

Impediments to the Successful Utilization of Pakistan's Coal Resources

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ABSTRACT

Pakistan is endowed with a vast variety of minerals including coal. However, despite its significant amount of coal deposits of about 186 billion tons, no significant contribution to the country's GDP has been realized from this resource. Also, in the face of the possession of this 'richness' in coal deposits, the country is still facing acute shortage of electricity, which wipes off about 2% of GDP annually. The current deposits of coal can give Pakistan its much needed social and economic boost. Unfortunately, Pakistan has not been able to utilize its Thar coal potential fully since its discovery in 1992, for instance, due to policy issues and other concerns. This paper investigates the current markets, trends and utilization modes for Pakistan's coal with reference to the reasons for failure of the Thar coal project as well as opportunities available for Pakistan, going forward.

I. INTRODUCTION

Amongst Pakistan's vast amounts of mineral resources, its coal deposits account as the world's 7th largest coal reserves, which are comparable to 50 billion tons of oil equivalent (TOE). This quantity is more than Saudi Arabia's and Iran's oil reserves (Shamsuddin, 2014). Apart from coal, Pakistan has the world's 5th largest copper and gold reserves, with an average production of 0.3 million tons of copper per annum. From 2009, Pakistan's GDP was expected to grow by 2% annually based on the assessment of its mineral potential (WB, 2014). Unfortunately, this potential has not made the desired effect on Pakistan's national economic development and gross domestic product (GDP) growth.

Coal has been found to be the cheapest fossil fuel used around the globe, mainly as a primary source for power-generation. Due to coal's vast chemical properties, its use is related to a number of industries. The abundance of Pakistan's coal reserves, if utilized appropriately can aid the country's socio-economic growth and development through avenues like power-generation, revenue-generation, regional trade etc. This paper would assess the opportunities available as well as the challenges posed to coal production and usage in Pakistan. Solutions would also be proposed for the country's effective utilization of its coal reserves.

II. THE ROLE OF POWER-GENERATION IN THE GDP OF PAKISTAN.

At the time of independence in 1947, Pakistan inherited 60 Megawatts (MW) of electricity for a population of 31.5 million people. In 1959, the production rose to 119 MW. By 1964,

Pakistan was producing 636 MW, which appeared to indicate that social and economic development was taking place in the country (GOP, 2013). However, Pakistan began experiencing power crisis from 1994, when the power shortage amounted to 2000 MW, with only 40% of the population having access to electricity (Aftab, 2014). Presently, about 2% of GDP is shaved off annually due to the power shortage in the country (Kazmi, 2013).

The power crisis has caused the country to be dependent on imported fuels for power-generation. This has led to the country to continuously be in trade deficit due to the importation of energy minerals and decreased foreign direct investment (FDI) (Kuo, 2012). Fuel and furnace oil account for 40% of imports, with machinery and equipment being 18% (PBS, 2014). Furthermore, Pakistan is facing the issues of subsidies, increased urbanization and consumption coupled with cost inflation, circular debt from slippages in bill payments, debt accumulation for independent power-producing companies, which result in decreased power-generation. The International Monetary Fund (IMF) extended a loan facility of US\$6.7 billion to Pakistan in 2013 so as to clear the circular debt, tariff adjustment and for financial viability (IMF, 2013). This has otherwise become an additional burden on its economy.

Coal production and usage in the country can be used to address the problems associated with importation of energy minerals, if implemented efficiently.

2.1 Potential of coal resource in terms of power-generation and local use within Pakistan.

Coal has the advantage of being a cheaper fossil fuel among other energy minerals. It is

estimated that in brick kilns, 1ton of coal will produce equal energy and output as 1ton of oil. Presently, coal is utilised for underground coal gasification, as industrial fuels and inbrick kilns. It can also be used as boiler fuel for the supply of steam as feedstock for the manufacturing of pipes,

cement, urea, smelting, paper and cloth. Coal briquettes can be used as fuels in the Northern areas of Pakistan, so as to facilitate the reduction of deforestation. The current coal consumption is Pakistan is illustrated in Table 2.1.

Table2.1: Consumption of coal in Pakistan.

Industry/Sector	Consumption (Million Tons)
Brick kiln industry	2.61
Domestic and coke making	1.12
Cement	0.96
Power-generation	0.20
Total	4.89

Source:GOP (2008).

In 2009, Pakistan consumed 12.174million tons of coal, which was 0.168% of the world's consumption (Anon., 2012).

2.2 Rising demand for energy materials – coal: Analysis of emerging markets.

World demand for coal has increased due to its usage in energy generation. The demand trend has shifted from Russia and Europe to Asia especially in countries likeChina and India as well

as other emerging economies, due to their rates of urbanization and population growth (EIA, 2014). There are 200 cities in China which have populations of over 10million people as opposed to Europe, which has only 35 cities of equivalent population and for which optimum level of energy is required (Solomon, 2014). The comparison of the world's consumption of coal between 1980 and 2010 is shown in the Table 2.2.

Table 2.2: Percentage of global consumption of coal in 1980 and 2010.

Country/Continent	1980 Consumption	2010 Consumption
Asia	24.3 %	63.1 %
North America	18.2 %	14.1 %
Europe	34.2 %	12.1 %
Russia/Soviet Union	18.2 %	5.5 %
Africa	2.7 %	2.7 %
Oceania	1.8 %	1.9 %
Central and South America	0.5 %	0.06 %

Source: US Energy Information Administration (2013).

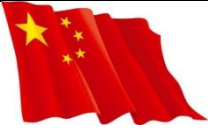

The primary energy demand for Asia (including China and India) is expected to rise by 2.5% per year and will reach 7.1billion toe (billion tons of oil equivalent) in 2035. By 2035, it is expected that Asia's energy demand will account for 42% of the world's energy demand (EJAP, 2014).

China is expected to be the largest consumer of natural gas by 2035 and will continue to be the single largest coal consumer till 2035 (EJAP, 2014). Due to its expected larger share in world's demand for energy materials, China has great influence on the demand and supply forces and prices of these energy minerals. India is the

second largest and most populous country in the world and by 2035, the population of India is expected to be about 1.5billion. By 2035, India's demand for coal should rise by 7% and for oil, it should approximately rise to 7million barrels per day.

The energy outlook for South East Asia's electricity generation indicated that coal would account for almost 60% of the energy production (IEA, 2013). With China and India emerging as centre hubs for almost all current and future economic activities, these two countries both constitute a significant share of consumption of the world's energy materials (see Table 2.3).

Table1.3: Comparison of China and India consumption.

	 China	 India
Population (million)	1,336	1,189
Coal (thousand short tons)	3,967,117	801,030
Oil (thousand barrels/day)	10,276	6,321
Natural gas (billion cubic feet)	5,152	2,076
Renewable Electricity (billion kilowatts hour)	797	162

Source: US energy information administration (2013).

The government of China planned to double its GDP in less than 10 years and even though China has slowed down in its economic growth, it still achieves a 7.4% growth rate annually (Gruber, 2014). Pakistan can take advantage of this increasing demand for coal from its neighbouring countries.

III. THAR COAL PROJECT – A CASE STUDY.

Pakistan's major coal field is called the Thar coal field, which is located in Thar Desert in its Sindh province. Sindh province has three main coal reserves. These are located in Thar, Lakhra and Sonda. Other lignite reserves are located in Lakhra, Sonda, Indus East and in other parts of central Sindh. Lakhra coal field is completely developed and a 150MW plant is being operated there by the Water and Power Development Authority (WAPDA). The coal seam of Lakhra is the same as

that of Thar (GOP, 2008). Thar has a potential of 100,000MW with a consumption rate of 536 million tons/year, Lakhra has a potential of 1,000MW with a consumption rate of 4.6 million tons/year and Sonda has a potential of 500MW with a consumption rate of 2.3 million tons/year. These areas are located in close proximity within the country.

The Geological Survey of Pakistan (GSP) located the huge reserve of Thar coal in 1992, with the research partnership of United States Geological Survey (USGS). Thar coal is spread approximately over 9,100 square kilometres with dimensions of 140 kilometres North – South to 65 kilometres East – West (Fassett, 1994). Thar coal has an estimated reserve of 175.5 billion tons. Out of the 186 billion tons of coal reserves in Pakistan, 175.5 billion tons are concentrated in Thar. The location map is shown as Figure 3.1

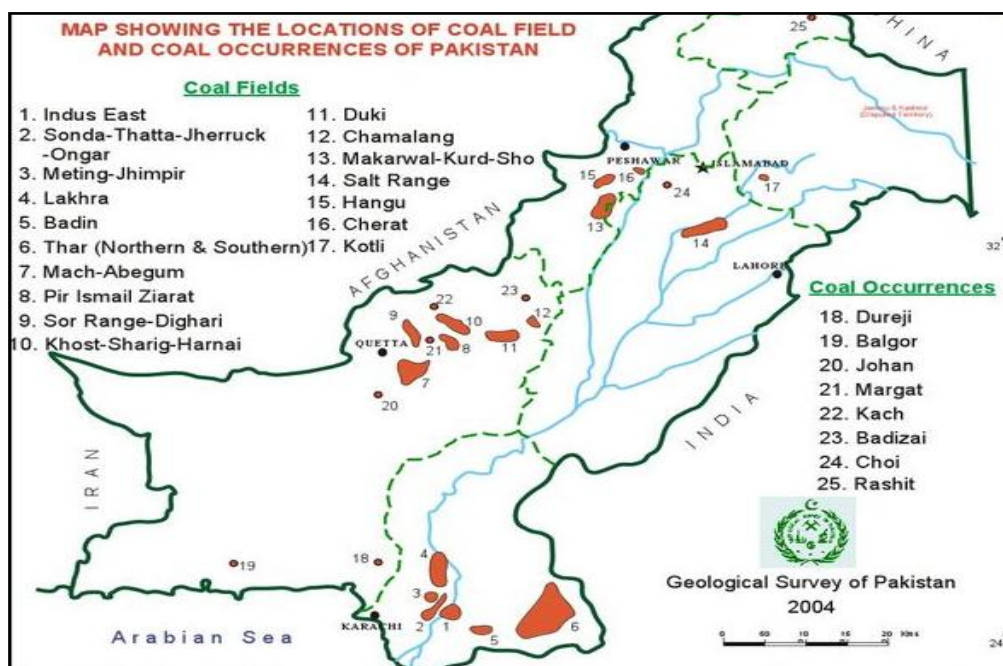


Figure 3.1: Location of coal reserves in Pakistan. Source: Geological Survey of Pakistan(2014).

In terms of the characteristics of Thar coal's chemical properties, it is comparable with many coal reserves in the world. Table 3.1

shows the comparison of Thar coal's chemical characteristics with other global coal reserves.

Table 3.1: Comparison of Thar Coal's characteristics with other international coal deposits.

Coal deposit Location	Heating Value (Net) Kcal/Kg	Sulphur %	Ash	Moisture	Stripping ratio m ³ /ton
Thar, Pakistan	2,770	1.07	7.8	47.46	6.12
Gujarat, India	2,600-3,000	3.4-5.9	9-12	38-40	9-14
Hambach, Germany	1,911-2,747	0.2-0.4	2-5	48-52	6.3
Maritza, East Bulgaria	1,550	4.5	19-35	54	1.7

Source: Asghar(2014).

The distance of Thar coal's reef from the ground and crust surface is in the form of a sand dune, which makes it cheaper to mine. The stripping ratio of Thar coal is also comparable to other coal mines in the world and the overburden found in Thar is not a challenge. The only issues that appear to be some kind of challenge include the carrying out of mining operations using heavy machinery and transportation of coal in Thar's dusty and warm environment. Therefore, it can be concluded that mining of Thar coal's reserves would not be much of a challenge.

IV. IMPEDIMENTS TO THE UTILIZATION OF THAR COAL RESOURCES.

4.1 Pakistan's Policy for power-generation and Thar coal project.

The Power policy of 1998 had failed to attract foreign investors to invest in coal for power-generation due to non-alignment with the National Mineral Policy (NMP) (GOP, 2008). Hence, the government of Pakistan felt the need to revise the policy and create much more favourable situations to attract FDI. The new Power policy of 2013 has certain reforms which were added after evaluating the 1998 power policy's failures. To attract foreign investors, import duty on all machine and equipment was reduced to 0%. Also, all companies which are involved in the project of power generation will be free from withholding tax, turnover tax rate and income tax on imports for the initial dividend of 30 years. The return on equity

will be US dollar-based, and if there is any variance between the US Dollar and Pakistani Rupee exchange rate, the tariff will be indexed for such variation. Debt would be obtained in four currencies for broader access of debt-financing namely US Dollars, British Pounds, Euros and Japanese Yen.

Thar coal field was declared as a special economic zone and Thar coal project was given the status of the 'project of national security' in 2009. However, Thar project did not appear to make any significance in power-generation in the last decade. One of the reasons for this 'failure' is that the Thar coal project came under a number of local, provincial and national organizations, which made the project's operations complex. The Chief Minister of Sindh had a direct influence on the decisions required in operations of the project as chairman of the Thar board. He was the focal person of the provincial government for Thar Coal Project and was required to provide all the technical and in situ facilities to the project. In addition, the federal minister of Water and Power was the vice chairman of the project and was mainly responsible for releasing the budget after evaluation of the deliverables (GOP, 2008). In addition, there were 11 federal and 8 provincial agencies, which were directly linked with the project. Disputes arose with regards to the allocation of resources, monitoring, allocation of human resources, as well as powers to take financial decisions etc. These federal and provincial agencies are shown in Figure 4.1.

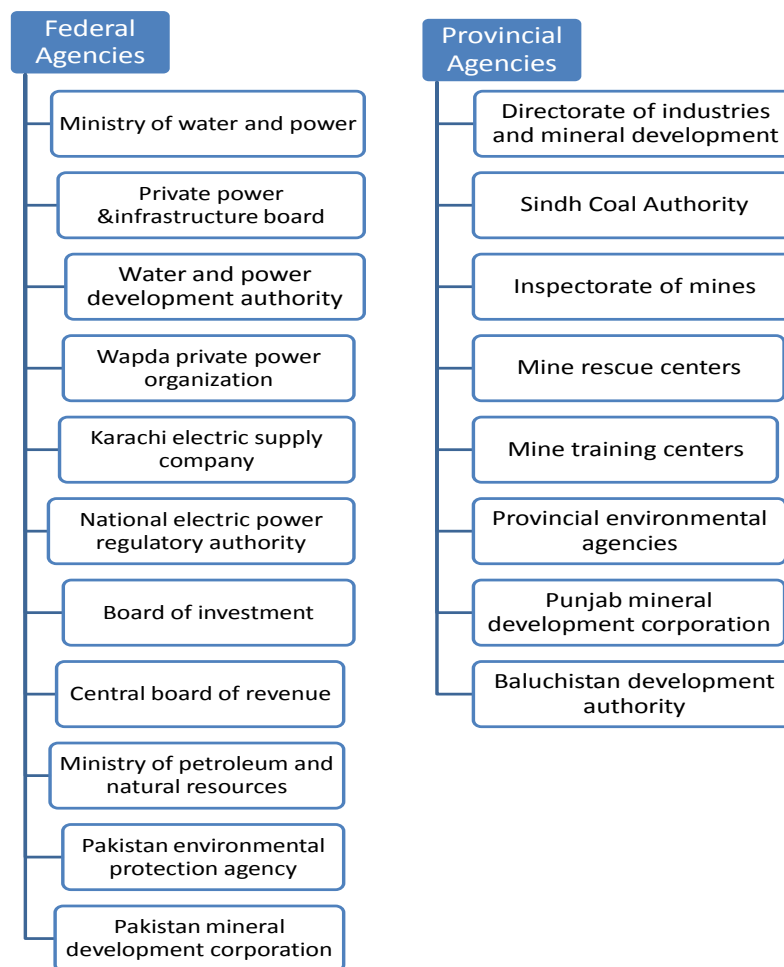


Figure 4.1:The federal and provincial agencies involved in Thar coal project. Source: Asghar (2014).

The involvement of these two ministers and various agencies caused conflicting jurisdictions for the decision-making for the project, which explains the complicated nature of the project's operations.

4.2 Mineral development policy and Thar Coal Project: Risks associated with mining in Pakistan.

Mining is characterised as having long lead times (approximately 18 – 23years) to develop and go into production phase, highly risks and cyclical in nature(Solomon, 2014). Therefore, in order to ameliorate the uniquely risky conditions of mining ventures, some of the major and top priorities of its investors include the existence of political stability, as well as a transparent, equitable, efficient, predictable and supportive mineral policy in the jurisdictions of their interest(Desai, 2014).In Pakistan, political instability is one of the major challenges, in which Coup d'états, regional conflicts, military rule and terrorism are some of the noteworthy issues affecting the country. Pakistan has had military rule

which has spread over more than 30years of its 67years of independence (Nasr, 2004).Also, Pakistan is listed second in terms of extremely risky countries for terrorism in the world (Maplecroft, 2014). Pakistan is also listed as 127th in terms of corruption and 5th in foreigner-kidnapping and ransom payment collection(TransparencyInternational, 2014; Red, 2012).

Another major challenge is the accountability atmosphere of the country, which is weak due to corruption being on the rise. Also, the political structure is weak with it being characterised by demands of kickbacks and cuts from international deals. The combined effect of the corruption levels, weak political structure and internal conflicts in the Planning Commission, led to the absence of deliverables in Thar coal underground gasification project. This caused the Federal government to hold the underground coal gasification in abeyance and stopped further release of funds (Daheem, 2014). Another example was the stoppage of the supply of coal by the Provincial government to the 100MW coal-fired

plant set up by Sindh Engro coal mining company (which was operating an open pit mining project) in 2011, due to tax and royalty issues. A weak taxation system is another hurdle in Pakistan. Nevertheless, with the income tax in Pakistan constituting 97% of direct tax collection, the present tax regime has targeted the realization of 11% Tax to GDP ratio, by establishing a rigid tax collection system and increasing the tax base (Aftab, 2014).

In addition to the risky nature of mining in Pakistan, its provincial and national mineral policies were formulated without the stakeholder consultation. These policies were neither given to

stakeholders for discussion and improvements, nor were they made public for comments. The results have been lengthy, time-consuming and complex procedures for foreign investors, who have to engage with different levels of organizations. For instance, a solicited proposal has to pass through several provincial and federal institutes in order to realize a smooth and successful outcome. At instances where there is some dispute between both parties – provincial and federal, investors always suffer as in case of Sindh Engro coal mining company. Figure 4.2 shows the procedure of approval of project proposals.

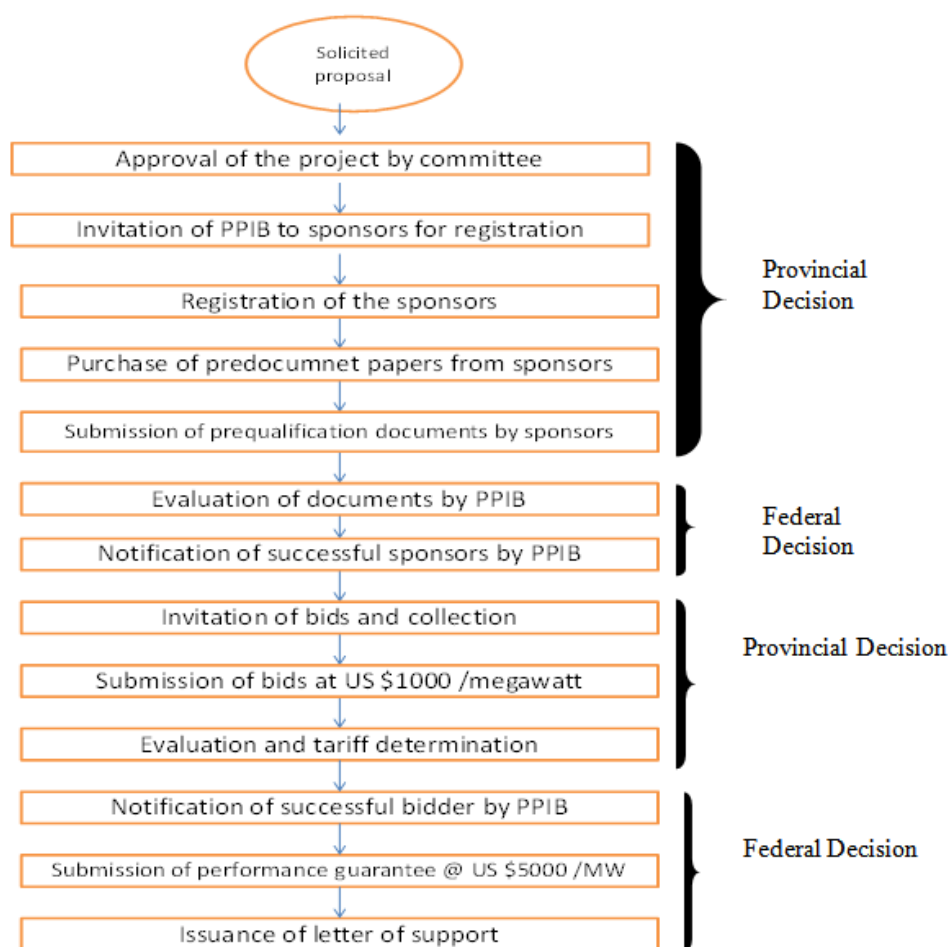


Figure 4.2: Procedure for approval for a solicited proposal. Source: Asghar(2014).

4.3 The current situation affecting investment in Pakistan.

Pakistan is facing multiple issues at local and international levels. In order to obtain a sound policy-making background document, carrying out local and international economic scans are essential (Mtegha, 2007). Pakistan has two national mineral policies but none of them has made significant impact on attracting FDI or in raising the GDP. The NMP1995 had a couple of hiccups in its smooth

functioning, which needed to be addressed (Dawn, 2012). The NMP 2012 is in its place currently but unfortunately, no background study for addressing the failures of past was carried out.

Pakistan's mineral assets are under the jurisdiction of provincial government, whilst power-generation and beneficiation of minerals come under the jurisdiction of federal government (GOP, 2008). This means that any foreign investor who wants to invest in mining would require permission

for power-generation as well. Therefore, the implication of this multiplicity of rights over different aspects of mineral development is that projects would have complex structures coupled with procedural delays. Adding uncertainties in the country's political situation makes it difficult to initiate projects. This scenario is unlike countries such as South Africa, whose minerals are under state ownership and the right of all South Africans.

As mentioned previously, the political situation in Pakistan is still very fragile, although, it was hoped for that after the smooth transformation of powers to the new government in 2013, the new government would take necessary steps to attract foreign investment. The economic indicators keep showing the poor performance of the present government. The current lack of investor-attractiveness is testimony to the fact that the government has not addressed the core issues in the policy formulation for the Mineral and Power sectors and the causes of failure of previous policies.

V. OPPORTUNITIES AVAILABLE FOR PAKISTAN'S COAL RESOURCES.

It has been indicated that Pakistan would be facing acute shortage in power in years to come and by the year 2020, the projected demand for electricity would reach 54,359MW, with a short fall of 36,462MW (GOP, 2014). This shortfall of electricity will cause the country to enter into a crisis zone, if not addressed timeously. Pakistan has two options for the successful utilization of its vast coal deposits, especially that of Thar coal.

Firstly, Pakistan needs long-term measures to be taken in order to address the challenges posed to the Thar coal project. These measures include investing in skill development, education, anti-corruption measures, stable political and financial environment and above all, formulating sound policies for Minerals and Power. This should yield handsome dividends for the country. Secondly, keeping in view the current and future trends in coal consumption as well as the geostrategic location of Pakistan, there is a dire need to market the coal in local and regional markets in Asia. With China and India focusing their power-generation on coal, this serves as an opportunity for Pakistan. This opportunity can be exploited for revenue-generation. Pakistan has road and railway infrastructures from Sindh to India which has been abandoned. If these infrastructures are resuscitated, they will facilitate the trade ties between the two countries. Pakistan can bargain on electricity provision for a specific period of time from India. During this time, Pakistan can further develop its own mines and power plants for coal production

and electricity provision, respectively. This would help to address the issue of energy crisis/shortage and also address other core issues with the provision of revenue-generation.

VI. CONCLUSION AND RECOMMENDATIONS.

With Pakistan's vital and geostrategic location in the region, as it shares borders with China, India, Russia and Iran, who are regional and emerging global powers, its mineral endowments can be exploited for the benefit of the country. As a case in point, which was mentioned in previous sections, its Thar coal deposits were not given deliberate attention as a major asset to the country. This was due to policy failures, unstable political situations and international challenges. However, the current energy crisis in the country calls for much deeper planning for the future.

By successfully utilizing its coal endowments, Pakistan has the potential to rise as a regional power. The only need is to prioritize the issues and challenges at hand, and address them deliberately. Power shortage is a prime issue of concern, which has to be dealt with as priority (Mtegha, 2007). Development of its Thar coal resources can play a pivotal role in the economic growth of Pakistan. Pakistan can have joint ventures with India and China for the supply and beneficiation of Thar coal. This would build strong ties with these regional powers.

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