrial users in the eastern and central regions, and from CNY 2.7 per MMBtu to CNY 4.9 per MMBtu for industrial users in the western regions.

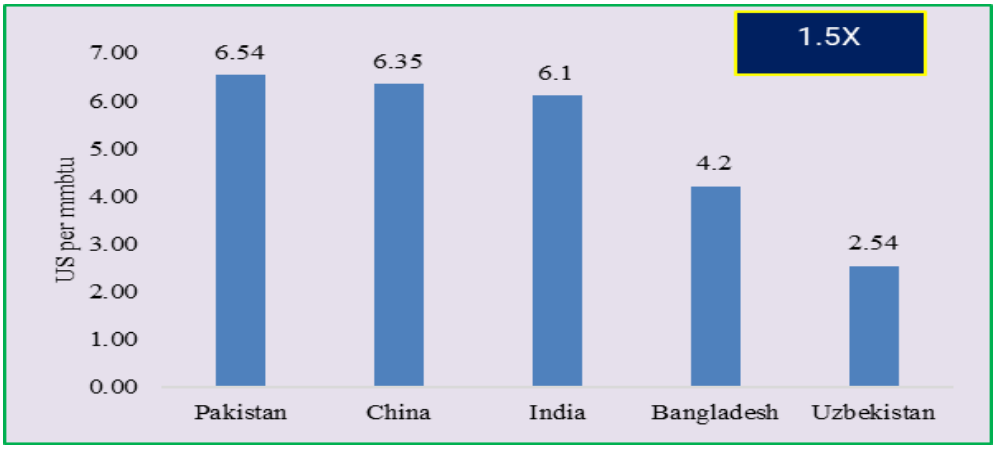
In **India**, the gas tariff for industry varies based on the location and the type of industry. The tariff ranges from INR 2.45 per MMBtu for small industries to INR 7.95 per MMBtu for large industries.

In **Vietnam**, the gas tariff for industry is regulated by the government and is based on a formula that takes into account the price of imported gas,

transportation costs, and taxes. The tariff ranges from VND 4,500 per MMBtu to VND 10,200 per MMBtu depending on the location and type of industry.

In summary, the gas tariff for industry varies across the region and is influenced by several factors such as government policies, competition, and availability of gas reserves.

Pakistan textile industry faces highest gas/LNG tariff in the region— denting its Competitiveness



Sources: S&P, Statistica, Review UZ, PIDE, M/o Planning India

Electricity Tariff for Industry across the Region (2021)

The electricity tariff for industry varies across the region and is influenced by several factors, such as the availability of energy resources, government policies, infrastructure, and demand-supply dynamics.

In Pakistan, the electricity tariff for industry varies based on the size of the industrial connection and the time of day. The tariff ranges from PKR 14.65 per unit for small industrial connections to PKR 11.09 per unit for large industrial connections during off-peak hours.

In Bangladesh, the electricity tariff for industry is based on a slab system and ranges from BDT 8.96 per unit for small industries to BDT 15.63 per unit for large industries.

In China, the electricity tariff for industry is regulated by the government and varies based on the region and the time of day. The tariff ranges from CNY 0.38 per unit to CNY 0.95 per unit for industrial users in different regions.

In India, the electricity tariff for industry varies based on the state and the time of day. The tariff ranges from INR 4.40 per unit to INR 8.30 per unit for different categories of industrial users.

In Vietnam, the electricity tariff for industry is regulated by the government and varies based on the voltage level and the time of day. The tariff ranges from VND 1,212 per unit to VND 2,701 per unit for different

voltage levels and time periods.

Pakistan's electricity tariff remains the highest in the region, leaving firms highly uncompetitive. Karachi receives electricity at a non-RCET tariff (i.e., USD 0.10 per kWh) as it enjoys cheaper indigenous gas. However, the supply of electricity is not sustainable.

Sources: IEA, ADB, MoF Pakistan, Forbes, and Lightcastle Bangladesh (data for 2020 and 2021)

Textile Policies

After the abolition of the Multi-Fiber Agreement (MFA) in 2004 and the enforcement of the Agreement on Textiles and Clothing (ATC), three textile sector policies in Pakistan have been approved.

The Textile Policies of 2009-2014 and 2014-2019 were formulated with the aim of enhancing textile and apparel exports to US$ 25 billion and US$ 26 billion, respectively. The objectives of both policies were to fully utilize the comparative advantage of cotton and the presence of a nearly self-sufficient, complete value-chain, starting from fiber to finished products.

Both policies proposed several financial and facilitation measures, including but not limited to the availability of energy at regionally competitive rates, reduced mark-ups for technology upgradation and working capital, tariff rationalization, simplification of temporary importation schemes, improvement of ease of doing business parameters, and infrastructure and human resource development.

Ambitious targets and financial commitments of Rs. 188 billion and Rs. 65 billion, respectively, were set in the first and second Textile Policies. However, these targets could not be fully achieved due to delayed or non-payment under respective facilitation schemes and non-allocation of funds for infrastructure development, vocational training, productivity, and compliance-related programs.

During the first policy period, energy was not fully available, and the textile and apparel value-chain was not allotted the top priority in energy distribution. High and volatile international commodity prices and high mark-up rates limited exports during the first policy period.

In the second policy period, energy was available, but not at regionally competitive prices. Although commodity prices were lower, the industry was not competitive enough to increase exports due to high utility rates. Moreover, the zero-rating regime was withdrawn in 2013 without providing an expeditious refund system that was committed, thereby creating a liquidity crunch for exporters. The zero-rating regime was restored in 2016 but withdrawn again in 2019. Similarly, other than sales tax refunds, customs duty drawbacks and withholding tax refunds were also not paid on time. The Technology Upgradation Fund (TUF) scheme was included in previous policies with special provisions to support SMEs.

To reduce the cost of doing business, the DLTL scheme was launched in the first Textile Policy for only two years, but payments were not made on time. In the second Textile Policy, the scope of the scheme was linked to incremental increases in exports compared to the previous year.

Furthermore, no new infrastructure and human resource development programs were initiated in both Textile Policies. On the other hand, Pakistan Textile City Limited (PTCL), a project of 1,250 acres, was placed under liquidation. Importantly, cotton production has fluctuated due to various reasons, and further import duties on cotton were imposed, thereby increasing the cost of production for the downstream value-chain.

A robust implementation mechanism was not devised, and financial commitments by the government were considered the only tool for implementing the policies.

The Textiles and Apparel Policy 2020-25 aims to address the shortcomings of previous policies through a multipronged strategy as follows:

1. **Government's strong resolve and commitment for the disbursement of pending liabilities of Rs. 121 billion from previous governments in the last three years.**
2. **A market-driven exchange rate is a significant boost to increase exports and reduce imports.**
3. **Rationalization of the tariff structure of the textiles and apparel value-chain under the National Tariff Policy.**
4. **Revision of customs duty drawback rates.**
5. **Provision of consistent and long-term financing facility (LTFF) and export financing scheme (EFS) rates at 5% and 3%, respectively, during FY 2021-22.**
6. **A mass-level training program will be launched, especially for industrial stitching, with a major focus on women.**
7. **The first-ever e-commerce policy is under implementation, which will provide open access to the textiles and apparel industry to tap available business opportunities across the globe. Amazon has already started registering Pakistani manufacturers and exporters, including those in textiles and apparel.**

SWOT Analysis of the Textile Sector of Pakistan

Strengths:

1. **Abundant Raw Material: Pakistan is blessed with the availability of high-quality cotton, which is the primary raw material for the textile industry. This makes it easier for Pakistan to produce high-quality textile products at a lower cost.**
2. **Competitive Labour Costs: The cost of labour in Pakistan is**

comparatively lower than in many other countries, making the country an attractive destination for textile manufacturers. This provides the industry with a competitive edge in the international market.

3. **Skilled Labour: The textile sector in Pakistan has a highly skilled workforce with technical expertise in various areas of the textile value chain. This has helped Pakistan produce high-quality textile products and gain a competitive edge in the global market.**
4. **Diversified Product Range: Pakistan's textile industry produces a wide range of products, including cotton yarn, fabric, home textiles, and garments. This diversification allows Pakistani textile companies to cater to a broad range of customers across the world.**
5. **Favourable Government Policies: The Government of Pakistan has introduced several policies and incentives to promote the textile industry, including duty-free access to textile products in the European Union under the GSP+ Scheme and in other countries. This has helped increase Pakistan's exports of textile products.**

Weaknesses:

1. **Energy Crisis: The textile sector is highly energy-intensive, and Pakistan has been facing an energy crisis in recent years, which has resulted in frequent power outages and increased production costs.**
2. **Outdated Technology: Many textile factories in Pakistan use outdated machinery and technology, which results in lower efficiency and higher production costs.**
3. **Limited Value Addition: Despite being one of the largest producers of cotton, Pakistan has limited value addition in the textile sector. This means the country exports raw cotton and imports finished textile products, resulting in a loss of potential revenue.**
4. **Lack of Innovation: There is a lack of innovation in the textile sector in Pakistan, with a focus on producing traditional products rather than developing new and innovative products that could increase the sector's competitiveness.**
5. **Compliance Issues: Pakistan's textile industry has faced challenges with compliance regarding labour rights and environmental regulations, which has resulted in a negative image for the industry.**
6. **Limited Export Destinations: Pakistan's textile industry heavily depends on a few markets, such as the United States and the European Union, which makes the industry vulnerable to external factors that may impact these markets.**

Opportunities:

1. **Diversification of Products: The industry could explore new and innovative product lines, such as technical textiles, medical textiles, and eco-friendly textiles. These products have growing demand in the global market and could provide new growth opportunities for Pakistani textile manufacturers.**
2. **Value Addition: The industry could focus on increasing the value addition of its products. This could be achieved by developing new finishing techniques, improving the design and quality of products, and adopting sustainable manufacturing practices. This would not only increase the competitiveness of the industry but also increase the revenue earned per unit of output.**
3. **Export Market Diversification: Pakistan could explore new export markets beyond its traditional markets, such as the United States and European Union. Emerging markets in Africa and Asia offer significant potential for Pakistani textile manufacturers.**
4. **Public-Private Partnerships: Collaboration between the government and the private sector could help address some of the challenges faced by the textile sector in Pakistan. This could include investing in research and development, providing access to modern technology, and developing sustainable manufacturing practices.**
5. **E-Commerce: The growth of e-commerce platforms presents an opportunity for Pakistani textile manufacturers to access new markets and customers. By leveraging these platforms, manufacturers can expand their customer base and increase their exports.**

Threats:

1. **Global Competition: Pakistan faces intense competition from other textile-producing countries such as China, India, and Bangladesh, which have lower labour costs, energy prices, and advanced manufacturing technology. This competition could affect the export competitiveness of Pakistan's textile industry.**
2. **Changes in Global Trade Policies: Changes in global trade policies, such as trade barriers and import tariffs, could affect Pakistan's textile exports. The recent US-China trade war and Brexit are examples of such policies that have impacted the global textile market.**
3. **Raw Material Prices: The price of raw materials, especially cotton, is highly volatile, which can impact the cost of production for textile manufacturers in Pakistan.**
4. **Environmental Regulations: Stringent environmental regulations in developed countries could impact Pakistan's textile exports. If Pakistani textile manufacturers fail to comply with environmental**

regulations, they could lose access to these markets.

5. **Labour Rights Issues: Pakistan has been criticized for its poor labour rights record, including child labour and poor working conditions. This could affect the industry's reputation and access to export markets that prioritize ethical manufacturing practices.**
6. **Currency Fluctuations: Currency fluctuations can impact the cost of production and export competitiveness of Pakistani textile manufacturers. For example, a stronger Pakistani Rupee would make the country's exports more expensive for foreign buyers.**
7. **Worldwide Recession: In recent years, the global economy has grown at a very slow pace, showing signs of recession. Continuation of such a situation could threaten Pakistan's export sector, including textiles.**
8. **Geopolitical Tensions: Geopolitical events such as the Russia-Ukraine war have negatively impacted overall global trade.**

Gap Analysis of Pakistan's Textile Sector

Current State	Action Plan	Desired State
Suboptimal Performance		
Availability of Raw Material (Shifting to other cash crops than cotton)	**Policy incentives for enhanced domestic cotton production using the best quality seeds (M/o NFS & R, Finance, Commerce)**	**Availability of sufficient raw material to ensure a vertically integrated supply chain**
Highest energy cost in the region	**Ensure continuous supply of energy at regionally competitive rates (M/o Commerce, Energy and Petroleum Divisions, FBR, NEPRA, Finance, OGRA)**	**Globally and regionally competitive textile products to enhance foreign exchange**
Low financial support to SMEs and exporters	**Devise schemes for soft loans to potential exporters, especially in value-added products (Finance Div., SBP, M/o Commerce)**	**SME sector will contribute in a befitting manner, and export of value-added products will be enhanced.**
Delay in opening	**Include imports for**	**Textile sector will meet**

of L/Cs for the import of raw materials	**textile inputs in the priority list. (M/o Finance, SBP)**	**its export orders timely.**
Low focus on value-addition	**Financial incentives for export of value-added products. (M/o Finance, Commerce, SBP)**	**Export of value-added products will bring more foreign exchange as well as diversification of textile mix.**
Technological Gaps	**Acquisition of modern and efficient technology for upgradation of textile processes and products. (MOFA, Commerce, BOI, etc.)**	**Textile sector will become technologically competitive in the export of technical textiles.**

Institutional Gaps

i. An independent Ministry of Textile Industry was established in 2004 to address sectoral issues; however, it was not fully empowered, and some functions of the ministry even remained under the ambit of other ministries, such as trade negotiations on textiles and apparel under the domain of the Ministry of Commerce.

ii. Due to a shortage of human resources, the Textile Division could not pursue projects to achieve set goals.

iii. Lack of effective coordination between the Ministry of Textile and other relevant ministries/divisions/departments led to the failure to resolve issues.

After merging into the Ministry of Commerce, the issues faced by the Textile Division have been significantly addressed, which are reflected in the better performance of the textile sector.

Regional Competitiveness

The gap analysis of Pakistan's textile sector, compared to its regional competitors such as China, India, and Bangladesh, is as follows:

i. Energy Supply: Compared to Pakistan, which faces a prolonged energy crisis, there is a continuous supply of energy to the textile sector of regional competitors, especially Bangladesh, where there is no shortfall and subsequent outages.

ii. Energy Competitiveness: Pakistan’s energy tariffs remain the highest in the region, leaving firms highly uncompetitive.

iii. Regulatory Framework: Pakistan’s ranking in Ease of Doing Business is

still not in double digits (108/190), mainly due to a complicated regulatory framework. In contrast, the regulatory frameworks of regional competitors are digitized, facilitative, and fast.

iv. Technological Differences: Pakistan's textile sector has not significantly upgraded its technological infrastructure, whereas regional competitors are using state-of-the-art technologies for textile production.

v. Export Incentives: Compared to India, Bangladesh, and many other countries, Pakistan does not offer any of the following to exporters:

- Concessionary export finance, which was withdrawn recently.
- Full export insurance, guarantees, and quality management.
- Export performance requirements for access to incentives.
- Export cash subsidy.

The classic case of an export cash subsidy is that of Bangladesh, where an export cash incentive of 2% to 20% is offered on 24 export products. The rate is higher for more value-added exports, emerging exports, and exports to new markets. India operates a duty scrip scheme.

Issues and Challenges

Based on various analyses of the textile sector, the following are the major issues and challenges faced by Pakistan's textile industry:

Issues:

i. Obstacles for SMEs include access to concessionary finance, international marketing, skilled labour, and compliance with international standards.

ii. High cost of doing business, as Pakistan ranks low (at 108/190) in the Ease of Doing Business and Competitiveness Index.

iii. The demand from the textile sector for the restoration of the zero-rating status.

iv. Non-availability of cotton and other raw materials.

v. Delay in the release of tax refund claims by FBR.

vi. Inconsistent policies.

vii. Ambitious and unrealistic export targets.

viii. Security and law & order situation (major exporters relocated to Bangladesh from 2009 onwards due to security concerns and the energy crisis).

ix. Less focus on fibre and product diversification.

x. High tariffs, especially on raw materials.

xi. High dependence on conventional textile products.

xii. The highest energy costs in the region, along with power outages.

xiii. Lack of centers for innovation and improvement of products and processes.

Challenges:

i. Pakistan, despite being the 5th largest cotton producer, faces the biggest challenge of restoring the profitability of cotton farmers by increasing per-acre cotton yield through the introduction of the latest seed technology.

ii. The second major challenge is product diversification via improvements in fibre mix, focusing on Man-Made Fibres (MMF), artificial or synthetic, to enhance competitiveness and produce goods more in line with global demand.

iii. Tariff escalation in the value chain, intended to encourage domestic value addition, has only made the sector more uncompetitive. Due to high tariffs on value-added products, domestic manufacturers end up importing more MMF rather than fabric, while countries such as Vietnam and Cambodia import MMF fabric and sell more value-added products in the international market. Rationalization of tariffs is imperative to ensure a more equal distribution of profits and encourage the industry to invest in improving productivity.

iv. Pakistan is a major supplier of raw materials and semi-processed raw materials. Hence, there is a need to shift to value-added products, such as garments and made-ups, along with performance-based technical textile products. Due to the lack of state-of-the-art infrastructure, such as textile/garment parks, the industry must invest in infrastructure components, particularly in captive power generation and effluent treatment plants.

v. Foreign Direct Investment (FDI) has not been attracted to textiles due to inconsistent policies, including exchange rate issues, lack of infrastructure facilities, and the unavailability of energy at competitive prices. The challenge will be to restore the confidence of international investors through the implementation of textile policies in letter and spirit.

vi. Improving the productivity and sustainability of the textile sector, especially increasing garment exports, is also a major challenge. This requires the initiation of mass-level training programs, particularly in industrial stitching, with a focus on SMEs.

Conclusion

The textiles and apparel sector occupies a pivotal position in Pakistan's

economy, with the most intensive backward and forward linkages compared to any other sector. It is considered the backbone of the country's economy and employs around 40% of the industrial labour. Pakistan's total textile exports crossed the threshold of US$ 19.3 billion during the fiscal year 2021-22, despite numerous challenges. There are several issues and challenges to the growth of the sector, including the unavailability of seed, minimal to no export incentives, high energy costs, low ease of doing business, currency fluctuations, lack of access to credit financing for SMEs, security and law & order issues, among others. The sector holds immense potential to contribute to the country's economy, and exports could reach as high as US$ 80 billion with necessary reforms and support in areas such as financing, regulatory framework, market access, export diversification, and improving the business climate. Overall, the textile sector is a vital pillar of Pakistan's economy, providing employment opportunities, contributing to GDP, and earning foreign exchange. The growth and development of the industry are crucial for the country's economic progress.

Recommendations And Way forward

Following recommendations are made:

To ensure sustainable growth of Pakistan's textile sector, the following measures should be taken:

General:

1. Focus on sustainable practices: The textile sector should adopt sustainable practices such as reducing water and energy consumption, minimizing waste, and promoting the use of eco-friendly materials.
2. Investment in technology: The sector should invest in advanced technologies such as automation, robotics, and digitalization to enhance productivity and product quality while reducing environmental impact.
3. Skills development: The government should invest in the development of the workforce by establishing training institutes and providing financial support to textile workers for their education and skill development.
4. Diversification: The sector should diversify its product range to cater to different markets and customer needs, including technical textiles and high-value products.
5. Branding and marketing: The sector should focus on branding and marketing its products globally by participating in textile fairs and exhibitions and using digital platforms for promotion.
6. Collaboration: The sector should foster collaboration between the

government, academia, and the private sector to develop innovative solutions, promote sustainable practices, and enhance competitiveness.

7. Infrastructure development: The government should invest in the development of infrastructure such as ports, highways, and railways to improve logistics and reduce transportation costs.
8. Access to finance: The government should provide financial support to textile manufacturers, particularly small and medium-sized enterprises, to access credit and investment.
9. Regulatory environment: The government should simplify regulatory procedures and introduce online services to reduce bureaucratic hurdles for textile manufacturers.
10. Compliance and governance: The sector should comply with national and international standards for environmental sustainability, labor practices, and corporate governance. This will enhance the sector's reputation, reduce risks, and improve market access.

Specific:

Short Term:

1. Reduce Cost of Doing Business i. Concessional energy rates for export-oriented sectors, i.e., Electricity at US cents 9/kWh and RLNG at US$ 6.5/MMBtu all-inclusive during FY 2021-22, with continuation of the concessionary regime at regionally competitive rates after deliberation with stakeholders. ii. Drawback of Local Taxes and Levies (DLTL) only for value-added products – Garments, Technical Textiles, and Made-ups. iii. Continuation of duty-free import of textiles and apparel machinery with the addition of spare parts (not manufactured locally). iv. Restoration of Tax Credit for Investment. v. Tariff rationalization of the entire Textiles and Apparel chain. vi. Continuous review of customs duty drawback rates for textiles and apparel products, including additional customs and regulatory duties. vii. Simplify temporary importation schemes from the perspective of SMEs. viii. Pursue FBR to devise a new temporary importation scheme to cater to fast fashion trends. Action by: (Ministry of Commerce, FBR, Ministry of Finance, State Bank of Pakistan)

Medium Term:

2. Financial Support i. LTFF Mark-up to continue at 5%. ii. Enhance LTFF disbursements by PKR 100 billion per annum. iii. Inclusion of indirect exporters and construction for the Apparel and Made-ups sectors under LTFF. iv. Export Finance Scheme (EFS) mark-up to continue at 3%. v. Revival of sick textile units. vi. Initiation of Back-

to-Back L/C. vii. Credit line for Brand Development and Acquisition.

3. Sector-Specific Initiatives i. Introduce the latest seed technology. ii. Cotton hedge trading. iii. Introduce a quality/grading-based marketing mechanism for cotton. iv. Initiate Clean Cotton Program. v. Launch a Special Technology Upgradation Scheme for ginning. vi. MMF not manufactured locally should be duty-free.

Market Access:

i. Facilitate international buying houses to open offices in Pakistan. ii. GSP+ status for upcoming years to avail preferential tariffs in the EU. iii. Negotiations with developed/developing economies for market access. Action by: (Ministry of Foreign Affairs, Ministry of Commerce)

Regulatory Regime and International Compliances:

i. Stock-taking of the entire regulatory regime to highlight changes and adapt international best practices. ii. Digitization of the regulatory framework. iii. Expedite the implementation of the National Single Window. iv. Initiate compliance programs for SMEs, including compliance with environmental and human rights laws and conventions. Action by: (Ministry of Commerce, Ministry of Industries & Production)

Long Term:

6. Infrastructure Development:

i. Establish new garment cities. ii. Revitalize Karachi Garment City Company (KGCC). iii. Add new buildings in Lahore Garment City Company (LGCC) and Faisalabad Garment City Company (FGCC). iv. Establish new expo centers. v. Grant SEZ status to existing and new garment cities. Action by: (Ministry of Commerce, Board of Investment)

7. Research and Product Development:

Establish an R&D fund to introduce new products and improve the quality of existing products. Action by: (Ministry of Commerce, Higher Education Commission)

8. Human Resource Development:

i. Review labor laws, especially to allow women to work in three shifts, aiming for increased female participation.

ii. Mass-level, female-exclusive textiles and apparel training programs, especially in apparel stitching.

iii. Scheme for women, disabled, and handicapped individuals on incremental increases in employment. Action by: (Ministry of OP & HRD, Ministry of Finance)

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Evaluation of Export Sector of Pakistan; Policies, Regulations and Practices

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Abstract:

The export sector plays a pivotal role in driving economic growth and prosperity, serving as a reflection of a country's development. Pakistan, facing an economic crisis, heavily depends on its exports to overcome challenges, yet its export performance remains inconsistent. Despite introducing policies such as the Strategic Trade Policy Framework (STPF) 2020-25, Textile and Apparel Policy, and Digital Pakistan Policy, implementation has often been fragmented. This paper analyzes existing export policies, identifying gaps and suggesting reforms to boost export competitiveness. Issues such as inconsistent policies, tariff imbalances, delayed implementations, and infrastructure deficiencies hinder growth. Additionally, the focus on textile exports and limited diversification restricts market expansion. To revitalize the export sector, comprehensive measures are recommended, including rationalizing tariffs, improving infrastructure, fostering technology adoption, and enhancing trade financing. Addressing these challenges is critical for Pakistan's sustainable economic recovery and long-term export growth.

Key words:

Export Growth, Trade Policy, Pakistan Economy, Export Diversification, Economic Crisis

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Introduction

Exports are a cornerstone of economic growth, contributing significantly to the prosperity and development of any nation. By serving as a vehicle for foreign exchange earnings, exports help fuel industrial growth, provide employment, and stabilize the balance of payments. For countries such as Pakistan, exports are even more critical due to the ongoing economic challenges. Pakistan's export performance has, however, been inconsistent over the years. While certain sectors, such as textiles, continue to dominate the export landscape, the overall diversity and competitiveness of Pakistan's export basket remain suboptimal. Despite the country's rich natural resources, strategic geographic location, and large labor force, it has not been able to fully capitalize on these assets to boost its export sector.

Pakistan, a developing country heavily reliant on agriculture and textiles, has witnessed significant fluctuations in its export performance, with limited progress in diversifying its export base. The nation's exports have traditionally been concentrated in textiles, agricultural products like rice and cotton, and some manufactured goods. Although the country's export of textiles surged to $19.37 billion in 2021-22, Pakistan has faced a declining trend in the export of other products, such as rice and cotton, signaling the lack of diversification within the export sector. This over-reliance on a few export categories has made Pakistan vulnerable to external shocks, such as fluctuations in global commodity prices and trade disruptions, limiting its potential for sustained economic growth.

In recent years, the government of Pakistan has recognized the importance of a robust export sector and introduced a range of policies and frameworks to promote exports. These include the Strategic Trade Policy Framework (STPF) 2020-25, the Textile and Apparel Policy 2020-25, and the Digital Pakistan Policy 2018, all aimed at enhancing the country's export competitiveness. The STPF 2020-25, in particular, focuses on improving the performance of key sectors, reducing the trade deficit, and boosting Pakistan's export volume. Despite these efforts, the implementation of these policies has been inconsistent, and the country continues to face several structural issues that prevent the effective growth of exports.

One of the primary challenges facing Pakistan's export sector is policy inconsistency. The frequent changes in trade policies and fiscal regulations have created uncertainty for exporters, making it difficult for businesses to plan and invest for the long term. The withdrawal of the zero-rating tax policy in 2013 and the introduction of new tax schemes resulted in delays in tax rebates, which placed a financial burden on exporters. Similarly, the government's commitment to providing energy at competitive rates to the export sector has not been fulfilled, further exacerbating the difficulties faced by industries. Such policy gaps have contributed to a lack of confidence in the export sector, hindering growth and development.

Another significant challenge lies in the tariff policy and its impact on the competitiveness of Pakistani exports. While Pakistan's tariff system is designed to generate revenue, it has inadvertently created an anti-export bias. High import tariffs on raw materials, machinery, and intermediate goods have increased the cost of production for domestic industries, making their products less competitive in international markets. Furthermore, the difference in tariff rates for industrial and commercial importers has led to inequities in access to inputs, particularly for small and medium enterprises (SMEs). The absence of a rationalized tariff structure has undermined the potential of Pakistan's export industries to become globally competitive.

Infrastructure deficiencies are another barrier to the growth of exports in Pakistan. Although the government has made commitments to improve the country's infrastructure, progress has been slow. The inadequacy of transportation and logistics networks—such as roads, ports, and airports—has raised the cost of exporting goods, making Pakistani products less competitive in international markets. Furthermore, delays in infrastructure development, particularly in the areas of road and port facilities, have created bottlenecks that hinder the smooth movement of goods, leading to higher transportation costs and reduced efficiency. These logistical challenges are compounded by the lack of modernization in the country's industrial sectors, which has prevented industries from adopting the latest technologies and improving productivity.

The issue of export diversification also poses a significant challenge. Pakistan's export basket remains overly dependent on textiles, which account for around 60% of total exports. While textiles have traditionally been a strong performer, they are vulnerable to global market fluctuations, such as changes in consumer demand, raw material prices, and trade policies. The lack of diversification into high-value and innovative sectors, such as electronics, machinery, and services, has limited Pakistan's potential for sustained export growth. Additionally, agricultural exports, though important, remain concentrated in a few commodities like citrus fruits, mangoes, and rice. There is untapped potential to expand the range of agricultural exports and develop new products for export markets.

The issue of financing is another critical factor limiting the growth of Pakistan's export sector. Exporters in Pakistan often face challenges in accessing trade financing, particularly due to the ongoing financial constraints in the country. The scarcity of funds and the high cost of borrowing have made it difficult for exporters, especially SMEs, to invest in expanding their operations or upgrading their technology. The lack of access to finance also affects the ability of exporters to meet international quality standards, invest in marketing, and expand into new markets. Additionally, the ongoing dollar crisis in the country, which has led to a shortage of foreign exchange reserves, has created additional obstacles for exporters in terms of meeting their import requirements and fulfilling international trade obligations.

In conclusion, while Pakistan's export sector holds significant potential for driving economic growth, a combination of policy inconsistencies, structural weaknesses, infrastructure deficiencies, limited diversification, and financial constraints has prevented the sector from realizing its full potential. To overcome these challenges, the government needs to take a more proactive approach by ensuring consistent and coherent policy implementation, improving infrastructure, rationalizing tariffs, facilitating export diversification, and enhancing access to finance. Only through a comprehensive and integrated approach can Pakistan's export sector achieve sustainable growth and contribute meaningfully to the country's economic recovery.

Problem Statement

Pakistan's export sector, a critical driver of economic growth, has faced persistent challenges despite the introduction of various policies and frameworks aimed at boosting competitiveness. The country's export performance remains inconsistent, with an over-reliance on textiles and agricultural products, limiting diversification and growth potential. The lack of effective policy implementation, coupled with infrastructure deficiencies, tariff imbalances, and financial constraints, has hindered the sector's ability to fully capitalize on available resources and global trade opportunities. Furthermore, the export sector struggles with inconsistent government policies, delayed infrastructure projects, and inadequate access to trade financing, which have created an uncertain business environment. These issues have contributed to a stagnant export growth trajectory, impeding Pakistan's efforts to improve its balance of payments and alleviate the ongoing economic crisis. This research seeks to identify the underlying factors restricting Pakistan's export growth and provide actionable recommendations to enhance the competitiveness, diversification, and overall performance of the export sector.

Gap Analysis

After evaluating the policies, regulations, and practices, the following issues and challenges have been identified and subsequently analyzed for gap identification to move towards a plausible conclusion. The gap analysis is as follows:

Policy in Question	**Initial Commitment**	**Actual Status/Challenge**	**Desired**
Low Output Quality	Quality enhancement to develop trust in international trade	Non-compliance with international standards inhibited growth in exports.	Encourage a competitive environment, as competition is the basic impetus to ensure quality.

Trade Policy	An exclusive focus on goods	Export of services has never been the focus.	In the digital era, the export of services is becoming increasingly important.
Value Addition and Export Promotion	M/o Commerce & Trade, in collaboration with MOFA, will focus on export promotion by conducting trade fairs, exhibitions, and festivals in host countries to introduce its products.	Due to lack of diversification and value addition, as well as a lack of enthusiasm from the Pakistani mission abroad, export promotion efforts in host countries have been ineffective.	Industries should focus on market competitiveness. A coordinated effort by the industry, M/o Commerce, MOFA, and the missions abroad is required to promote Pakistani products at international trade shows.
Export Product Diversification	The textile and apparel policy STPF committed to diversifying export products and expanding the export basket.	Export products have not been diversified as committed in the last three policy frameworks.	To expand Pakistan's exports, product diversification is crucial.
Market Access	Policies committed to identifying new avenues for Pakistani exports, such as the Look Africa policy launched in 2018.	Pakistan has limited market access in major markets worldwide.	Pakistan should enhance market access by adding value to products, launching high-tech products, and making products cost-effective while complying with international standards.
Tariff Policy	Zero rating for the import of raw materials, manufacturing plant machinery, and equipment.	Zero rating was withdrawn in 2013, and a tax adjustment scheme was introduced, causing bureaucratic hurdles and delays in tax rebates.	Tariff regularization and rationalization should be implemented in letter and spirit, as the government's withdrawal from

			commitments to the export sector has impeded export growth.
Outdated Technology	A Technology Upgradation Fund was created in the previous policy to support the industry in upgrading and shifting towards the latest technology in the textile industry.	The Technology Upgradation Fund could not materialize due to the unavailability of funds from the government.	The creation and allocation of funds for technological upgradation are crucial for industry growth, as the textile world has moved towards modern technology, and Pakistan is lagging behind.
Letter of Credit	Initially, the government and the state were under obligation to pay liabilities to those within the country or external agencies doing business with Pakistani exporters.	Due to the economic crisis, the State Bank stopped the opening of LCs for the past one and a half years.	The government must ensure the opening of LCs to avoid being declared in default and ensure smooth operations in the export sector.
Dollar Disparity	The business community undertakes deals with foreign importers under the assumption that the dollar will remain stable, with the SBP ensuring the stability of the Pakistani currency through policy measures.	The dollar has been unstable for the past two years, increasing the cost of raw materials, machinery, and equipment, which has made Pakistani products uncompetitive in the global market.	Measures must be taken to prevent further devaluation of the Pakistani currency, as it has already declined significantly. This is necessary to save the industry and enable export growth.
Tax Regime	Initially, in Vision 2025, exports were exempt from income tax until 2025.	The government withdrew this commitment in 2021 and introduced a tax credit scheme.	The government must fulfill its commitments to avoid a trust deficit between the state and the business community.

Infrastructure Development	The Textile and Apparel Policy 2014-19 committed to enhancing infrastructure to support the growing export industry and ensure efficient transportation.	Despite the commitment, infrastructure remains inadequate and has not improved transportation channels for speedy export growth.	Infrastructure, such as roads, ports, and airports, needs urgent improvement, considering the government's financial constraints, to ensure cost-effective transportation of goods.
Trade Financing	The Textile Policy, Digital Pakistan Policy, and Strategic Trade Policy Framework committed to financing trading activities.	Trade financing and access to trade financing remain limited due to the scarcity of funds caused by the country's financial crunch.	Loans with longer repayment durations, lower interest rates, and reduced bilateral requirements can help Pakistani startups overcome financial constraints.
IT Policy 2000	Creation of an IT Fund, protection of intellectual rights, protection of electronic crimes, and a one-window solution.	Delayed implementation of policy decisions. The IT Fund was created in 2006, the IPO was created in 2012, PECA was created in 2016, and the National Single Window Act was enacted in 2017.	As fixed timelines were not provided, it took nearly two decades to fulfill the commitments made in 2000. Therefore, timelines should be incorporated into the Digital Pakistan Policy of 2018.

Challenges

- **Inconsistency of policies**: The tariff policy's zero rating was withdrawn in 2013, and a tax adjustment scheme was introduced, causing bureaucratic hurdles and delays in tax rebates.
- **Fiscal constraints**: The Trade Upgradation Fund could not be materialized.
- **Delayed implementation of policy decisions**: The first IT Policy was approved in 2002, whereas, as per recommendations, the IT Fund was created in 2006, the IPO was created in 2012, PECA was created in 2016, and the National Single Window Act was passed in 2017.
- **Tax Regime**: The government withdrew its commitment in 2021 and introduced the Tax Credit Scheme.
- **Letter of Credit**: Due to the economic crisis, the State Bank stopped the opening of LCs during the last one and a half years.
- **Dollar parity**: The dollar has been unstable for the last two years, which has multiplied the cost of raw materials, machinery, and equipment, rendering the prices of Pakistani products uncompetitive in the global market.
- **Export product diversification**: Export products could not be diversified as committed in the last three policy frameworks.
- **Infrastructure development**: Despite the commitment, the infrastructure remains inadequate and has not enhanced channels of transportation for speedy export growth.
- **Trade Financing**: Trade financing and access to trade financing remain limited due to the scarcity of funds caused by the financial crunch the country is facing.
- **Market access**: Pakistan has limited market access in major markets of the world, such as Europe and Japan.
- **Export promotion**: Due to limited diversification and value addition, export promotion efforts by Pakistan in host countries lack enthusiasm from Pakistani missions abroad.

Conclusion

To support the development of its export sector, the Pakistani government has implemented a range of policies and initiatives. These include the establishment of Export Processing Zones (EPZs) and Special Economic Zones (SEZs), which provide various incentives and facilities to exporters. The government has also implemented several tax incentives and schemes to encourage exports, including duty drawbacks, tax exemptions, and zero-rated sales tax on exports.

However, despite these efforts, Pakistan still faces challenges in the development of its export sector. These challenges include insufficient

investment in infrastructure, inadequate access to finance, limited technological capabilities, and a lack of skilled manpower. Additionally, the country faces stiff competition from other low-cost manufacturing countries, and fluctuations in global demand and prices can significantly impact export performance.

Overall, the development of Pakistan's export sector is crucial for the country's economic growth and development. Continued efforts to address the challenges facing the sector, such as investment in infrastructure, workforce training and education, and technology development, will be essential to further expand and diversify Pakistan's export base.

Recommendations

Based on the discussion above, the following is recommended:

1. To improve output quality, a competitive environment may be provided, as competition is the basic impetus to ensure quality. **– Action by MoC**
2. Trade policies should focus on the export of services rather than goods. **– Action by MoC**
3. For value addition and export promotion, industries should focus on market competitiveness. Similarly, coordinated efforts by the industry, M/o Commerce, MOFA, and the missions abroad are required to promote Pakistani products at international trade shows.
4. To expand Pakistan's exports, product diversification may be prioritized. **– Action by Chamber of Commerce and Industries in collaboration with MoC**
5. Market access should be enhanced through value addition and ensuring quality standards. **– Action by PQSA and MoC**
6. Tariff regularization and rationalization should be implemented in letter and spirit, as the withdrawal from the government's commitments to the export sector has caused impediments to export growth. **– Action by MoC and FBR**
7. A Technology Upgradation Fund may be created to support industries in upgrading and shifting towards the latest technology in the textile industry. **– Action by MoC and MoITT**
8. The government must ensure the opening of LCs to avoid being declared in default and to ensure smooth operations in the export sector. **– Action by SBP**
9. The government must fulfill its commitments to avoid a trust deficit between the state and the business community with respect to tax concessions/incentives.
10. Infrastructure, such as roads, ports, and airports, needs to be improved on an urgent basis, considering the financial constraints of the government, to ensure cost-effective transportation of goods.
11. For trade financing, loans with longer repayment durations, lower interest rates, and reduced bilateral requirements can help Pakistani

startups overcome financial constraints. – **Action by Finance Division & SBP**

12. Fixed timelines should be incorporated for targets in policies. – **Action by MoC**
13. Renewable energy resources and solar power plants must be encouraged to ensure an uninterrupted alternate supply to export industries. – **Action by MoP and MoC**
14. National Single Window implementation, coupled with CPEC operationalization, may be enabled to boost exports. – **Action by Pakistan Customs**
15. Youth and skill development. – **Action by MoFE and NAVTTC**

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Energy, POL, Gas/LNG, Policies, Strategies and Practices in relation with the Industrial Development in Pakistan

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Abstract:

Energy plays a critical role in the social and economic development of a nation, serving as the backbone of its economy. However, energy crises can lead to negative impacts, including reduced agricultural yields, decreased industrial output, higher inflation, and rising poverty levels. Pakistan, experiencing severe energy shortages, faces escalating demand coupled with insufficient supply, leading to significant disruptions in key sectors such as agriculture and industry. The fertilizer industry has been particularly affected, with gas shortages causing production interruptions. Additionally, the energy sector's reliance on expensive thermal power generation has exacerbated financial strains, contributing to a circular debt crisis. This paper analyzes the existing energy policies, strategies, and practices in Pakistan and identifies key challenges such as unclear policies, overemphasis on large-scale projects, and limited private sector involvement. It concludes with recommendations for short-term, medium-term, and long-term actions, including enhancing private sector participation, improving energy conservation, and investing in renewable energy solutions to ensure sustainable energy management.

Key words: *Energy crisis, industrial development, Pakistan, energy policies, circular debt*

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Introduction

Energy is the backbone of an economy, playing an important role in improving the social structure and building a strong economic foundation. However, when a nation undergoes an energy crisis, it experiences a negative impact on its social and economic spheres, especially. What we see today are lower agricultural yields, decreased industrial output, lower Gross Domestic Product (GDP), higher inflation, unemployment, and poverty. Unfortunately, Pakistan is on the list of countries experiencing the worst form of the energy crisis. Energy demand has increased and is expected to reach higher levels in the years to come. Load-shedding has disrupted economic activities in Pakistan, with capacity utilization in some key industries falling to almost 50 percent. The fertilizer industry is the worst affected, as it has faced interruptions to its gas supplies, forcing closures in various areas.

As far as the fertilizer industry is concerned, Pakistan has the capacity to produce more than one million tons of exportable surplus urea, but the energy crisis has decreased this annual production level, and Pakistan now has to import urea. As a result, the decrease in urea exports has eroded the country's foreign exchange and led to the payment of millions of dollars in subsidies. In the absence of electricity, oil, and gas, most industrial units remain closed. Those that are still functioning are gradually moving toward closure or relocation to neighboring and other countries. Similarly, unscheduled shutdowns and termination of electricity have severely affected agricultural productivity. Load-shedding has also hindered the production of insecticides, pesticides, and fertilizers, pushing the sector into decline.

Specifically, the emergence of circular debt in the energy sector is due to the increased dependence on expensive thermal oil power generation. The slippages in bill payments, particularly by public institutions, trigger a chain of delayed payments for imported furnace oil, natural gas, and other inputs for thermal production. The world is facing an energy shortage, which has sent shockwaves from Europe to Asia, and Pakistan is no exception. The energy industry in Pakistan is in crisis due to a lack of energy output to meet the country's rising demand over the past few decades. Pakistan is now reliant on imported energy resources such as gas and oil. According to Cheema (2022), Pakistan may face an extremely challenging and disastrous winter as a result of the lack of long-term energy management strategies by policymakers.

The conflict between Ukraine and Russia has caused fuel prices to soar, endangering the supply chain and making it difficult for Pakistan to maintain the effective operation of its power plants. Many LNG companies have broken their agreements with Pakistan. Long-term LNG suppliers have canceled several shipments scheduled for delivery in recent months, further tightening supplies, which has directly resulted in complications for Pakistan. As a result, Pakistan is now forced to buy costly LNG. Moreover, the circular debt, currently at a staggering 2.5 trillion Pakistani rupees, is 10% higher than it was in the previous fiscal year. By 2025, it is anticipated to reach 4 trillion Pakistani rupees, according to studies. Due to the severe financial burden this is placing on our meager foreign exchange reserves, OGDCL and PPL are unable to expand into new markets, as their revenue is trapped in a vicious cycle of debt. The lack of new investment in exploratory initiatives, following declining oil and gas reserves, is concerning and does not bode well for the nation.

Apart from the aforementioned reasons, other contributing factors include decreasing gas supply and dependence on oil, unrealistic power tariffs (leading to low investments), poor payment recovery, inefficient revenue collection, overpopulation, and overuse.

Problem Statement

Energy is undoubtedly the backbone of any economy and plays a pivotal role in the economic development of a country. In Pakistan, the high cost of electricity and gas, coupled with frequent power outages and dependence on imported oil/LNG, has led to a decline in industrial productivity and competitiveness. Pakistan has recently been hit by a severe energy crisis, which has adversely affected the performance of all sectors, with industry being the worst affected due to the increased demand for energy. Pakistan has not been able to keep pace even with the developing countries of the world and has thus failed to achieve the desired economic growth. Consequently, several industries have been compelled to shut down or relocate outside the country due to increased production costs and low profit margins. This is a critical situation that warrants immediate attention and a thorough understanding of the bottlenecks in policies and strategies, along with practicable recommendations for moving forward in the current situation.

Scope

The scope of this public policy document is to critically analyze the capacity, preparedness, output, policies and processes of energy sector in Pakistan and its impacts on industrial development. This research will also cover role

of the energy sector in industrial development in Pakistan in comparison with best practices around the world.

After investigating issues and challenges, the paper will dilate upon the policy recommendations.

Research Methodology

Qualitative research method has been used for this research. Primary data has been collected from Power Division and Petroleum Division, whereas, secondary data has been collected from Economic Survey of Pakistan 2021-22, Newspapers, Journals and case studies. Data has been analyzed in the context of the energy, POL, Gas/LNG, policies, strategies and practices in relation with the Industrial development of Pakistan. Situational analysis of the capacity, preparedness, output, policies and processes of energy sector in Pakistan was carried out. In addition, its impact on national economic development of Pakistan and analysis of legal and institutional framework of energy sector in Pakistan were conducted. Comparative analysis of the role of energy sector of Pakistan in industrial development with the best practices around the world was carried out. SWOT-EETH analysis of energy sector in order to promote industry in Pakistan for each related policy, legal and institutional framework separately and GAP analysis was also carried out.

Literature Review

Energy is the backbone of an economy and plays an important role in improving the social structure and establishing a strong economic foundation (Economic Survey, 2021-22). However, when a nation undergoes an energy crisis, it experiences a negative impact on its social and economic spheres, especially. Unfortunately, Pakistan is among the countries experiencing the worst form of the energy crisis. Consequently, some key industries have shut down their operations, and their output has fallen to almost 50 percent.

The fertilizer industry is the worst affected, as it has faced interruptions to its gas supplies, forcing closures in various areas. Pakistan has the capacity to produce more than one million tons of exportable surplus urea, but due to the energy crisis, Pakistan has to import urea. As a result, the decrease in urea exports has eroded the country's foreign exchange.

Industrial growth has a positive and significant impact on the overall GDP (Gross Domestic Product) of Pakistan, with the industrial sector contributing 18% to GDP. Many countries, including Taiwan, China, and Korea, are prime examples of the positive relationship between industrial growth and GDP. The industrial sector has also shown an impact on exports and imports with respect to the balance of payments. According to the World Bank (2005), electricity serves as an important input for the industrial sector, especially for developing countries like Pakistan. For the regulation of electricity, the National Electric Power Regulatory Authority (NEPRA) has played an important role. Since 2005, Pakistan has experienced serious electricity crises due to peak demand from both domestic and industrial consumption. The Economic Survey of Pakistan (2008) clearly indicated that to meet current demand, the concerned authorities must enhance generation capacity by 50%.

To promote the effective and sustainable development of renewable energy, the Chinese government has formulated a series of policies on renewable energy development, including laws, regulations, economic incentives, research and development, industrial support, and government renewable energy model projects. Denmark has converted its energy systems into a 100% renewable energy system. It is concluded that such large-scale renewable energy development is possible if the government develops strategies for integrating renewable energy into coherent energy systems influenced by energy savings and energy efficiency measures (Lund, 2007). According to Cheema (2022), Pakistan might face an extremely challenging and disastrous winter as a result of the lack of long-term energy management strategies by policymakers.

ANALYSIS OF LEGAL FRAMEWORK OF ENERGY SECTOR IN PAKISTAN

Article 157(1) of the 1973 Constitution of the Islamic Republic of Pakistan provides for electricity as follows: "The Federal Government may, in any Province, construct or cause to be constructed hydro-electric or thermal power installations or grid stations for the generation of electricity and lay or cause to be laid inter-Provincial transmission lines." Article 158 provides: "The Province in which a well-head of natural gas is situated shall have precedence over other parts of Pakistan in meeting the requirements from that well-head, subject to the commitments and obligations as on the

commencing day." Nuclear energy is included in the federal legislative list of the 1973 Constitution of Pakistan.

The WAPDA Act of 1958 provides for the regulation of water and power from hydro resources in Pakistan. Regulation of nuclear energy is addressed through the Pakistan Atomic Energy Commission Ordinance, 1965.

The Pakistan Council of Renewable Energy Technologies Act, 2018 provides for the acquisition, development, and dissemination of techniques and processes for the promotion and propagation of photovoltaic, solar, thermal, hydrogen, biogas or biomass, mini or micro hydro, wind, and other alternative and renewable energy techniques; (b) establishing facilities and expertise for developing suitable technologies to produce materials, devices, and appliances in the fields of alternative and renewable energy sources; and (c) organizing, coordinating, promoting, and executing research and development in the fields of alternative, new, and renewable energy technologies.

The National Electricity Policy 2021 was issued by NEPRA. Other policies include the Alternative and Renewable Energy Policy, 2019; Power Generation Policy, 2015; Transmission Line Policy, 2015; Power Policy, 2002; Hydro Policy, 1995; Framework Guidelines (Fast Track); Solar PV Initiative 2022; Petroleum Act, 1948; Petroleum Policy, 2012; Marginal Field Guidelines; Fare Gas Guidelines; Low BTV Gas Policy; Model Petroleum Concession Agreement, 2013; Pakistan Petroleum Exploration and Production Rules, 2013; Petroleum Act, 1934; Mines Act, 1923; Regulations of Mines and Oil Fields Minerals Development Government Act, 1948; Minerals Policy, 2013; LPG Policy, 2016; LNG Policy, 2011; Fertilizer Policy, 2001; SME Policy, 2021; and the Auto Industry Development Export Policy (2021-26).

Analysis of Institutional Framework of Energy Sector in Pakistan

Under the institutional framework, Ministry of Energy and Power Division and Petroleum Division as well as Ministry of Industries and Production. Regulatory authorities include ODGCL, SNGPL, SSGPL, NEPRA and WAPDA and DISCOS.

Situational Analysis of Capacity, Preparedness, Output, Policies and Processes

Pakistan's energy sector remains one of the main obstacles to economic growth. Although Pakistan has managed to increase power generation since 2013 and mitigate power blackouts that plagued the country over the past decade, expensive fuel sources, a reliance on imported energy products, chronic natural gas shortages, major debt in the power sector, and aging and insufficient transmission and distribution systems have prevented the sector from growing and modernizing.

This policy document presents the Energy Outlook in relation to the industrial development of Pakistan, with an analysis of the country's energy mix in oil, petroleum oil lubricants (POL) products, gas including liquefied natural gas (LNG), coal, liquefied petroleum gas (LPG), and electricity. To forecast future energy demand, an accurate contemporary energy demand model, historical consumption trends of the energy sector, and its linkage with industrial development and macroeconomic parameters such as gross domestic product (GDP), population, energy prices, and other key indicators have been considered. The data for these variables has been obtained from relevant sources. The research primarily focuses on supply and consumption side analysis, forecasting primary energy demand for the future, an energy balance for different sectors, and a set of recommendations for supply/demand.

Oil & Petroleum Products: Historically, imported and local POL products were the major energy sources for the economic sector and power generation in the country. Presently, their use has been reduced to 22 percent of the energy mix, mainly due to the government's policy to phase out furnace oil (FO)-based power generation in the country.

Forecast results show an increase in POL consumption from 17.03 million tons in 2020 to 24.15 million tons by 2030. On the supply side, due to limited upstream exploration of oil, oil production will decrease with an annual compound growth rate (ACGR) of negative 4 percent. For future sustainability in oil and POL, upgradation/expansion of refineries is necessary to reduce oil and POL imports. A national oil logistics and infrastructure study should be conducted to identify long-term solutions for refining plans and demand growth.

Natural Gas including LNG: For decades, natural gas has been the leading energy source to serve sectoral and power generation needs. Currently, natural gas accounts for 40 percent of the energy mix. Due to the continuous depletion of local gas reserves, the supply gap is filled with imported LNG to meet rising demand.

Forecast results show that sectoral consumption will reach 1,337 billion cubic feet (CFt), while the share of natural gas in power generation will reduce to half by 2030. On the supply side, upstream gas production in the country has depleted by an ACGR of negative 5 percent. To bridge the gap between demand and supply of gas, the expansion of LNG import infrastructure will be needed to accommodate the import requirement of 1,900 million cubic feet per day (MCFD) by 2030. Moreover, recommendations such as shifting captive power plants (CPPs) from gas to the national grid, LNG cost optimization and terminal management, importing natural gas from neighboring countries, and constructing a North-South pipeline to transfer imported LNG from the port to the northern regions of the country have been suggested.

LPG: Compared to historical trends, an increase in the primary supply of LPG in the country has been observed. Significant investment in LPG supply has helped the domestic and commercial sectors substitute natural gas. LPG has covered energy needs in areas where natural gas supply disruption exists or where a distribution network is absent. Forecast results predict a 50 percent increase in LPG demand within the domestic, commercial, and transport sectors. The energy balance for LPG shows that the supply side should improve to cater to the growing LPG demand in the country. To serve this purpose, the private sector should enhance its investments in the import and improvement of supply, logistics, and marketing of LPG, particularly in remote areas of the country.

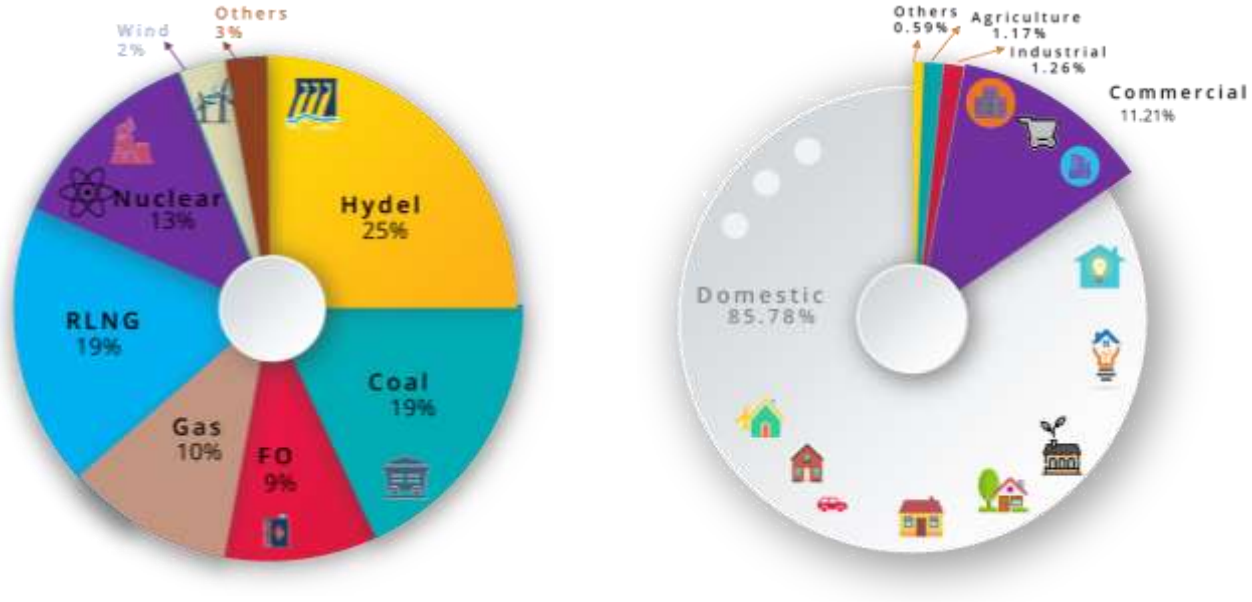
Coal: Coal has historically been used in power generation and industries, including brick kiln and cement industries. Currently, Pakistan has abundant coal reserves to meet the future coal needs of the country. Advancements in coal-use technologies have replaced a fair share of oil and gas in the industrial sector. Forecast results show that coal-based power generation will double coal consumption in the country by 2030.

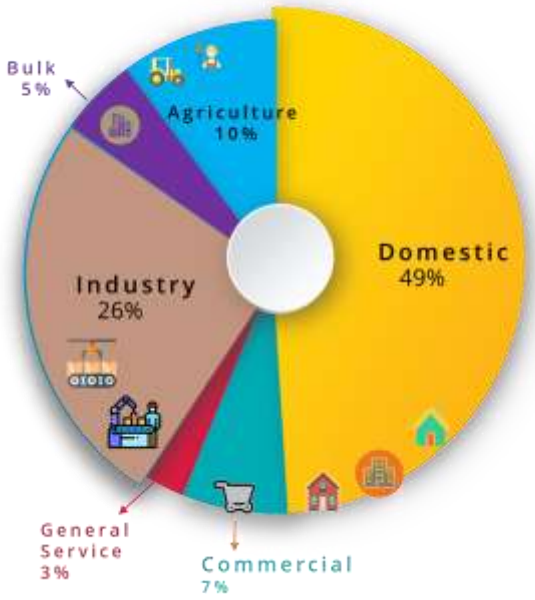
Moreover, the boom in the construction sector will directly increase industrial coal consumption, as cement industries consume coal as a primary energy source. To meet the growing coal demand locally in a sustainable way, Thar coal can be used as a substitute for imported coal in the future, as mining expansion is already underway to reach 30 million tons per annum (mtpa). Substitution of coal will have a positive impact on coal prices and foreign exchange savings. For smooth and uninterrupted supply,

railway tracks can be developed to adopt rail as the primary mode of coal transportation.

Electricity: The rising electricity demand in the country is met by expensive and unsustainable thermal power generation. Over the years, electricity demand has increased due to the expansion of the national grid, advancements in domestic heating/cooling technologies, and the development of the industrial sector. Forecast results show that demand will continue to increase by 2030 in all sectors, including transportation, due to the National Electric Vehicle Policy supporting more electric vehicles (EVs) on the roads in Pakistan. The need for a better energy mix, replacing thermal power with hydro and renewable energy, is also suggested. The Indicative Generation Capacity Expansion Plan (IGCEP) is an informative document for generation expansion planning and has improved supply-side planning. However, the demand side must be improved in consultation with sectoral experts, academia, and relevant stakeholders (Pakistan Energy Outlook Report 2021-2030, 2022).

Pie Charts 1&2 show generation mix & consumer mix of energy





Source: NEPRA

Capacity, preparedness, output, policies and processes of Energy Sector in Pakistan

Wind Energy

Pakistan has considerable potential for using wind energy along the coastal belt of Sindh and Balochistan (in southern Pakistan). The Government of Pakistan (GOP) has developed a wind power energy corridor along the southern coastal regions of Sindh and Balochistan. Wind data, provided by Pakistan's Meteorological Department, measures Pakistan's coastal belt at 60 km (Gharo-Keti Bandar) and 180 km long, with an exploitable potential of 50,000 MW of electricity generation through wind turbines. Currently, there are 26 private wind projects operating, producing approximately 1,335 MW. In addition, 10 wind projects with a cumulative capacity of 510 MW have achieved financial closure and are under construction. As the Government of Pakistan has developed the RE Policy, which envisages generating 60 percent of energy from renewable resources by 2030, this ambitious target provides several opportunities for the wind energy market in Pakistan.

Small/Mini/Micro Hydroelectric

In addition to large hydro, there are prospects for the development of small, mini, and micro hydro power under the revised RE Policy. The GOP considers small hydropower projects as clean and inexpensive sources of energy. Small hydropower projects are mainly located in the remote areas of Pakistan, particularly in the northern regions. Recently, the GOP has identified new generation requirements by capacity, fuel technology, and utilizing indigenous resources for power generation by announcing the Indicative Generation Capacity Expansion Plan (IGCEP). This plan envisages developing hydropower projects by adding an additional 13,000 MW of hydropower capacity by 2030, from an existing capacity of 9,000 MW, which would account for a 25 percent share in the total energy mix.

Solar

Pakistan receives an average of nine and a half hours of sunlight daily. Solar power entered Pakistan's energy mix in 2013 after the government introduced a set of support policies to foster renewable energy development. According to the Pakistan Economic Survey, over the last five years, six solar power projects totaling 430 MW have initiated commercial operations and are now providing electricity to the grid. With the rising costs of electricity in Pakistan and an unreliable grid supply, more industries and commercial organizations are turning to captive solar solutions. There has been a strong surge in domestic installation of rooftop photovoltaic panels in larger cities. For projects under 1 MW, net metering regulations came into effect in September 2015. This sector is trending toward significant growth, as the GOP is targeting at least 1 million customers and adding approximately 3,000 MW of solar power through net metering.

To expand renewable energy in Pakistan's energy mix, the World Bank has provided $100 million in financing to the Sind Solar Energy Project to support independent power producers in developing 400 MW of new solar power projects and provide partial grants to private sector firms for the commercial provision of Solar Home Systems to 200,000 households.

U.S. and international assistance have helped Pakistan make some major strides in addressing these problems, but without major reforms, Pakistan's energy future remains challenging. According to the National Electric Power Regulatory Authority's (NEPRA) 2021 annual report, Pakistan's total installed power generation capacity is 39,772 MW, of which 63% of energy comes from thermal (fossil fuels), 25% from hydro, 5.4% from renewables (wind, solar, and biomass), and 6.5% from nuclear.

In the current scenario, renewable energy (RE) resources can play an important role in closing the deficit. With the current government's focus on renewable energy, the Ministry of Energy recently revised the Renewable Energy (RE) Policy of 2019. According to the revised RE policy, the Government of Pakistan aims to derive 60 percent of energy from renewable sources, including hydro, by 2030, which would reduce Pakistan's dependence on imported fuel products.

Situational Analysis of Electricity, Petroleum and LNG Policies

Electricity Policy

The National Electricity Policy 2021 was issued by the Power Division of the Federal Government. The supply of reliable, secure, efficient, and affordable electricity is one of the primary drivers for the sustainable growth of a nation's economy. In the past, electricity shortfalls have adversely impacted the socio-economic balance of the country. The Government has framed various policies, from time to time, to address such issues, including but not limited to policies for the generation and transmission sectors. The National Power Policy 2013 encompassed all three sub-sectors—generation, transmission, and distribution—and provided policy goals, targets, and guidelines for the sector. However, due to multifarious reasons, the implementation of policy initiatives has primarily focused on the generation sub-sector. As a result, the goals and targets set for the power sector have not been fully met.

Recently, the NEPRA Amendment Act has been promulgated to lay the foundation for the development of an integrated, sustainable, and competitive power market. Accordingly, as envisaged in Section 14A of the NEPRA Amendment Act, the Government has prepared the National Electricity Policy for the development, reform, improvement, and sustainability of the power market and power sector.

The National Electricity Policy identifies the major goals to be achieved for the power sector and, in this respect, provides policy directions. It also outlines the key guiding principles to develop subservient frameworks that will steer decision-making in the power sector to achieve the identified goals. However, plans for implementation or specific operational instructions have not been prescribed, and these will be prepared by the Government in the form of periodic National Electricity Plans.

The vision of the policy is to ensure universal access to electricity through a self-sustainable power sector, developed and premised on: optimal utilization of indigenous resources; an integrated planning approach; an efficient, liquid, and competitive market design; and an affordable and environmentally friendly outcome for consumers.

As per the Policy, the goals for the power sector are to ensure access to affordable, secure, and sustainable energy. These broad and overarching goals, once attained, will realize the vision of the Government for the power sector. None of these goals is subservient to any other; all actions taken pursuant to this National Electricity Policy will ensure balanced implementation that does not prejudice any one goal for the achievement of others, while ensuring alignment with the SDGs. In discharging their respective functions, the Government, the Regulator, and all sector entities, including provincial entities, will be guided by these goals to overcome the challenges and impediments faced by the power sector and to devise future plans of action.

Accessibility of electricity to all areas, including rural areas, at affordable rates is the cornerstone of socio-economic development. Making power available, when it is not affordable, has limited value. The Government shall strive to ensure that electricity is accessible to all consumers at rates that are commensurate with their ability to pay, coupled with the development of an efficient and liquid market design.

Energy security, including uninterrupted availability of energy sources, is an essential goal for the power sector. The Government shall endeavor to diversify the fuel mix of the generation capacity in the country through optimal utilization of energy resources such as hydro, renewable sources, coal, natural gas, and nuclear.

The sustainability of the power sector is of paramount importance, and all sector entities shall strive to take the necessary steps to ensure such sustainability. This shall include measures to minimize environmental degradation, ensure technical and operational sustainability, promote integrated development of the power sector, and achieve financial self-sustainability, including the progressive elimination of circular debt.

Key Guiding Principles of the Policy

Six principles shall inform the actions and plans for the power sector to enable it to achieve the goals identified above:

Efficiency will be progressively increased across the entire value chain of the sector. This will be done, broadly, by gradually improving efficiency in the generation fleet and system operations, optimum utilization of the fuel base, reduction in Transmission and Distribution (T&D) losses, improvement in collections, demand-side management, conservation, sound governance practices, including decentralization, etc.

Transparency is one of the core values of the power sector and is a sine qua non to attract investment. Transparency also enhances consumer confidence, and, as a result, improves the liquidity of the sector. Transparency will be ensured through a predictable policy framework, uniform application of the regulatory framework, elimination of institutional conflicts of interest, automation and digitization of processes, and adopting best practices for the dissemination of authentic and timely information to all stakeholders.

Competition contributes to improving quality, increasing efficiency, and reducing costs. Enhancement of competition in the sector will provide stepping stones for the transition into a competitive wholesale market. Competition shall be the cornerstone for the development and operations of the entire value chain of the power sector.

The **sustainability** of the entire power sector pivots around the financial and commercial viability of its individual sub-sectors. This will be done by: a. Promoting investments on a least-cost basis balanced with development in underserved areas; b. Having cost-reflective tariffs in transmission and distribution, to the extent feasible; c. Timely passing of costs to consumers, while netting off any subsidies funded by the Government; and d. Recovery of costs arising from open access, distributed generation, etc.

A **multi-pronged approach for indigenization** will be adopted, which shall include promoting local content, transfer of technology, and R&D across the value chain of the power sector.

This may also include Government-to-Government and Business-to-Business agreements, through which the Government or private entities/parties in Pakistan shall promote the transfer of technology. Further, steps will be taken to facilitate the creation of development funds to support domestic R&D as well as resources needed for the augmentation of indigenous capacity.

Environmental responsibility is recognized worldwide as a vital pillar to ensure the overall sustainability of a power sector. Therefore, all aspects of the sector shall be guided by environmental targets benchmarked with international commitments, including carbon footprints (decarbonization) and emission targets for the sector, in line with Pakistan's commitment to reduce and limit greenhouse gas emissions.

Policy Areas

The National Electricity Policy identifies nine (9) policy areas of the power sector, in which all actions shall individually and collectively be aimed at attaining the above-mentioned goals by applying the key guiding principles, thereby achieving the vision for the power sector. These areas are as follows:

i. Sustainable development of the power sector requires that, despite varying seasonal energy requirements, sufficient generation capacity be made available to cater to the peak demand of the country.

ii. The transmission network serves as the backbone for a sustainable and secure sector, which enables the delivery of affordable electricity. Efforts shall be made to develop a robust transmission network that complements generation plans for smooth dispersal of power between generating stations and load centers. Such integration will ensure smooth operations of the power sector, while avoiding congestion and blackouts/brownouts.

iii. The distribution segment is the interface of the entire sector with the consumers of electricity. The financial viability of the entire sector is premised on the efficient operations of the distribution system and timely recoveries from consumers.

iv. Effective and efficient performance of system operations is crucial for the power sector, as it enables safe, reliable, non-discriminatory, and economic dispatch of electric power from generation companies. Per key guiding principles, actions shall be taken to ensure the integrity of system operations.

v. The efficient and liquid power market design, as approved by the Regulator, will contribute to attaining the policy goals.

vi. Financial sustainability of the sector is premised on the recovery of the full cost of service, to the extent feasible, through an efficient tariff structure, which ensures sufficient liquidity in the sector.

vii. Energy conservation and efficient use of energy are effective tools to manage the demand/supply of electricity and can lead to an improved energy intensity index. The cost of one megawatt-hour saved through energy efficiency and conservation is much lower than the corresponding cost of generating one megawatt-hour. Accordingly, concerted efforts shall be made to promote efficiency and conservation measures, which shall serve as a first fuel for the above purpose. To meet the existing and future energy needs of the country, power sector planning will be integrated with the energy value chain. Accordingly, the Ministry of Energy shall, henceforth, develop the future integrated energy plan on a sustainable basis.

viii. Good governance is a prerequisite for efficient and sustainable performance of any entity and eventually contributes to the sustainability of the entire power sector. All sector entities and stakeholders shall adopt principles of transparency, fair play, and good governance in their decisions and operations.

The Challenges and Issues in the National Electric Policy, 2021

Implementation

The policy faces challenges in implementation due to a lack of coordination between various stakeholders, lack of financial resources, and infrastructure constraints.

Political interference

Electricity policies are affected by political interference, which can hinder the implementation of the policy and delay its progress.

Lack of investment

Lack of investment in the power sector may limit the implementation of the policy and delay the achievement of its objectives.

High transmission and distribution losses

High transmission and distribution losses are a major issue in many countries, and Pakistan is no exception. Addressing this issue is crucial for the success of the policy.

Technical challenges

The policy faces technical challenges, such as integrating renewable energy sources into the grid, maintaining grid stability, and managing the demand and supply of electricity.

Public opposition

The policy is facing opposition from the public, particularly as it involves the construction of new power plants or transmission lines in densely populated areas.

Inadequate regulatory framework

The policy is challenged by inadequate regulatory frameworks, which may fail to provide a level playing field for different players in the power sector.

Environmental concerns

The policy has to address environmental concerns, particularly as it involves the construction of new power plants or transmission lines in environmentally sensitive areas.

Critical Analysis of National Electricity Policy 2021

The National Electricity Policy 2021 of Pakistan is a policy document that aims to reform and improve the country's electricity sector. While the policy has several positive aspects, there are some shortcomings as well. Some of the shortcomings are:

Lack of Clarity

The policy lacks clarity in some areas, which may lead to confusion and inconsistency in its implementation. For example, the policy does not provide clear guidelines on how the government plans to increase the share of renewable energy in the country's energy mix.

Overemphasis on Large-Scale Projects

The policy places a strong emphasis on large-scale projects such as coal-fired power plants, which may not be the most efficient or sustainable solution for the country's electricity needs. This approach may lead to an over-reliance on fossil fuels and delay the transition to cleaner and more sustainable energy sources.

Limited Focus on Demand-Side Management

The policy focuses primarily on supply-side solutions such as increasing generation capacity and improving transmission and distribution infrastructure. However, it does not give adequate attention to demand-side management measures such as energy efficiency and conservation, which can reduce electricity consumption and lower costs.

Limited Role for the Private Sector

The policy does not adequately facilitate private sector involvement in the power sector, which could help increase the capacity of the electricity grid and reduce the burden on the government.

Insufficient Funding

The policy has not outlined a clear plan for financing the development of the power sector, which could hinder the implementation of the policy.

Lack of Accountability

The policy does not provide a clear mechanism for ensuring accountability and transparency in the electricity sector. This may lead to inefficiencies and corruption in the sector, which can undermine the effectiveness of the policy.

As a result of the critical evaluation carried out, the gap analysis is provided below.

GAP ANALYSIS OF ELECTRICITY SECTOR

Target	Current State	Desired State	Action Plan
Power	Current Supply 26,083 MW	Current demand 49,435 MW	Power Generation Energy Conservation Energy Efficiency Rationalization consumption patterns
	68.4% thermal based production	Shift to Sustainable and economically efficient energy production	Incentives for Alternate and renewable energy production
	Inaccurate demand and supply estimate	Systematic collection of data	Coordination among Producers and Suppliers

Petroleum Sector

In 2019, Pakistan had the capacity to refine 19 million tons of crude oil, but only 4.3 million tons of oil was produced during the year, meeting only 20% of the country's petroleum needs. Pakistan heavily relies on crude oil imports to meet its petroleum needs.

Petroleum Exploration & Production Policy 2012

Transportation, energy, and industry are the three main sectors that rely on petroleum products. Transportation consumes 59% of petroleum products; electricity consumes 32%, and industry consumes 8%.

The salient features of the policy are to accelerate E&P activities in Pakistan with a view to achieving maximum self-sufficiency in energy by increasing oil and gas production, promoting direct foreign investment in Pakistan by increasing the competitiveness of its terms of investment in the upstream sector, promoting the involvement of Pakistani oil and gas companies in the country's upstream investment opportunities, training Pakistani professionals in the E&P sector to international standards, and creating favorable conditions for their retention within the country. The policy also aims to promote increased E&P activity in the onshore frontier areas by providing globally competitive incentives, enable more proactive management of resources through the establishment of a reorganized Directorate General of Petroleum Concessions (DGPC) comprising both Federal and Provincial representatives, with the Federal Director serving as ex-officio Director General, and providing the necessary control and procedures to enhance the effective management of Pakistan's petroleum reserves. Additionally, it aims to ensure the energy security of the country by enhancing domestic exploration, decrease reliance on imported energy by providing additional incentives to exploration and production companies for increasing indigenous production, and to undertake the exploitation of oil and gas resources in a socially, economically, and environmentally sustainable and responsible manner.

GAP ANALYSIS OF PETROLEUM SECTOR

India and China are importing more than 90% of crude oil, while Japan and Thailand are importing more than 80% of crude oil. Pakistan, Sri Lanka, and Indonesia are importing around 35% of crude oil, while Nepal and Cambodia are using almost 100% refined oil. Indonesia is rapidly relying on internal reserves, reducing its petroleum imports by almost 10% annually.

The mandatory storage capacity of Pakistan is 20 days, compared to Bangladesh, which has a capacity of 45-50 days. As the demand for oil is continuously rising, the storage capacity needs to be enhanced. As a result of the critical evaluation carried out, the gap analysis is provided below.

As a result of the critical evaluation carried out, the gap analysis is given as under.

Target	Current State	Desired State	Action Plan
POL	Domestic Oil production declined to 73,000 barrels per day from 98,000 barrels per day from 2017 to 2021	High Domestic E&P	Tax incentives for E&P
	Domestic Oil Refinery Industry caters to 20% of the consumption need	High domestic Oil Refinery output	Tax Incentives for Refinery Industry
	Imported Oil mix: 65% of Refined Oil and 35% of Crude Oil	Import of Crude Oil up to 90% regional practices	Tax Incentives for Refinery Industry
	Oil Storage Capacity up to 20 days	Oil Storage capacity up to 45 – 50 days	Regulatory framework and oil levies for the development of storage capacities

GAS AND LNG POLICY

LNG Policy of 2011 of the Government of Pakistan

Pakistan's policy for the sustainable development of the energy sector, including the provision of reliable and competitively-priced LNG, is based on the following objectives: (a) Optimization of the primary energy mix, based on economic and strategic considerations; (b) Maximizing the utilization of indigenous energy resources; (c) Enhancing private sector participation in the energy sector by strengthening the regulatory framework and institutional capacity; (d) Developing energy infrastructure; and (e) Developing human resources with emphasis on energy sector-specific technical skills and expertise.

Natural gas plays a key role in Pakistan's energy balance, currently accounting for around 50% of the country's primary energy supplies. With accelerating economic growth, the demand for gas is projected to increase sharply, and the country's recoverable indigenous gas reserves will be insufficient to meet this demand. Gas shortages have already emerged and will increase substantially in the following years if indigenous supply is not supplemented through imports. To address the shortage, strong emphasis is being placed on importing gas from neighboring gas-producing countries through cross-border gas pipelines and also in the form of liquefied natural gas ("LNG"). Necessary measures are being taken for the installation of LNG receiving, storage, and re-gasification facilities and the expansion of gas transmission infrastructure for the distribution and sale of regasified LNG ("RLNG") in the domestic market.

The LNG Policy of 2006 has been modified in 2011 to facilitate the expeditious implementation of LNG projects.

LNG IMPORT PROJECT STRUCTURE

An LNG import project may be structured under one of the following alternatives:

Integrated project structure, under which a private or public sector party, joint venture, or consortium (hereinafter referred to as the "LNG Developer") is responsible for purchasing LNG supplies, transporting them to its LNG import terminal (comprising receiving, storage, and re-gasification facilities), and supplying RLNG to the domestic market and/or for its own use.

The LNG Developer would enter into a Gas Sales and Purchase Agreement (GSPA) directly with a Government-designated buyer, gas utility, or any customers (hereinafter referred to as "RLNG Buyer(s)"); or

Unbundled project structure:

i. A Government-designated buyer, gas utility, any consumer, or any LNG supplier (hereinafter referred to as "LNG Buyer(s)") would directly import the LNG under an LNG Sale and Purchase Agreement ("SPA") either on a delivered ex-ship (DES) basis, free-on-board (FOB) basis, or C&F basis.

ii. For FOB purchases, the LNG Buyer would additionally enter into an agreement with a shipping company to transport LNG to the receiving terminal.

iii. The LNG Buyer(s) would enter into an agreement with the LNG Terminal Owner and/or Operator (hereinafter referred to as the "LNG").

ISSUES IN LNG POLICY 2011

1. **Pricing:** One of the major issues in the LNG policy of 2011 was the pricing of LNG. The policy did not provide a clear mechanism for determining the price of LNG. This created uncertainty and made it difficult for investors to make decisions about LNG projects.
2. **Regulatory Framework:** The LNG policy in 2011 did not have a comprehensive regulatory framework to govern the import, storage, transportation, and distribution of LNG. This lack of regulation made it difficult for companies to make investments in the sector.
3. **Infrastructure Development:** While the policy aimed to promote the development of LNG infrastructure, it did not address the challenges in infrastructure development, such as the lack of port facilities, pipeline networks, and storage facilities.
4. **Competition:** The policy did not create a level playing field for competition in the LNG sector, as the government continued to regulate the pricing of natural gas, which gave an unfair advantage to state-owned companies.
5. **Contractual Issues:** There were several contractual issues that arose in the LNG sector, such as disputes between buyers and sellers over pricing and the supply of LNG.
6. **Environmental concerns:** The policy did not adequately address the environmental concerns associated with LNG.

There were concerns about the impact of LNG on the environment, including air and water pollution, as well as the potential for accidents.

7. **Security of supply:** The policy did not provide a clear plan for ensuring the security of LNG supply. This created uncertainty for investors and raised concerns about the reliability of LNG as a source of energy.
8. Overall, while the LNG policy in 2011 aimed to promote the development of LNG infrastructure in Pakistan, there were several issues that needed to be addressed to achieve the objectives of the policy

As a result of the critical evaluation carried out, the gap analysis is given as under.

GAP ANALYSIS OF LNG SECTOR

Target	Current State	Desired State	Action Plan
RLNG	Domestic production 4 BCFD	Demand of 6 BCFD	Incentives to gas exploration Gas pipeline completion (TAPI)
	Delays in procurement and supply	Robust Supply Chain Management	Contract Management LNG Terminal Management Inventory Management
	Dependence upon Qatar for supply of LNG	Diversification of Suppliers	Russian as supplier of Oil & Gas

ENERGY SECTOR IMPACTS ON INDUSTRIAL DEVELOPMENT OF PAKISTAN

The industrial growth has positive and significant impact on overall GDP (Gross domestic product) of Pakistan whereby industrial sector contributes 18 % to GDP. Many countries including, Taiwan, China and Korea are the best examples of positive relationship between industrial growth and GDP. Industrial sector has also studied impact on export and import with respect to balance of payment. According to World Bank (2005) electricity serves as important input for industrial sector especially for developing countries like Pakistan. For regulation of electricity National Electric Power Regulatory Authority (NEPRA) has been playing an important role. Since 2005 in Pakistan serious electricity crisis are experienced due to peak demand from both domestic consumption and industrial consumption. Economic Survey of Pakistan (2008) clearly indicated that in order to meet current demand concerned authorities must have to enhance generation capacity by 50%.

The use of energy has increased significantly due to various inventions and innovations of common use made in last century. Thus almost all human activities have become more dependent on energy. For developing nations in particular, there is fundamental need for reliable and affordable energy. In these countries, energy demand has been increased due to expansion in industry, modernized agriculture, increased trade and improved transportation. Pakistan is dependent on energy imports because there is lack of investment in indigenous resources of hydro, natural gas and lignite. Biomass is the largest energy source. The government has decided to stop building new coal-fired power plants because of environmental issues. The public oil and gas companies are planned to be privatized for various concerns. Due to significant increase in electricity demand, both state-owned companies and IPPs are actively engaged in producing electricity. However, fiscal sustainability has become a challenge due to increase in energy payments. This energy deficiency began from a fuel mix transformation which was initiated two decades ago, when power generation used to rely more on imported furnace oil than hydropower. The current energy crisis began to manifest itself by late 2007.

Pakistan imports nearly a third of its energy resources in the form of oil, coal, and liquefied natural gas (LNG). An import-driven energy policy is not sustainable for Pakistan, making it energy insecure in the long term. Besides being a drain on its foreign exchange reserves, it exposes the economy to international energy price shocks, putting the entire economy at risk through inflation. Inflationary pressures reduce the competitiveness of the country's exports, further constraining the economy's capacity to pay for energy imports. This paper analyzes Pakistan's energy security under the 4As framework over the 6-year period of 2011–2017.

The 4A methodology attempts to measure and illustrate graphically the change in the energy security of a region by mapping it onto four dimensions: availability, applicability, acceptability, and affordability. The analysis indicates that Pakistan's energy security improved initially over the first 3 years but then deteriorated over the next 3 years. Despite significant investments in the energy infrastructure over the last 5 years, Pakistan continues to be energy insecure. This paper recommends the immediate and rapid adoption of green energy solutions, like distributed solar and smart metering, and increased conservation efforts, like developing and implementing building insulation standards to mitigate energy insecurity.

Relying heavily on imported energy is not sustainable for Pakistan's economy, which has been running a current account deficit for over 2 decades (with the exception of 1 or 2 years). Borrowing (from friendly nations, international sovereign bonds, and multilateral banks) funds these deficits almost by default, as bureaucratic inertia and the absence of an enabling political and regulatory environment typically limit the foreign direct investments flowing into the country. As Pakistan's external liabilities build up and it diverts an increasing share of its foreign exchange earnings toward external debt servicing, it is simply not left with the financial means to import energy continuously. It is important for the country to rethink its energy design to achieve not just energy sufficiency but also energy security. Energy security is a multidimensional concept and is a measure of a unique nexus that encompasses economic, political, geopolitical, and institutional, legal, and regulatory aspects of a country or region. The first dimension is the economics of energy security, which covers the consequences of import dependence in relation to instable energy markets, the diversification of the primary energy mix and the use of indigenous resources, and the circular flow of energy. The second dimension is the political economy of energy security, which examines the interrelations between crude and natural gas exporting and importing countries. The third dimension is the geopolitics of international relations, which explores how geopolitics influences and shapes coalition, cooperation, or unilateral action for energy security. The fourth dimension consists of the aspects of energy security in institutional, legal, and regulatory frameworks in the local, regional, and international context (Energy Security in Pakistan: A Quantitative Approach to a Sustainable Energy Policy, 2019)

COMPARATIVE ANALYSIS OF THE ROLE OF ENERGY SECTOR OF PAKISTAN IN INDUSTRIAL DEVELOPMENT WITH THE BEST PRACTICES AROUND THE WORLD

Many people in Pakistan are wondering what the situation is in the region in terms of energy supplies and prices. We will try to provide a rough comparative sketch of the energy scene in South Asia, involving Pakistan, India, and Bangladesh. India is comparatively rich in terms of energy resources – coal, hydro, and solar – and has been mostly self-sufficient in these resources. However, lately, there have been local coal supply issues compared to demand, and India has had to import coal from abroad. Imported coal is being mixed with local coal, with a cost penalty of 30% in the cost of generation.

India imports gas in the form of liquefied natural gas (LNG), which is expensive these days. However, there is hardly any electricity generation based on gas. Inefficiency and transmission and distribution (T&D) losses in India are comparable to those in Pakistan, or even higher, which affects the cost of supplies. There are huge DISCOM losses, which have accumulated to levels almost comparable to those in Pakistan. In Pakistan, these losses show up in the form of a unique term called circular debt.

Bangladesh and Pakistan seem to have an identical syndrome – high installed capacity and low fuel availability due to higher prices. Bangladesh had to approach the IMF as well due to the current account deficit created by heavy and expensive energy imports. Installed electricity capacity in Bangladesh is 25,566 MW against peak demand of 14,782 MW. Approximately 7.89% of electricity is generated from coal, 50.84% from gas, including LNG, 28% from furnace oil, and 6% from diesel.

Various electricity conservation measures have been enforced in Bangladesh. It faces almost the same problems as Pakistan: excess capacity, high capacity charges, and dependence on expensive imported gas and furnace oil.

Tariff Variances:

Although averages may be deceptive, the Indian average tariff for large customers is Rs 23.38 per kWh, and for small consumers, the average is Rs 10.70 per kWh in Pakistan. These figures appear comparable with Bangladesh's corresponding figures – maximum Rs 25.33 per kWh and minimum Rs 12.64 per kWh.

Pakistan's maximum tariff is 40% higher than the Indian average. Compared with the corresponding Pakistani tariff of Rs 32.77 per kWh, Pakistan's tariff is 31% higher than that of India. However, they are able to supply free electricity to small consumers up to 200 units. It is anyone's guess how they finance such a subsidy.

Pakistan's maximum tariff is 16-29% higher than the corresponding Bangladesh tariff. The minimum tariff of the two countries is almost identical – Rs 12.64 per kWh for Bangladesh vs Rs 13.45 per kWh for Pakistan. Bangladesh's power infrastructure is similar to that of Pakistan and suffers from the same difficulties of expensive imported fuel. Lower T&D losses and subsidies enable it to maintain a lower tariff than Pakistan. It is obvious that the Bangladesh government is subsidizing electricity.

India is the least-cost country due to mostly local coal-based electricity and hydro. There are subsidies and accumulated DISCOM losses, which have enabled India to keep a low tariff. India has practically no significant problems with electricity tariffs compared to Pakistan and Bangladesh.

Pakistan's circular debt is a form of unpaid subsidy and may continue to remain on the books, in one form or another, for a long time. The induction of cheaper renewables and local Thar coal, along with higher capacity utilization, appears to be the near-term solution to alleviate the high tariff issue. Pakistan's electricity tariff problems are becoming increasingly intractable, particularly due to the floods and political instability (Ali, 2022).

Comparative Analysis of Energy Sector Mix of Pakistan with India and Bangladesh in relation to Industrial Sector

Country	Pakistan	India	Bangladesh
Contribution to GDP	19%	26%	36 %
Unit Cost Rs.	28 & 34	11 & 23	13 & 25
Industrial Sector Consumption	28%	41%	28%

Energy Production Mix

Country	Hydel	Gas & Coal ,Oil	Solar & other RE	Nuclear & Other Sources	Subsidy
Pakistan	21 %	68 %	3 %	8 %	Yes
India	**11** %	57 %	29 %	3%	Yes
Bangladesh	1 %	85 %	4 %	10 %	Yes

SWOT-EETH Analysis of the Energy Sector in Order to Promote Industry in Pakistan for Each Related Policy, Legal, and Institutional Framework Separately

Policy Framework:

Strengths:

- The government has implemented several policies to promote the industrial sector in Pakistan.
- The industrial policy aims to enhance the competitiveness of local industry, increase exports, and attract foreign investment.
- The policy also focuses on increasing the contribution of the industrial sector to the country's GDP and generating employment opportunities.

Weaknesses:

- The policy lacks a clear roadmap for the development of different industrial sub-sectors, resulting in uneven growth rates.
- The lack of effective implementation mechanisms and monitoring systems has hindered the policy's success.
- The policy has not adequately addressed the environmental impact of industrialization, leading to pollution and other environmental concerns.

Opportunities:

- The government can introduce policies to promote innovation and technology in the industrial sector, leading to more efficient and sustainable production methods.
- There is an opportunity to increase investment in Special Economic Zones (SEZs) to attract more foreign investment and increase the country's export potential.
- The government can incentivize the establishment of small and medium-sized enterprises (SMEs) in the industrial sector to enhance employment opportunities.

Threats:

- Political instability in the country can impact the policy's continuity, leading to a lack of clarity and consistency in the government's approach to the industrial sector.
- The global economic slowdown can affect the export potential of the industrial sector, leading to reduced revenues and profitability.
- The lack of infrastructure development, including roads, transport, and energy, can limit the growth potential of the industrial sector.

Legal Framework:

Strengths:

- Pakistan has established several laws and regulations to govern the industrial sector, including the Factories Act and the Environmental Protection Act.
- The legal framework aims to promote workplace safety, protect workers' rights, and prevent environmental degradation caused by industrial activities.

Weaknesses:

- The implementation of the legal framework is weak, leading to violations and non-compliance by industries.
- The legal framework lacks clarity and consistency, leading to confusion among industries and government agencies.
- The legal framework has not kept up with the changing needs of the industrial sector, leading to outdated and inadequate regulations.

Opportunities:

- The government can revise the legal framework to address emerging challenges facing the industrial sector, including environmental concerns and new technologies.
- The government can enforce strict penalties for violations and non-compliance, leading to better adherence to ethical and legal standards.
- The government can establish specialized courts to deal with industrial disputes and ensure timely resolution of legal issues.

Threats:

- The lack of resources and capacity of government agencies to enforce the legal framework can hinder its effectiveness.
- The political influence of industries can impact the implementation of the legal framework, leading to violations and non-compliance.
- The legal framework can be misused to stifle competition and promote monopolies in the industrial sector.

Institutional Framework:

Strengths:

- The government has established several institutions to promote and regulate the industrial sector, including the Ministry of Industries and Production and the Pakistan Industrial Development Corporation.
- These institutions aim to provide support and guidance to industries and promote their growth and development.
- The institutional framework includes specialized agencies to address specific issues, such as the Environmental Protection Agency.

GAP Analysis

Current Status:

Energy: Pakistan faces significant challenges in meeting its energy demands. The country has a limited capacity to generate electricity, leading to frequent power outages, load shedding, and high energy costs. The majority of the country's energy comes from non-renewable sources such as oil, natural gas, and coal.

POL (Petroleum, Oil, and Lubricants): Pakistan is heavily dependent on imported petroleum products, which puts a significant strain on the country's economy. The government heavily subsidizes these products, leading to a significant fiscal burden.

Gas: Pakistan has significant natural gas reserves, which are mainly used for domestic consumption. However, the country is facing a gas shortage due to a lack of investment in infrastructure and exploration.

Policies, Strategies, and Practices: Pakistan has implemented several policies and strategies to promote industrial development, including the Industrial Policy 2011 and the Automotive Development Policy 2016-21. However, the implementation of these policies has been hindered by bureaucratic hurdles, corruption, and a lack of investment in infrastructure.

Desired Status:

Energy: The desired status for Pakistan's energy sector is to transition to renewable sources of energy, such as wind and solar, to reduce the country's dependence on non-renewable sources. This would require significant investment in infrastructure and a shift away from traditional fossil fuel-based power generation.

POL (Petroleum, Oil, and Lubricants): The desired status for Pakistan's petroleum industry is to reduce the country's dependence on imported petroleum products and promote domestic production. This could be achieved through increased investment in exploration and development of domestic reserves and reducing subsidies on petroleum products.

Gas: The desired status for Pakistan's gas industry is to increase investment in exploration and infrastructure to fully utilize the country's natural gas reserves. This would require significant investment in infrastructure and exploration.

Policies, Strategies, and Practices: The desired status for Pakistan's policies, strategies, and practices related to industrial development is to promote a more business-friendly environment with reduced bureaucratic hurdles and corruption. This would require significant reforms in the government and a focus on improving the ease of doing business. Additionally, the government should focus on developing infrastructure and promoting investment in key sectors to foster industrial growth.

Conclusion

On the basis of the foregoing analysis of the policies, strategies, and practices related to industrial development in Pakistan, the following conclusions are made:

Lack of Clarity:

The policies lack clarity in some areas, which may lead to confusion and inconsistency in their implementation. For example, the policies do not provide clear guidelines on how the government plans to increase the share of renewable energy resources in the country's energy mix.

Overemphasis on Large-Scale Projects:

The policies place a strong emphasis on large-scale projects, which may not be the most efficient or sustainable solution for the country's energy needs. This approach may lead to an over-reliance on traditional fuels and delay the transition to cleaner and more sustainable energy sources.

Limited Focus on Demand-Side Management:

The policies focus primarily on supply-side solutions, such as increasing generation capacity and improving transmission and distribution infrastructure. However, they do not give adequate attention to demand-side management measures, such as energy efficiency and conservation, which can reduce energy consumption and lower costs.

Limited Role for the Private Sector:

The policies do not adequately facilitate private sector involvement in the energy sector, which could help increase the capacity of the energy mix and reduce the burden on the government.

Insufficient Funding:

The policies have not outlined a clear plan for financing the development of the energy sector, which could hinder the implementation of the policies.

Lack of Accountability:

The policies do not provide a clear mechanism for ensuring accountability and transparency in the energy sector. This may lead to inefficiencies and corruption in the sector, which can undermine the effectiveness of the policies.

Procurement:

The procurement component is missing in the LNG Policy, which led to a debacle during high demand.

Supply Chain Management:

The policies do not provide a roadmap for supply chain management.

Recommendations

Short-Term Recommendations

Private Sector Participation

The government should encourage private sector participation in national growth and the development of the energy sector. The government may tax a fraction of top companies' profits to create a fund for off-grid solutions. In India, the top 500 companies are required to contribute 2% of their profits to CSR funds for off-grid solutions.

Clean Energy Cess

The government should regulate or impose a cess upon certain consumption patterns to generate funds for investing in renewable energy projects. India charges a cess of INR 400 per tonne of coal consumed.

Joint Liability Group (JLG) for Off-grid Installations

The government may extend small loans to a group of 4-10 local entrepreneurs, known as a JLG, for non-farming activities that may be applicable for micro-grid installations. Currently, India benefits from this model of micro-financing for off-grid solutions.

Energy Conservation

Pakistan, as an energy-scarce country, must carefully examine its patterns of energy consumption and rationalize its effective use. Making good use of daylight, closing marketplaces early at night, and adopting work-from-home mechanisms may all help reduce energy consumption and give the government more room to divert energy to industrial units.

Medium-Term Recommendations

Development of Refinery Industry and Import of Crude Oil

To encourage investment in the refinery industry, the government should implement tax breaks. The government must also import crude oil rather than refined oil. This could result in a $1 billion annual profit.

In order to deal with unexpected supply disruptions or price fluctuations, the country's storage capacity must be increased from 20 days to 60 days.

Efficient Supply Chain Management of LNG

Efficient procurement of LNG and effective terminal operations may help the country avoid delays and price shocks.

Long-Term Recommendations

Incentives for Oil & Gas Exploration

The country requires investment in oil and gas exploration. This may help reduce reliance on imported oil and bridge the trade deficit.

Incentives for the Development of the Alternate Renewable Energy Industry

The country needs to introduce incentives for the domestic industry to develop solar panels, electric vehicles, a net metering mechanism, and industrial efficient equipment for the effective use of energy.

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