P-ISSN: 2709-6254	Journal of Development and Social Sciences	June 2021,Vol. 2, No. 2
O-ISSN:2709-6262	http://dx.doi.org/10.47205/jdss.2021(2-II)3	[23-29]

Journal of Development and Social Sciences
www.jdss.org.pk

RESEARCH PAPER

Cost-Benefit Analysis and Technical Viability of Kalabagh Dam

[1]Qasim Shahzad Gill* [2] Adnan Nawaz

1. Johnson Shoyama Graduate School of Public Policy, University of Saskatchewan, Canada
2. School of Global, Urban and Social Studies, RMIT University Melbourne Australia

PAPER INFO

Received:
February11, 2021
Accepted:
June 10, 2021
Online:
June 20, 2021

Keywords:
Agricultural Growth,
Cost-Benefit Analysis,
Hydro-Power,
Kalabagh Dam

***Corresponding Author:**
qasim.gill@usask.ca

ABSTRACT

This article spells out the details of Kalabagh Dam project such as location and technical specifications of the project as well as the cost-benefit analysis of the dam. In addition, this article accounts for the technical apprehensions regarding Kalabagh Dam. The dam was also aimed at augmenting agricultural growth, providing a cushion against flood threats, generating low-priced hydro-power and lastly to compensate for the depleting capacity of the existing mega reservoirs to store water due to sedimentation. The theory deployed on the article known as cost-benefit analysis delineates the worth of the mega project of Pakistan but it is hard to say that it is still unfixed due to decision making approach of politicians of the country who remained unable to resolve it. Incumbent government must take Kalabagh Dam under consideration to build it as soon as possible because of its natural site and to overcome the energy slowdown.

Introduction

The Kalabagh Dam (KBD) Project was proposed by the Water and Power Development Authority (WAPDA), Pakistan, with the help of World Bank in 1987. The estimated cost of the KBD project at the time of proposal in 1987 was $2,650 million, and it surpassed $6,124 million in July 2005(Bhatti, 2011).According to a report that was recently released by the International Monetary Fund (IMF), Pakistan is the third most water-deficient country in the world. The KBD is a proposed hydroelectric dam on the Indus river at Kalabagh in the Mianwali(Fayyaz, 2011)district of the Punjab province in Pakistan. It is supposed to be a rock fill dam with a height of 260 feet above the river-bed. The retention level above the mean sea level is 915 feet, with usable water storage of 6.1 million acre-feet for timely irrigation supplies. The live storage capacity of the reservoir (i.e., 6.1 MAF) is merely 7% of the average per annum flow of water (Consultants, 1988). On the right bank, there will be two spillways for ejecting floodwater, having a maximum capacity of 2 million cusecs. On the left bank, the construction of a power house is proposed. It will be connected with 12 conduits, each having a 36-foot diameter, having a united size of 300, which would make the ultimate hydro-power producing capacity of the dam 3,600 megawatts(Fayyaz, 2011).

Dam projects need to be carefully evaluated while performing the cost-benefit analysis; however, according to Flyvbjerg (2009), the cost-benefit analysis can be unpredictable for major infrastructure projects. I will evaluate the total anticipated cost of the project and will compare it to the total expected benefits. I will perform this cost-benefit analysis in three parts. First, I will estimate all potential costs involved in the construction, followed by the benefits associated with this proposed project, and finally evaluate the expected benefits in view of the importance of the dam for Pakistan. This article will also discuss the technical apprehension regarding the project that has been expressed from time to time. I will discuss the technical apprehension using two approaches: techno-centric and socio-centric. I will use publicly available information and comprehensive economic reasoning and intuition to determine our model's inputs.

Cost-Benefit Analysis

Costs	Benefits
• Estimated population affected by the project would be 83,000. The government will provide alternatives to them(WAPDA, 2012) with the cost of Rs. 68 Billion. • The project would take about 6-7 years to complete before the first power unit comes in operation. • Drainage Works& all other costs is included in the total cost. The estimated total cost of the KBD project is around Rs. 1 Trillion (Alamgir, 2018).	• Kalabagh Dam will yield direct annual benefit of Rs. 65.57 billion from irrigation supplies. • Average power benefits are estimated as Rs. 35.94 billion per annum. • The energy generated at Kalabagh would be equivalent to 20 million barrels of oil. • The investment cost of KBD would be repaid within 10-12 years (Alamgir, 2018).

Conducting cost-benefit analysis is extremely useful determining the true value of a hydroelectric dam. The table above shows both the costs and the benefits of this project. Kalabagh Dam will help to save billions of dollars annually. There will be no problem of flooding after the construction of the KBD. Nowadays, most power is produced from furnace oil in contrast to hydro-power, which is very costly. When dams are built solely for the generation of hydroelectric power, all other purposes of water usage become secondary. Pakistanis are wasting almost 35 MAF of water, and it is uselessly going into the Arabian Sea. According to the Indus River System Authority (IRSA), Pakistan is dumping freshwater having an economic value of $21 billion into sea annually due to low storage capacity. The estimated cost for this project has increased to more than three times of that in the original proposal in the last30 years. Delay in the construction of dams is not uncommon. A study conducted at Oxford University stated, based on the largest database of its kind, that delays in the construction of dams go up to 45%cent on an average. Success in megaproject management is typically defined as the maintenance of budget, time, and benefits in the delivery of projects(Flyvbjerg, 2013). This serves to illustrate what may be called the "iron law of megaprojects": over budget, over time, repeatedly (Flyvbjerg, 2011). The KBD is the cheapest hydel project even 30 years after its proposed date. The former chairman of the WAPDA stated that all four provinces are having to pay $1.2 billion annually due tothe failure to build the KBD.Withthe construction of the KBD, three main

problems of Pakistan will be solved: power, flood, and irrigation. In simple words, this project holds the key to progress in Pakistan. However, two important provinces have some reservations that need to be addressed in a proper way, as consensus is very important for this project. A good cost-benefit analysis does involve substantial decision costs as well (Adler, 2009). There is no doubt that discounting this project means putting Pakistan in a massive drought. Pakistan is suffering from shortage of water and power supply, which is adversely affecting its agricultural and industry. There is no money to buy fuel to generate thermal power. It is, therefore, important to note the significance of this project in all aspects, and as mentioned, the investment cost of the KBD will be repaid within 10–12 years.

Importance of Kalabagh Dam

This article is also focusing on the importance of this project for Pakistan. It is beyond doubt that water is the most vital natural resource which cannot be generated but ought to be preserved. Nations with farsighted pragmatic approach strive to conserve each drop of water as on this commodity the lives of the people depend. The biggest challenge for developing countries is to construct dams to discount the droughts but the major hurdle is a delay which is very common. Pakistan is afflicted with the worst electricity crisis, flood damages while the water storage capacities in existing dams are depleting fast and it seems that Pakistan is on the verge of becoming a water-scarce state in coming years if the appropriate decision of construction dam is not taken. Pakistan has not built major water storage dam after 1974. The report of the World Commission on Dams while commenting on the benefits of the dam's states that "The benefits were seen as self-evident and when balanced with the construction and operational costs in economic and financial terms seem to justify dams as the most competitive option."(Parasuraman & Sengupta, 2001) The Kalabagh Dam project like other mega-dam project has substantial benefits for Pakistan. The overall potential benefits to be reaped by multi-purpose Kalabagh Dam project for the state and society of Pakistan are summarized below under three sub-heads.

To Avoid Food Grave Scarcity in Future

The irrigation system was developed in Pakistan under the Indus Basin Project, the largest irrigation system in the world. On annual basis, Kalabagh Dam will supplement 6.1 MAF for irrigation purposes. This additional water will be harnessed during Rabi season as well as to sow Kharif season crops. Bashir A. Malik projected that substantial amount of water from Kalabagh Dam will help irrigate approximately additional 2.4 million acres of uncultivated land of entire Pakistan otherwise Pakistan will confront food grave scarcity in coming years which will have two-fold implications. Firstly, the extra foreign exchange will be reserved for the import of food grains. Secondly, the reduction in exports commodities such as rice, cotton and so forth will outcome in lowering foreign earnings of Pakistan(Bengali, 2003).Therefore, the importance of a project like Kalabagh cannot be gainsaid as it will augment water supply to crops which in turn will boost the agriculture sector of Pakistan.

To Generate Large Amounts of Low-Cost Hydro-Electric Power

Pakistan remained an energy-deficient state historically. In Pakistan, the electricity is produced mainly from hydro and thermal sources. The current condition of the country

is worst in terms of electricity, during the summer the power shortfall reaches about10k megawatts (MW) (Bhutta, 2016). Hydro-power has a certain advantage over other ways of generating electricity because the reservoir can store water during hours of low requirement and begin generating power during peak hours of electricity use while the nuclear, coal and oil plants take much time to start up(Kaiser Bengali, 2003).Kalabagh Dam has the potential of 3600 MW. Shams ul Mulk asserts that Kalabagh Dam will produce 12 billion units of electricity at the cost of Rs 1.2 per unit as well as energy generation by precious fuel plants cost the population Rs 132 billion per annum. Kalabagh Dam can lessen the reliance upon imported fuels as Pakistan satiates 81% of its basic energy requirements by gas and oil. The yearly energy production of the dam will be equal to 20 million barrels of oil which are presently utilized for thermal power generation and it is not only bankrupting WAPDA but also putting an intolerable burden on people(Kaiser Bengali, 2003).Thus, the injunction of frugal and environment-friendly hydro-power to the national power grid is indispensable by multi-purpose Kalabagh Dam to not only mitigate reliance upon imported fuels but also to invigorate industrial development so as to steer the country towards sustainable development.

To Eliminate and Control the Flood Peaks in the River Indus

"The 2010 monsoon flood disaster in Pakistan was massive and unprecedented, killing more than 1,700 persons, affecting over 20 percent of the land area, more than 20 million people and causing loss of billions of dollars through damages to infrastructure, housing, agriculture and livestock, and other family assets" (Economic Survey of Pakistan 2009-10). Had there been Kalabagh Dam the losses might have been less.

Other Benefits

Kalabagh Dam will create about 30,000 job opportunities during its building process and considerable jobs after its commissioning will be dispensed. The per annum gains of the project will be Rs. 25 billion so its investment expenditure can be repaid in nine to ten years(Fayyaz, 2011). The dam has the economic life of half a century without needing any machinery and equipment replacement (Kalabagh Dam Proposed).

Technical Apprehensions Regarding Proposed Kalabagh Dam

This section will investigate the technical issues that have been raised regarding the Kalabagh Dam project which have made it a controversial project by virtue of it has faced standstill. Flyvbjerg(2009) argues that the technical factors are unlikely to account for all errors. The technical issues associated with Kalabagh Dam can be elucidated in the light of two-fold approaches which are techno-centric approach and socio-centric approach. There is a fiery debate among the stakeholders of Kalabagh Dam in the paradigm of these two approaches. The techno-centric approach advocates its construction on technical grounds while the socio-centric approach repudiates the construction of dam pronouncing the consequences of the dam project on socio-environmental fronts. The respective perceptions of the stakeholders are couched in these two approaches to highlight the technical apprehensions pertaining to the proposed Kalabagh Dam which has been the apple of discord in hydro-politics of Pakistan.

A succinct overview of aforesaid two approaches must be taken into view. The techno-centric approach calls for the huge, foreign debt funded and capital-intensive water

conservation projects. In this approach, the policy makers seek engineering solutions which deal water as a raw material to be harnessed with scientific knowledge in its utmost capacity while ignoring socio-economic implications of the water development project. In this approach, expertise and knowledge are taken as the only way out to deal with the pressing problem of water conservation and management (Bengali, 2003). As this approach offers technological solutions for water issues so it disassociates itself from the tensions stemming from politico-socio fronts of the state as a byproduct of water conservation and management (Bengali, 2003).Conversely, the socio-centric approach is premised on the notion that hydro-project development, conservation, and management do not happen in a vacuum as the social structure and people's varying perceptions concerning the project warrant adequate responses. Both approaches regarding the development of hydro projects impinge upon each other. It is stated that if the technological solutions to water management have the capability to considerably amend the social structure and system then the social system is also very much capable of exerting influence upon technological solutions (Bengali, 2003). Kaiser Bengali has aptly distinguished these two approaches by remarking that "As opposed to the techno-centric reliance on large, capital-intensive foreign debt funded approaches, the socio-centric approach relies on indigenous physical and human resource management (Bengali, 2003)." The most commonly referred justifications for mega dams are irrigation, hydro-power and water supply coupled with flood control. It is with the increase in savvy of the affected people about environmental and social ramifications of mega dams that affected people getting a clue from the retrospect perceived the dam building with suspicion and mistrust(Parasuraman & Sengupta, 2001). Thus, it reveals the competition between two approaches over water conservation strategy.

Interestingly, the debate on large dams is excessively polarized so Kalabagh Dam is not an exception to it. Flyvbjerg (2009) mention the one reason that strategic misrepresentation can be the cause of political and organizational pressures. The proponents of the mega-dam project pronounce the socio-economic benefits obtained by the dam building enlisting electricity, irrigation, water supply, and flood control which falls within the purview of the techno-centric approach. On the contrary, the opponents pinpoint the socio-economic and eco-system impacts of the mega dams stressing the depressing imprints of dam building such as annihilation of eco-system, dislocation of masses and inequitable sharing of the advantages from large dams along with the unequal distribution of benefits and costs which is the domain of socio-centric approach(Parasuraman & Sengupta, 2001). It is generally observable that the supporters of mega-dam projects are better organized as they are linked with dam industry and assisted by the donors while the opponents are dubbed as disgruntled and unorganized factions having narrow view of the development project striving to halt the progress to preserve the interests of the minority at the cost of dominant majority. Additionally, the opponents perceive the past experiences of dam building whereby there remained a deficit between professed benefits and actual advantages. Conversely, the proponents of mega-dams argue that social and environmental issues can be managed through measures of restoration and compensation. The opponents uphold that past experiences are unsatisfactory and reveal that state cannot effectively address the socio-environmental concerns stemming from mega-dam construction(Parasuraman & Sengupta, 2001, p. 1882).The reservations of each federating unit on its technical aspect and possible remedies would be addressed as the consequences could be dire to the economy, and to

public trust in the institutions and people who administer infrastructure spending. (Flyvbjerg, 2009).

Conclusion

The intent of this paper has been to use the insights from decision-making theories to address issues in a way that we can understand how decisions are made. This paper elaborated upon the idea and has provided direction to policymakers' decision making while focusing on the national interest. Keeping in mind the importance of this project, policymakers and politicians are expected to work on it more actively, without any delay. If there are any consensus-related issues concerning this project, they should be addressed logically. This paper tried to discuss the issue of apprehension of the technicality of the project and performed cost-benefit analysis. The social aspect should also be taken in consideration, even though the cost-benefit analysisdoes not take it into consideration. (Adler, 2009).All stakeholders should jump into it, and the case should be forwarded to the committee of chief ministers under the constitutional forum of CCI (Council of Common Interest), which is the highest executive forum under the constitution for recording the concurrence of federating units on matters involving their common interest. I picked the piece of Fly berg (2009), as it is the best paper for discussing and analyzing the mega project and performed cost-benefit analysis, which is the best technique to answer the problem and evaluate the outcome of any project. Cost-benefit analysis can be done in any case to evaluate the benefits of the intended project. The focus of the paper was placed on the three aspects, evaluation of the cost-benefit analysis, the importance of this project and the technical apprehension of this project which can be used for future research, and comparison with a similar case anywhere in the developing world.

References

Alamgir, A. (2018, October 1). *Eurasiareview*, https://www.eurasiareview.com: https://www.eurasiareview.com/01102018-can-pakistan-defeat-raw-by-building-kalabagh-dam-oped/

Bhatti, M. N. (2011). The problem of water management in diverse societies: Study of Kalabagh Dam project in Pakistan. *Journal of Public Administration and Governance, 2*(1), 240.

Bhutta, Z. (2016, June 26). *tribune*. Retrieved June 8, 2021, from https://tribune.com.pk: https://tribune.com.pk/story/1742548/1-electricity-deficit-power-shortfall-hits-record-peak/

Consultants, K. (1988). *Kalabagh dam project report.*

Economic Survey of Pakistan 2009-10. (n.d.). Government of Pakistan Finance Division. Retrieved from http://www.finance.gov.pk/: http://www.finance.gov.pk

Fayyaz, M. (2011, March). Construction of Kalabagh Dam. *PILDAT, 1*(6), 16-17.

Flyvbjerg, B. (2013). Mega delusional: The curse of the megaproject. *New Scientist*, 28-29.

Kaiser Bengali, e. (2003). *Politics of Managing Water.* Islamabad: Oxford University Press Pakistan.

Kalabagh Dam Proposed. (n.d.). Retrieved from http://cms.waterinfo.net.pk/pdf/kbd.pdf

Parasuraman, S., & Sengupta, S. (2001). World Commission on Dams: Democratic Means for Sustainable Ends. *Economic and Political Weekly, 36*(21).

WAPDA. (2012). *Kalabagh dam (Report).* WAPDA.