



Reasons for delay in selected hydro-power projects in Khyber Pakhtunkhwa (KPK), Pakistan



Aysha Batool^a, Faisal Abbas^{a,b,*}

^a Department of Management Sciences, COMSATS Institute of Information Technology (CIIT), Park Road, Islamabad 44000, Pakistan

^b Charles H. Dyson School of Applied Economics and Management, Cornell University, 406 Warren Hall, Ithaca, NY 14850, USA

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ABSTRACT

This paper aims at exploring reasons for delays in Hydro-Power projects completed in last 5 years in Pakistan. Hydro power projects at Allai Khwar, Duber Khwar and Khan Khwar, Khyber Pukhtunkhwa, Pakistan were initiated by Water and Power Development Authority (WAPDA) in 2003 and completed with an average time over-run of 200% and incurred 2.5 times more cost than originally estimated. Study of project documents, interviews from experts highlighted the critical reasons for these costly delays. These reasons were rated and ranked by all three parties of hydro power projects i.e. Client, consultant and contractor on Relative Frequency Index, Relative Severity Index and Independent Relative Importance Index through questionnaire survey. Most of the respondents agreed that “lack of political will, delay in civil work, delays in release of funds by the Government, bad Law and order situation, project start without proper site investigation and poor project time management are the leading reasons behind delays of these Hydro Power projects. These results would be helpful for policy makers and implementing agencies in better planning and mitigating the delay effects in future projects.

1. Introduction

Pakistan has abundant water and energy sources and economy expanded with time, demand for energy increased both in industrial and domestic sectors. However, energy production could not meet the rising demand; resultant energy crisis prevailed [15]. This acute electricity shortage is persisting since 2006–07 and contemplated to be most terrible power crises that has been faced by country after inception. Since then, this gap has grown proportionately [7]. The electric power deficit had crossed the level of 5000 MW during the year 2011 [19]. Power shortages have resulted in an annual loss of about 2% of GDP in the year 2011–12 [13]. Over the last three decades, an inactive approach has been applied towards construction of hydro power projects in Pakistan, hence, share of hydro power in the national energy mix fell from 60% in 1962–63 to less than 30% in 2009–10. This led to increased cost of electricity generation in Pakistan [19]. Hydroelectric power stations are classified as the most efficient power plants as they can have an operational efficiency of up to 90% given the water availability. In 2010, cost of generation from WAPDA hydro power sources was Rs. 1.03/kWh, while from public sector thermal plants, cost was Rs. 8.5/kWh [19,22]. Total power generation capacity of Pakistan as on 30th June 2014 was 24,375 MW out of which

16,366 MW (67.14%) was thermal, 7116 MW (29.19%) was hydro power, 787 MW (3.23%) was nuclear and 106 MW (0.43%) was wind [21].

National Electric Power Regulatory Authority [21,22] shows that there was no substantial increase in electricity generation capacity in Pakistan in last ten years in comparison to a steep rise in electricity demand (Table 1).

Pakistan has been blessed with about 10,000 MW potential of Hydropower generation [25]. However, currently the country is managing an installed capacity of only 7116 MW i.e., 17% of total potential [21]. Major portion of installed hydro power capacity is owned by WAPDA and only 214 MW of total installed capacity is owned by private sector (Table 2). After 1450 MW Ghazi Barotha Hydro Power project in 2003–04 no mega project is initiated beside six small to medium hydro-power projects of 458.4 MW generation capacity by WAPDA. These projects with major delays costing Pakistan economically and socially along with exponential increase in cost of these projects. Due to delays in timely completion of these projects, gap between demand and supply of electricity widened and 10–12 h load shedding become a norm across country affecting daily lives of people immensely.

Details of the Hydro Power projects started in last 15 years in

* Corresponding author. Independent Consultant and Development Research Scholar, Islamabad, Pakistan.

E-mail addresses: ayshabatool17@gmail.com (A. Batool), fa99@cornell.edu, faisal_abbas26@yahoo.com (F. Abbas).

Table 1
Installed electricity generation capacity by type in Pakistan (2007–14).
Source: [21,22].

Year	2007	2008	2009	2010	2011	2012	2013	2014
Thermal	13215	13539	14576	15047	16363	16069	16041	16366
Hydel	6555	6555	6,555	6,555	6645	6730	6947	7116
Nuclear	462	462	462	462	787	787	787	787
Wind	0	0	0	0	0	1	50	106
Total	19692	20232	20556	22064	23795	23587	23825	24375
(Deficit)	(1,912)	(4,574)	(4,274)	(5,885)	(5,656)	(7,053)	(4,759)	(5,384)

Table 2
Total installed hydro power electricity generation capacity of WAPDA, Pakistan (Project wise).
Source: WAPDA (official documents-various years)

Sr. No	Power station	Plant location	Type of power station	Installed capacity (MW)	Commissioning year
1	Renala	Renala, Punjab	Run of Canal	1	1925
2	Dargai	Dargai, KPK	Run of Canal	20	1952
3	Rasul	Rasul, Punjab	Run of Canal	22	1952
4	Kurram Garhi	Kurram Garhi, KPK	Run of Canal	4	1957–58
5	Chichoki Millian	Chichoki Millian, Punjab	Run of Canal	13.2	1959
6	Warsak	Warsak, KPK	Reservoir	243	1960–81
7	Shadiwal	Shadiwal, Punjab	Run of Canal	13.5	1961
8	Nandipur	Nandipur, Punjab	Run of Canal	13.8	1963
9	Mangla	Mangla, AJK	Reservoir	1000	1967–94
10	Tarbela	Tarbela, KPK	Reservoir	3478	1977–93
11	Chitral	Chitral, KPK	Run of Canal	1	1982
12	Chasma	Chasma, Punjab	Run of River	184	2001
13	Gazi Barotha	Gazi Barotha, Punjab	Run of River	1450	2003–04
14	Khan Khwar	Shangla, KPK	Reservoir	72	2012
15	Allai Khwar	Battagram, KPK	Reservoir	121	2013
16	Duber Khwar	Kohistan, KPK	Reservoir	130	2013
17	Jinnah	Mianwali, Punjab	Run of River	96	2013
18	Jabban	Malakand, KPK	Run of River	22	2013
19	Gomal Zam	South Waziristan Agency, KPK	Reservoir	17.4	2014
Total Installed Hydel Capacity (WAPDA)				6902	

Pakistan along with date of completion and delay suffered is shown in Table 3.

In this study, our focus would be on three of the 6 recently completed projects by WAPDA i.e. Allai Khwar Hydro Power Project (AKHPP), Duber Khwar Hydro Power Project (DKHPP) and Khan Khwar Hydro Power Project (KKHPP). These projects were initiated by WAPDA in Khyber Pakhtunkhwa province (KPK), Pakistan under the name of High head Complex (HHC) projects in 2003 [36]. All three projects suffered delays from 5 to 6 years. Furthermore, as the projects were recently completed it was relatively easier to find the project team for data and interview purposes.

The main aim of this research is to identify and rank the reasons causing delay in completion of Allai Khwar (HPP), Duber Khwar (HPP) and Khan Khwar (HPP) in Pakistan from client, consultant and

contractor's point of view. Furthermore, the study identify the reason of delay through literature review, study of projects documents and interviews with experts and then ranking of these reasons by respondents on Relative Frequency Index, Relative Severity Index and Independent Relative Importance Index using a questionnaire survey.

2. Literature review

2.1. Global studies

According to Elinwa and Joshua [9], about 80–90% of construction projects suffered with time delays and majority of these projects i.e. 89% belonged to Govt sector. Assaf and Al-Hejji [6] found that only 30% contracts in Saudia were completed within scheduled time.

Table 3
Hydro-power projects initiated and delayed in 2000–15 by WAPDA.
Source: WAPDA (official documents-various years)

No	Power station	Installed capacity (MW)	Start date	Scheduled completion date	Actual/expected completion	Delay suffered (approx.)
1	Gomal Zam	17.4	July 2002	Sep 2006	June 2013	7 years
2	Satpara Dam	17.3	April 2003	Dec 2006	June 2012	5 years
3	Allai Khwar	121	June 2003	Jun 2007	Mar 2013	6 years 250%
4	Duber Khwar	130	June 2003	Oct 2008	Dec 2013	5 years 200%
5	Khan Khwar	72	June 2003	Oct 2007	Mar 2012	5 years 200%
6	Mangla Dam raising	1000	June 2004	Dec 2009	Dec 2010	1 year
7	Jinnah	96	Feb 2006	Feb 2010	Oct 2013	4 years
8	Neelum Jehlum	969	July 2007	July 2012	Nov 2017	5 years
9	Diamer Basha	4500	2008	2015	2037	7 years
10	Golen Gol	106	July-02/Feb-11	2009/Jun-16	2017	–
11	Keyal Khwar	128	2011	2015/2016	2017/2018	–

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