

FINANCING MANAGEMENT ANALYSIS OF PASIR KOPO DAM CONSTRUCTION PROJECT IN BANTEN PROVINCE

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ABSTRACT

The strategic program of the Republic of Indonesia’s Government is stated in the National Medium-Term Development Plan (RPJMN) for 2020 – 2024. One of its target is construction of eighteen (18) multipurpose dams. Pasir Kopo Dam is included in the RPJMN target and its expected to provide raw water supply, irrigation water, and increase the potential for electrical energy through Micro-Hydro Power Plant (PLTMH). However, the dam construction requires a huge project costs which can’t be handled solely by State Budget (APBN). There is funding gap in State Budget for financing the dam construction, so another financing alternative is needed. Public Private Partnership (PPP) is an alternative financing scheme for dam construction. PPP is influenced by economic feasibility analysis and identification of influential project risks. The selection of an investment-worthy PPP Scheme in the Pasir Kopo Dam Development Project is expected to be mutually beneficial for all parties involved in the cooperation.

Keywords: dams; PPP; economic feasibility; project risk; APBN.

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INTRODUCTION

The Strategic Program of The Republic of Indonesia’s Government stated in the National Medium-Term Development Plan (RPJMN) 2020-2024 based on Presidential Decree Number 18, year 2014. One of its targets is construction of eighteen (18) multipurpose dams in which Pasir Kopo Dam included.

According to

Kendarto (2020), there’re things that need to be considered in Public Private Partnership (PPP) in dam project, such as:

1. Dam’s Project Regulation to be cooperated by PPP scheme.
2. PPP structure and scoop of cooperation
3. Service level agreement of project’s output.
4. Fiscal capacity of institution in charge of cooperation.
5. Form of Investment Return (Availability Payment/Identification of government support).
6. Land Acquisition and Resettlement Action Plan.
7. Technical Risk and force majeure identification.
8. Protected Catchment area .

The Proposed Public Private Partnership form for Pasir Kopo Dam Construction showed in Table 1.

Tabel 1. PPP Form for Pasir Kopo Dam Construction

No.	PPP Form	Government’s Scoop	Enterprise’s Scoop
1.	Design	<ol style="list-style-type: none"> 1. Land Acquisition and issuing Permit. 2. Obtaining Design, Impounding, and Operation Sertificate. 	<ol style="list-style-type: none"> 1. Preparing Design Document for Pasir Kopo Dam 2. Arranging Technical Document needed for sertification up until permit issued. 3. Organizing the study of emergency plan for Pasir Kopo Dam.
2.	Construction	Witnessing the test and Approving the	<ol style="list-style-type: none"> 1. Carry out Pasir Kopo dam and micro-hydro power plant construction based

No.	PPP Form	Government's Scoop	Enterprise's Scoop
		test/ commissioning result	on scoop of work which has been mutually agreed.
3.	Financing	Provide financial support for construction.	2. Performing tests and commissioning. The financing source and/or search for financing source.
4.	Operation	Conducting Monitoring and	1. Operating Pasir Kopo dam and Micro-hydro power plant.
5.	Maintenance	Evaluation regarding Operation and maintenance that Enterprise has performed.	2. Maintaining Pasir Kopo Dam and micro-hydro power plant.
6.	Asset's Transfer	Hand over asset from implementing enterprise.	Returning the Asset to government.

(Source: BBWS C3 Kementerian PUPR, 2019)

The things that need to be considered in PPP in Pasir Kopo dam construction listed as follow:

1. Main things need to be considered :
 - a) The authority of institution in charge of cooperation
 - b) Scoop of cooperation
 - c) Asset
 - d) The Form of Cooperation
2. Consumer Real Demand Survey:
 - a) Consumer Target
 - b) Ability to Pay & Willingness to Pay
 - c) Service Form.

Pasir Kopo dam expected to provide raw water supply, irrigation water and increase the potential for electrical energy through Micro-Hydro Power Plant (PLTMH). Pasir Kopo dam located in Lebak district and can provide service for Lebak district, Serang district, and Tangerang district in Banten Province. Pasir Kopo dam has storage of 166,21 million m³ and added storage capacity per capita to 0,66 m³/capita/year.

RESEARCH METHOD

Sugiono (2003) reckoned that in order to complete this research, research method is needed. Research method is scientific way to obtain information with specific usage and purpose. Scientific way means this research based on the science characteristic of rational, empirical, and systematic. According to Yin (2014), the selection of research strategy that will be implemented need to take account of research question and researcher control over the event being studied and when the observed event is in progress (contemporary or historical events)

Research Variable

In this research, the variable used listed bellow:

- a. Dependent Variable (Y), Financing management of Pasir Kopo dam Construction Project in Banten Province.
- b. Independent Variable (X), Economic feasibility and financial risk in Pasir Kopo dam construction project in Banten Province: Economic risk, Financial risk, Completion risk, Raw material supply risk, Environmental risk, dan Political risk (Finnerty, 2007; Yescombe, 2007; PT Penjaminan Infrastruktur Indonesia (Persero), 2016; Bappenas, 2016).

Data Collection and Analysis

Data collection is carried out to obtain the information needed in order to achieve the research objectives. The objective presented in the form of hypotheses which serve as temporary answer to the research question. This answer need to be tested empirically.

There are two type of data used in this research:

1. Primary Data; This data obtained by direct survey and interview with observed respondent. This data will be processed by researcher.
2. Secondary Data; This data obtained from literature study such as publication, journal, paper and previous research. This data used to identify research variable.

Data collection performed by handing out questionnaire to the selected respondents. The respondents then assess the level of impact on risk factor variable for financing of Pasir Kopo dam construction. The respondents are people who are directly involved in the construction of Pasir Kopo dam in Banten Province, both from government and enterprises.

Financial feasibility analysis of this project attained by processing data from respondents and secondary data to generate the value of investment worthiness (IRR, NPV and B/C Ratio).

From respondents questionnaire regarding risk variable, the data then processed and analyzed. The result the compared with temporary hypotheses. Data analysis carried by using SPSS software.

Analysis method used in this research based on PMBOK 6th Edition and use risk management approach. The analysis process is intended as an evaluation material for the development of an integrated planning system in every stage of the project.

Analysis method performed as follow:

- a. Data analysis phase 1: reliability and validity analysis.
- b. Data analysis phase 2: descriptive analysis.
- c. Data analysis phase 3: Statistic analysis (validity and realibility, correlation, risk), economic feasibility analysis (NPV, IRR, B/C Ratio), quantitaive risk analysis, risk identification of project in PPP scheme.

RESULTS AND DISCUSSION

The Result of Research in Accordance to Research Purpose

Based on processed respondent data and secondary data, the magnitude of risk and value that affect cost and benefit. With the help of Crystall Ball tools by inputing range of values obtained from expert validation, the investment feasibility values are obtained as follows:

Table 2. Calculation of IRR, NPV and B/C Ratio excel output with Adjust Risk using Crystal Ball

	before risk	risk probability										
		0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Internal rate of return (IRR)	22.30%	19.92%	20.04%	20.16%	20.28%	20.40%	20.52%	20.65%	20.78%	20.90%	21.03%	21.15%
Nett Present Value (NPV)	5,689,289	4,866,443	4,908,514	4,949,693	4,991,338	5,032,637	5,074,427	5,115,396	5,157,548	5,199,084	5,240,253	5,282,783
B/C ratio	6.68	6.37	6.38	6.37	6.37	6.38	6.39	6.39	6.39	6.39	6.40	6.40

(Source: data processed by researcher, 2021)

With certainty value of 80%, then obtained:

- IRR = 20,90%
- NPV = IDR 5,199 Trillion
- B/C Ratio = 6,40

Data collection in this study started with interviewing experts (in this step five expert were interviewed). The experts then giving input and suggestion regarding proposed questionnaire. Some adjustment implemented in proposed questionnaire based on expert’s input and suggestion.

The variable data that has been validated by the experts then processed into questionnaire. Initially there’re 29 variables in proposed questionnaire but through expert’s input and suggestion, it have shrunk to 24 variables. The questionnaire then distributed to 40 respondents. Each question item has a frequency and impact column that will be assessed using Likert scale (level 1-5).

The 24 variables come from six risk catagories:

1. Economic Risk
2. Financial Risk
3. Project Completion Risk
4. Raw Material Supply Risk
5. Environmental Risk
6. Political Risk

After the questionnaire results collected, the data analysis carried out. The analysis requires several stages of testing and weighting. The tests are internal validity and reliability using SPSS software

program tools. Internal validity test is variable correlation measurement with the combination of other variable value thus the consistency of the variable to the compound value of the remaining variable can be studied (Griffin, 2005).

After the validity test conducted, the reliability test then carried out. The reliability test performed to obtain the internal consistency value of the overall measurement scale. This reliability test was carried out with the help of the SPSS 23 program by paying attention to the Cronbach's Alpha value where the minimum value was 0.6 to indicate that the data had good internal consistency.

The results of the SPSS 20th version analysis show that the results of the respondent's questionnaire are valid and reliable to be used as research material.

From the cashflow analysis, it is known that the IRR value of the project indicates the feasibility of the project to be implemented. The next step is performing investment feasibility analysis through SPV formed to run Pasir Kopo dam PPP project to find out the financing scheme in the PPP project, it is necessary to know the Cooperation scheme, which is as follows:

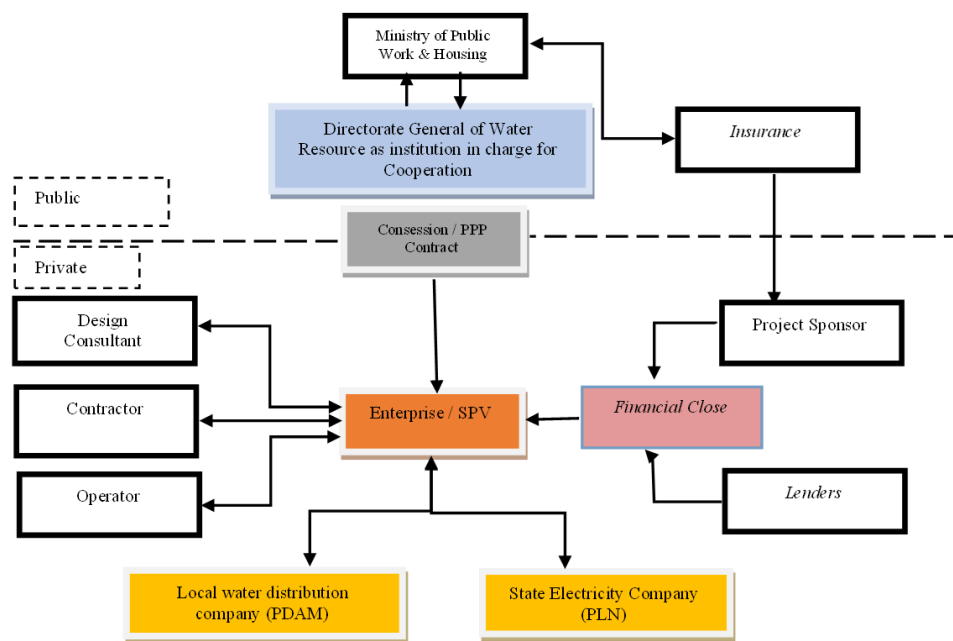


Figure 1. Contractual scheme Pasir Kopo dam project (Source: Processed by Researcher, 2021)

From scheme above, the source of funds for SPV comes from sponsor and lender. The sponsor consist of the government and enterprise. Lenders are bank that provide loans for project implementation. In accordance with expert validation, the government is considered more capable in handling land acquisition risk because it has bigger authorities thus it is generally assumed that government partake in financing land acquisition for the construction.

Referring to the results of secondary data from A Guidebook on Public-Private Partnership in Infrastructure (UNESCAP, 2011), PPP schemes have developed into at least five general categories that are closely related to asset ownership, responsibility for investments, risk assumptions and contract duration. The five classifications are:

1. Contract management and supply
2. Turnkey contract
3. Rental
4. Concession
5. Private Finance Initiative (PFI)/ Private ownership.

Five classifications stated above then compared to research result in which:

1. Expert verified that the dominant risk transfer is handled together.
2. 50 years contract duration.
3. Construction and dam operation carried by SPV.
4. The private investment is bigger than the government.

The most suitable scheme is a concession with a BOT (Build-Operate-Transfer) variant. In the form of PPP, the government defines and grants special rights to a enterprise (or other business entities)

to build and operate the facility for a certain period of time. The government may retain ownership of main facilities and/or other parts that provide services. In concession, the payments can be made in two ways: The concession holder pays the government for concession right and the government can also pay for the concession based on special agreement. Usually, the payment by government required in commercial project and/or reduce the level of commercial risk taken by private sector, especially in early years of PPP when the private sector may not have sufficient confidence in running such a commercial business. The concession period generally ranges from 5 to 50 years.

Research Discussion in Accordance to its Purpose

In this study, it is explained that the PPP in Pasir kopo dam project is expected to reduce the government's investment burden while taking project risks into account. To attract private sector to partake in PPP scheme the investment value must be carefully calculated and somehow beneficial for private sector by considering equity or capital value of each party and take risk factors in the variable that affect investment feasibility. In this case, the project feasibility value needs to be assessed (risk-based) in order to form an appropriate value for the cooperation scheme.

This problem is significant, because Pasir Kopo dam project has a complex level in terms of construction methods, long term, and requires a huge cost. Based on this, the residual and inherent risks can arise and hinder the project's objectives. It is necessary to have financial analysis based on optimal risk allocation in determining investment value between public and private sector in which risks are take into account so that project's objective can be realized.

From this discussion, it can be conclude that risk factors have an important role and need to be fully considered in the calculation of project funding so that the distribution of equity has an appropriate value. One of the ways to incorporate the risk element into cashflow, is to quantified it into number. These quantified values will later be referred as adjusted risk value. The adjusted risk value then used as an input in project's cashflow that can resulted in increasing cash out and decreasing cash in and overall affecting profit-sharing value obtained by government.

Table 3. Adjusted Risk Value

No.	Variable	Impact to Cash flow
1	X3	5% - 10%
2	X11	2% - 5%
3	X12	1% - 3%
4	X23	5% - 10%

(Source: Processed by Researcher, 2021)

Adjusted risk value impact on cash-out cashflow, list as follow:

- a. X3, the risk that dependable flow for raw water doesn't meet the expected value will resulted in reduced project's revenue by around 5%-10%.
- b. X11, the increasing amount of construction cost will increase the funding for project to 2%-5%
- c. X12, the high operating and maintenance cost will increase project funding by around 1%-3%
- d. X23, the delay caused by land acquisition will increase project funding by around 5%-10%

The most fitted scheme for PPP project in dam construction us a concession with BOT/ BOOT (Build-Own-Operate-Transfer) because of following reasons:

- a) Financing structure shows high private sector investment
- b) The private sector is dominant in taking the risk.
- c) During concession period, private sector carried out dam construction, operation, and maintenance.
- d) Long concession period (more than 30 years)
- e) Required SPV to manage the dam.

This study tries to provide a reference for Ministry of Public Works and Housing in term of preparing a risk-based funding for investment project in dam construction with the cooperation of private sector. This investment scheme in the Pasir Kopo dam project is expected to bring new opportunities while taking risk into account to obtain financing for infrastructure.

If the risk in dam project managed properly, it can produce Public Private Partnership scheme that suit each dam characteristic. With all its advantages and disadvantages, PPP is expected to fill the funding gap in state budget (APBN) regarding infrastructure, especially dam construction.

CONCLUSION

From this study following conclusion were obtained: The Pasir Kopo dam project in Banten Province is economically viable for investment. There are four potential risk factors that can strongly impact profit sharing: raw water dependable flow doesn't fulfil expected value (X3), Dam construction cost increase (X11), High operation and maintenance cost (X12), and construction delay caused by land acquisition not fully carried out (X23). The risk distribution of this project, in many cases, will divided evenly between public (government) and private sector (enterprise) and managed together. This is influenced by the nature of contractual and financing scheme. Based on this research, an investment worthy PPP scheme is concession with a BOT or BOOT variant, because: a) The financing structure that shows the high level of private investment. b) The private sector is more dominant in taking the risk. c) During concession period, construction, operation and maintenance will be carried out by private party. d) Long concession period (more than 30 years). SPV is needed to manage the dam.

REFERENCES

- A Artiningsih, dkk. (2019). Skema Pembiayaan Pembangunan Infrastruktur Non-Konvensional di Kota Semarang. *Jurnal RIPTEK*, 13(2), 92-100. (Indonesian).
- Adeswastoto & Putra. (2018). Manajemen Risiko Pada Proyek Konstruksi Di Pemerintah Kabupaten Kampar. *Jurnal Teknik Industri Terintegrasi (JUTIN)*, 1(1), 61-68. (Indonesian).
- Adhi Suyanto, dkk. (2001). *Ekonomi Teknik Proyek Sumber Daya Air: Suatu Pengantar*. Jakarta: Masyarakat Hidrologi Indonesia. (Indonesian).
- Aftortu, dkk. (2019). Analisis Risiko Proyek Konstruksi Studi Kasus Bendungan Way Sekampung Paket 2 Dengan Metode Failure Mode and Effect Analysis dan Domino. *JRSDD*, 7(1), 549 – 558. (Indonesian).
- Anwar, Suroyo. (2009). *Pemahaman Individu, Observasi, Checklist, Interview, Kuesioner dan Sosiometri*. Yogyakarta: Pustaka Pelajar. (Indonesian).
- Argyantoro, Arvi. (2020). KPBUs Bidang Sumber Daya Air: disampaikan dalam acara “FGD Pelaksanaan Perizinan Pembangunan Bendungan dan Identifikasi Standar Pelayanan Minimal Bendungan dalam Skema KPBUs”. Direktorat Pelaksanaan Pembiayaan Infrastruktur Sumber Daya Air, Kementerian Pekerjaan Umum dan Perumahan Rakyat. (Indonesian).
- Asian Development Bank. (2007). *Public Private Partnership Handbook*. Asian Development Bank.
- Bappenas. (2016). *Penyusunan Toolkit KPBUs Berbasis Website*. Jakarta : Author. (Indonesian).
- BBWS C3. (2014). *Studi Kelayakan Bendungan Pasir Kopo Sungai Cisimeut DAS Ciujung*. PT. Wiratman. (Indonesian).
- BBWS C3. (2019). *Detail Desain Bendungan Pasir Kopo Kabupaten Lebak Tahap II*. PT. Mettana KSO PT. Amythas. (Indonesian).
- BBWS C3. (2019). *Kajian Market Sounding Bendungan Pasir Kopo*. BBWS C3. (Indonesian).
- Berndt, E. R., and B. Hansson. (1991). *Measuring the Contribution of Public Infrastructure Capital in Sweden*. National Bureau of Economic Research Working, 38-42.
- Cooper dan Emory. (1996). *Metode Penelitian Bisnis*. Jakarta : Erlangga. (Indonesian).
- Damodaran, Aswath. (2014). *Applied Corporate Finance Fourth Edition*. United States of America : Stern School of Business New York University.
- Gittinger, J. Price. 1986. *Analisis Ekonomi Proyek-Proyek Pertanian Edisi Kedua*. Jakarta: UI Press – John Hopkins. (Indonesian).
- Hatmoko, Jati Utomo Dwi, dkk. (2016). Risk Management of West Semarang Water Supply PPP Project : Public Sector Perspective. *Construction Project Management*, 48-54.

- Iribaram, dkk. (2018). Analisa Resiko Biaya Dan Waktu Konstruksi Pada Proyek Pembangunan Apartemen Biz Square Rungkut Surabaya. *Jurnal Rekayasa dan Manajemen Konstruksi*, 6(3), 141-154. (Indonesian).
- Ismiyati, dkk. (2019). Penerapan Manajemen Resiko pada Pembangunan Proyek Perpanjangan Dermaga log (Studi Kasus: Pelabuhan Dalam Tanjung Emas Semarang). *Media Komunikasi Teknik Sipil*, 25(2), 209-220. (Indonesian).
- Juliansyah Noor. (2007). *Metode Penelitian Kualitatif*. Kencana Prenada Media Group. (Indonesian).
- Maulana, Mochamad Rifki. (2021). Pemahaman dan Pembelajaran Tahap Perencanaan dan Penyiapan Pembangunan Infrastruktur di Indonesia Melalui Skema Kerja Sama Pemerintah dan Badan dalam Penyediaan Infrastruktur (KPBU). *Jurnal Ilmu Sosial dan Pendidikan*. 5(1), 86-107. (Indonesian).
- Palupie, Yudhitya Maharani Ristian, dkk. (2016). Alokasi Risiko Proyek Infrastruktur dengan Skema Kerjasama Pemerintah dan Badan Usaha (KPBU) : Suatu Tinjauan Literatur. *Seminar Nasional Teknik Industri Universitas Gadjah Mada*, 96-103. (Indonesian).
- Parente, W. J. (2006). *Public Private Partnerships Dalam Workshop On Fundamental Principles and Techniques for Effective Public Private E Partnerships In Indonesia*. Jakarta.
- Peraturan Presiden Republik Indonesia Nomor 38 Tahun 2015 tentang Kerjasama Pemerintah Dengan Badan Usaha Dalam Penyediaan Infrastruktur. (Indonesian).
- Prakoso, Gilang Reno dan Adis Imam Munandar. (2020). Analisa Stakeholder Dalam Kebijakan Pembangunan di Indonesia. *JIEP*, 20(2), 115-122. (Indonesian).
- Project Management Institute (2017). *A Guide to the Project Management Body of Knowledge Guide*, 6th Edition. PMI : Pennsylvania.
- Purwanto. (2010). *Evaluasi Hasil Belajar*. Yogyakarta: Pustaka Pelajar. (Indonesian).
- Pusdiklat Sumber Daya Air dan Konstruksi. (2017). *Modul 3: Kelayakan Ekonomi*. Bandung : Author.v(Indonesian).
- Pusdiklat Sumber Daya Air dan Konstruksi. (2017). *Modul 5: Kelayakan Finansial*. Bandung : Author.v(Indonesian).
- PT Penjaminan Infrastruktur Indonesia (Persero). (2016). *Acuan Lokasi Risiko*. Jakarta : Author.v(Indonesian).
- Rao, Vivek. (2018). An Empirical Analysis of The Factors That Influence Infrastructure Project Financing by Banks in Select Asian Economies. *ADB Economics Working Paper Series*, 1(554), 1-25.
- Revantoro, dkk. (2017). Analisis Risiko Dalam Proyek Jalan Raya Di Kabupaten Malang. *Jurnal Bangunan*, 22(1), 21-34.v(Indonesian).
- Samosir, Herri Suryadi. (2020). *Studi Prioritas Pembiayaan Pembangunan Infrastruktur dengan Skema KPBU Menggunakan AHP*. Medan : Universitas Sumatera Utara.v(Indonesian).
- Sebayang, dkk. (2018). Pengelolaan Risiko Proyek Gedung Bertingkat Pada PT. XYZ Di Jakarta terhadap Kinerja Waktu. *Jurnal Teknik Sipil : Jurnal Teoretis dan terapan Bidang Rekayasa Sipil*, 25(3), 229-236. (Indonesian).
- Senduk., dkk. (2016). Pemodelan Pengelolaan Risiko Proyek Pada Perusahaan Penyedia Jasa Konstruksi Skala Kecil (Studi Kasus Kontraktor di Manado). *Jurnal Ilmiah Media Engineering*, 6(2), 498-507. (Indonesian).
- Singarimbun, dkk. (1989). *Metode Penelitian Survei*. Jakarta : LP3ES. (Indonesian).
- Siregar & Iffiginia. (2019). Penggunaan Critical Path Method (CPM) Untuk Evaluasi Waktu Dan Biaya Pelaksanaan Proyek. *Teknika: Jurnal Sains Dan Teknologi*. 15(2), 102–111. (Indonesian).

Situmorang, dkk. (2018). Analisis Risiko Pelaksanaan Pembangunan Proyek Konstruksi Bangunan Gedung. *Jurnal Tekno*, 16(69), 31-36. (Indonesian).

Sugiyono. (2008). *Metode Penelitian Kuantitatif, Kualitatif dan R&D*. Bandung: Alfabeta. (Indonesian).