

Implementing of Risk Assessment Model for Public Private Partnership (PPP) of Airport Infrastructure Development in Indonesia

Rusdi Usman Latief*

Department of Civil Engineering, Faculty of Engineering, Hasanuddin University, Jl Perintis Kemerdekaan KM 10, Makassar 90245, Indonesia; rusdiul@gmail.com

Abstract

Infrastructure is one of cause of Indonesian economic growth slowly and competitiveness more weakness. Limitation of Government's budget in building of the airport infrastructure development drives the project implementation to the Government cooperation scheme between public and private sectors known as Public Private Partnership (PPP), whereas PPP in Indonesian airport infrastructure development is relatively recent issue. The purpose of the study are to develop the conceptual model of the assessment and risk response, to analyze the risk characteristics, and to analyze the risk assessment and response of Public Private Partnership (PPP) for Indonesian airport infrastructure. The research data was derived from various airports in Indonesia. Interview and survey had been conducted with several institutions from primary and the secondary data both government and private institutions, namely the General Director of Air Transportation of Transportation Department, Airport Authority, Central Bureau of Statistics, PT Angkasa Pura 1st and 2nd. Analytical tools used in this research were Probability Impact Matrix. Conceptual model of risk assessment of PPP for airport infrastructure in Indonesia is an approach model of risk management that has been developed completely by adding risk allocation and risk mitigation strategies. The results indicated that the assessment analyze of the risk exist at the level of the category of 'extreme' and 'high' of four levels of the available categories.

Keywords: Airport Infrastructures, Public Private Partnership (PPP), Risk Assesment

1. Introduction

The need of air transportation in Indonesia grows rapidly, the increase of passenger and cargo reflects the circumstance each year. Surely it should be countered by the enlargement of airport infrastructure¹. The development of air transportation in Indonesia is fully influenced by geographical condition as well as an archipelagic nation; therefore air transportation plays essential role in strengthening politic, economic development, social, culture and national security. Fiscal limitation which is form national budget causes the expansion of infrastructure capacity in Indonesia hampered. Amongst of 2010–2014, it is estimated the need of investment about IDR1.450 quintillion². One of the steps that government has taken to cope the infrastructure deficit is to encourage active participation from private

sector, where private is allowed to join in developing infrastructure through Public – Private Partnership (PPP) scheme. Regulation that supports the implementation of PPP project through PPP scheme is determined by government through presidential regulation no. 67 2005 and has been re-regulated by presidential regulation no. 13 2010 government's cooperation and its business in providing infrastructure.

Diversity in the sector has caused the regulations diverse as well as PPP regulations. Each sector of infrastructure is regulated by specific regulation and regulations of its implementation. PPP airport cooperation model in Indonesia is relatively new and government is working to provide its regulations³. The identification problem in this research is feasible implementation model of PPP airport is a model which considers every risk in PPP project. Such as model facilitates transfer of specific risks to the

* Author for correspondence

specific party who is considered well capable in managing them. Besides airport sector, one of the important regulation no. 1 2009 about air transportation is that PT. Angkasa Pura as airport operator owned by nation no longer monopolizes this sector. This is why government is working to provide the regulations for implementation of airport operation.

The scope in this research is that the first is case study used in this project is Airport infrastructure in Indonesia which is found in PPP infrastructure 2010–2014. The second, this research focuses on primary stakeholder from government and private who have interest in Indonesian PPP airport. The result of this research is expected to give benefit in giving a decision making model/policy in PPP airport infrastructure cooperation with risk management approach.

2. Literature Review

2.1 Risk Management

Risk management is a formal process which the risks may be identified, analyzed and dealt with systematic way. The losses can be minimized in this way. The research guides on risk management referring to the Project Management Body of Knowledge in 2013, the risk management measures are as follows⁴:

- Risk Management Plan
- Risk Identification
- Do Qualitative Analysis
- Do Quantitative Analysis
- Risk response planning
- Risk Control

2.2 Public Private Partnership (PPP)

A Public Private Partnership (PPP) is an agreement between a government and a private firm under which the firm delivers an asset, a service, or both in return for payments contingent to some extent on the long-term quality or other characteristics of outputs delivered. Agreements may range from service or management contracts to concession agreements and privatization and cover widely varying activities, not just those in infrastructure sectors. Government chooses Public Private Partnership (PPP) to provide infrastructures for better public service and utilize value for money through risk sharing. Synergic management drives innovation, utilization and efficient asset management for its life cycle. The implementation of Public Private Partnership (PPP) prioritizes optimal design which focuses on

output specification, and the design process is focused on operational performance. Precise optimization and risk sharing, so that project cost could be reduced (debt interest, low assurance premium). Private spending in providing infrastructure will reduce government burden in short term; as a result, government budget could be allocated to suppress poverty³.

Utility of Public Private Partnership (PPP) scheme:

- Availability of many alternative finance sources;
- Realization of providing infrastructure quicker ;
- Less burden toward government National and regional budget (APBN/APBD);
- Many infrastructure could be provided;
- Society service performance becomes better;
- Accountability could be increased more ;
- Private donates capital, technology, and managerial ability.

The input related to the government and private role in Public Private Partnership (PPP) is expected be linked to the proper investment, value for money, availability of high level quality service, integrated operational design, and innovation³.

2.3 PPP Airport Infrastructure in Indonesia

The airport can be defined as one or more runways and facilities to complement the aircraft (taxiways, apron area) along with Union terminal and facilities to lower passenger and cargo⁵. Airport operators are responsible for the provision and maintenance of airport infrastructure, and on conditions of service, including the main searches of passengers, and security, fire, hygiene and maintenance areas of the passenger terminal.

Major infrastructure airport terminal operations, consisting of runway operations, and taxiways facilities such as engineering facilities. The cargo, plane maintenance facility ARRF (Airport Rescue and Fire Fighting) fuel, logistics facilities, administration, service aircraft, traffic and utilities main⁶. Airport operation of obtaining income, service aircraft service fleets, and marketing activities is to cover main airport of service provision. This infrastructure becomes a reference for BAPPENAS to develop the airport in the form of cooperation PPP. The Type of project that exists in PPP book 2010–2014 BAPPENAS diverse. The project will be soon in tender's supports airport infrastructure in Indonesia; especially in the form of PPP cooperation entered into PPP Book list (2010–2014) BAPPENAS. PPP project status with the airport already tendered in Indonesia⁷. It is indicated in the following of Table 1.

Table 1. Airport project already tendered

No	Airport Project	
	PPP Book 2010–2014	Location
1	Kertajati International Airport, West Java	West java Provinces
2	Development of New Bali Airport	Bali (Jembrana Regency, Buleleng regency, and Nusa Penida, Klungkung Regency)
3	Development of New Samarinda Airport	East Kalimantan Provinces
4	Development of Singkawang Airport	West Kalimantan Provinces
5	Expansion of Dewandaru Airport	Karimun Jawa, Jepara, Central Java
6	Expansion of Tjilikriwut Airport	Central Kalimantan Provinces
7	South Banten Airport	Pandeglang Regency, Banten Provinces

Source: PPP Infrastructure in Indonesia 2010–2014

2.4 Risk of PPP Airport Infrastructure

The main risk in investment related Airport directly with the basic parameters of the PPP infrastructure investment in the airport that is the decisive variable the magnitude of the cost of the investment. Victor Craig divided the PPP risk of airport into Air Traffic Forecast, Airport Development Proposal, Airport Transport Risk, Revenue Estimation, Capital Cost Estimates, Concessionaire Competition and amp; Culture, Institutional Influence, Effect of Term of Reference for Privatization⁸. Biju Varkey categorised the PPP risk are airport Revenue Risk, Operating Risk, Regulatory Risk, and Review of Policy on Water Infrastructure⁹. While the national development and Planning Agency of the Republic of Indonesia (BAPPENAS), the risk of PPP is the airport land acquisition, tariffs, demand, political risk and country risk, as well as the main buyer of creditworthiness (off-taker)³.

2.5 Risk management in PPP Airport Infrastructure

One of the keys to success of a project of PPP risk allocation and mitigation is appropriate. The allocation of risk is a risk-sharing partnership project with the basic principle that the risk is shared and charged to the party most able to control those risks. Allocation of risk includes the risk-sharing project between the Government and Private Business entities based on the principle of allocation of risk. Risk mitigation aimed at reducing the possibility of risk to the impact thereof. The Government or Private Business entities must prepare risk mitigation well because both of them are the responsibility of the respective risk project. PPP projects in Indonesia can exploit all forms of cooperation between Governments and the private sector. Selection of a specific form of cooperation for the project was done based on the results of the review of the

risk. KPS can be implemented in various forms including Build-Own-Operate (BOO), Build-Own-Transfer (BOT), Operate and Maintain, Lease-Operate-Develop (LDO).

There are no restrictions on how the implementation of PPP in a project in Indonesia, though with the proviso that should be used in ways that can facilitate the transfer of risks specific to the rated best in process management. A clear risk management needed to achieve the success of PPP projects. The allocation of risk, there are several principles in the PPP direction for allocation³. Risks that are beyond the control of either party, or equally influenced by both parties (e.g. force majeure events) should be shared. The risk that the Government can manage well, or be in a position to control more precisely than the private sector (for example planning approval, the legislation risks) should be maintained by the Government. Negate the risk through a legally in distribution agreements with third-party or task givers. The principle of allocation of risks is that most parties can control a particular risk should also bear the risk. Success in regulating the allocation of risks is carried out by means of the identification of risks. In meeting this success required a risk allocation matrix which gives an overview of related divisions intact in risk for the parties involved in the PPP. Risk allocation matrix which is used as a tool to adjust the procurement process predictions on allocation and risk values. The final value at risk represents value for money for deals and providing services, rather than the public sector. Engineering document should support in the process of risk assessment for comprehensive risk identification process.

3. Research Method

The implementation of this research is based on a flow chart as shown in Figure 1.

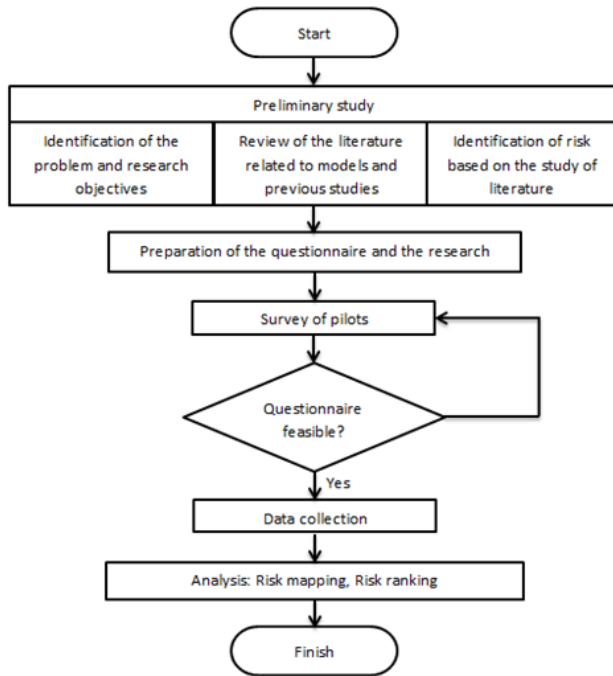


Figure 1. Flowchart methodology.

Table 2. Identification of PPP airport risk 3, 8, 9

No	Risk Variables	Victor Craig (2012)	Biju Varkkey and G Raghuram (2011)	Panduan Investor KPS (2010)
1	Land acquisition			•
2	Airside and terminal design	•		
3	Capacity and site expandability	•		
4	Changes in aircraft mix	•		
5	Competing airports	•		
6	Airline alliances	•		
7	Capital cost estimates	•		
8	Concessionaire composition and culture	•		
9	Institutional influences	•		
10	Effect of terms of reference for privatization		•	
11	Corporate governance		•	
12	Center state relations		•	
13	Continuity of political leadership		•	
14	Local political activism		•	
15	Demand		•	•
16	Price		•	•
17	Cost escalation		•	•
18	Staffing		•	
19	Labor unions		•	
20	Coordination between governmental agencies		•	
21	Classification and licensing		•	
22	Revenue sharing		•	
23	Risk country and risk politic			•

3.1 Risk Identification

Risk identification can be seen in Table 2. Risk identification is done through the study of literature research PPP Airport earlier. After performing risk identification, risk assignment conducted on elements of the Government, the private sector and the risks in sharing and further conducted data collection by way of delivery of the questionnaire. Data processing data questionnaire and objectively in order to get the proper scheme in decision-making PPP airports in Indonesia.

3.2 Preparation of Questionnaire and Model Research

Preparation of questionnaire and models of research is done by the method of risk management according to the Project Management Body of Knowledge (KNOWLEDGE) 2013 Edition by doing identification, just my assessment, and response to risk4. Preparation of questionnaire begins with the determination of the

primary stakeholders KPS airport consisting of 16 elements of the Government's 12 Air Transportation Directorate of the respondent, the respondent BAPPENAS, 2 Ministry of Finance of the Republic of Indonesia while the private element is represented by 16 airport that KPS projects "on going" or potential ready to be tendered. The preparation of a questionnaire carried out in two stages. The first stage of the preparation of the initial questionnaire (survey of pilots). The second stage is the result of the identification of the risk of KPS airports arranged in form of a questionnaire. The next questionnaire attempted on early respondents to see if respondents understand about the content and intent of the question on the questionnaire. Based on input from the spread of initial questionnaire carried out repairs so that the questionnaire could be to spread out. The design of the questionnaire as an instrument made in retrieving data. The questionnaire serves the risk variables had been obtained and the consequences of each choice risks to avoiding subjectivity of the primary results of the questionnaire. Therefore, the stakeholder obtained objective. For risk 24 obtained from the Air Transportation Directorate that is not included in Table 2.

3.3 Data Analysis

The survey feedback includes three groups of data, the probability of occurrence (P) of each risk items as 1 = very low probability and almost not / rarely to occur (probability < 0,02), 2 = low chance and sometimes/ rarely occur (probability 0,02-0,1), 3 = medium chance and may not occur (probability 0,1-0,5), 4 = high chance and likely to occur (probability 0,5-0,8), 5 = very high chance and almost certain to occur (probability >0,8); the impact on project objectives that would result in as 1 =very small and small impact, 2 =small and small impact on cost, time, and quality, 3 = medium and medium impact on cost, time, and quality, 4 = big and substantial impact on cost, time, and quality, 5 = very big and threaten the success of project; and baseline relative value based on the main four category of risk level¹⁰.

4. Result and Discussion

The form a model of risk management Division risk related to Governments and private parties in one matrix of risk allocation with the support of the Government in

reducing the risk, so that risk management models for airport infrastructure PPP became the input to policy makers, be it Government or private so that it can deliver on the right cooperation schemes for PPP especially the infrastructure of airports in Indonesia.

4.1 Descriptive Statistic

The questionnaire survey forms were distributed to primary stakeholders for PPP Airport development. The completed responses were collected either personally, or received through regular postal mails, e-mails, and faxes. It can be seen in Table 3. Out of 48 distributed questionnaires, 24 were returned. 24 questionnaires were complete and used in the analysis.

Table 3. Summarizes the respondent's profile

Respondent's Profile (%)	Respondent's Profile (%)
<i>Affiliation type</i>	<i>Education</i>
Public sector	Bachelor
Private sector	Master
	Diploma
<i>Employment of respondents</i>	<i>Hierarchical level</i>
Less than 5 years	Managing director
Between 5 to 10 years	Section chief
Between 11 to 20 years	Senior manager
More than 20 years	Airport project advisor
	Senior admin

4.2 Survey Results

Based on the survey results, the Risk Relative Importance (RRI) index was calculated for each risk based on probability and impact. Also, these risks were determined to their baseline risk level category. The results are presented in Table 4. It presents the category of risks in the Indonesia PPP airport projects industry based on baseline risk level and risk relative importance index for comparing to each other and select the best risk map (matrix) that is a basis for further risk control measures. According to risk relative importance values, the high risk level ranked ones (out of 24 risk items) are assumed as an appropriate way to represent the key risks. After calculation, the results showed that there are 12 risk items with values equal to extreme risk level category (50%), 12 risk items with values equal to high risk level category (50%), and we can focus on extreme and high risk level category for the more controls.

The data collected from the current questionnaire survey was analysed using the independent samples T-test. The T-test is used to compare the values of the means from two samples and test whether it is likely that the samples are from populations having different mean values¹¹. In this research, the independent samples T-test compare the mean scores of two groups, means public type respondents group and private type respondents group on a given variable means the risk relative importance of the risks to the parties in PPP projects. If the T- test is significant (the value under "Sig." is less than .05), the two means are significantly different. If it is not significant (Sig. is greater than .05), the two means are not significantly different; that is, the two means are approximately equal. After calculation, the results showed that there are 22 risk items with the two means are approximately equal, 2 risk items with the two means are significantly different.

To properly evaluate PPP power airport risks, one

must consider both the probability of occurrence and the impact of consequences on project objectives once the risk event occurs. This is achieved best by plotting the risk probability-impact matrix (Figure 2). In the matrix, the x-axis represents the impact value while the y-axis represents the probability value. Both scales are 1–5 (one being very low to 5 being very high) and baseline risk level compare with RRI to generate the best risk map.

Based on the Figure 2, the proper risk map (risk matrix) that is the “hard” matrix which it presents the high cost matrix however safer. It shows the converted numerical values and the calculation of the Relative Importance (RI). The risk matrix includes a legend of risk level that would be of assistance to project participants when the risk is unknown, and would also provide the framework to rank order risk elements by impact for subsequent mitigation: Extreme risk (E) – occurrence would prevent achievement of objectives, causing unacceptable cost

Table 4. Risk relative importance index and baseline risk level for understanding the proper risk map¹¹

Risks	Probability		Impact		Risk Relative Importance (RRI)		T-test		Baseline
	Mean	Std.	Mean	Std.	Mean	Std.	t	Sig	
Land acquisition	4.42	0.78	4.21	0.93	18.58	5.68	1.446	0.791	Extreme
Airside and terminal design	3.79	1.02	3.67	1.01	14.54	6.74	-2.317	0.364	Extreme
Capacity and site expandibility	3.67	0.96	4.13	0.85	15.63	6.30	-1.103	0.188	Extreme
Changes in aircraft mix	3.92	0.88	3.42	1.02	13.75	5.95	-.698	0.119	Extreme
Competing airport	3.13	1.19	2.88	1.08	9.92	6.61	1.316	0.446	High
Airline alliances	3.46	0.98	3.04	1.16	10.96	5.54	.178	0.336	High
Capital cost estimates	3.96	0.46	3.63	0.88	14.42	4.21	1.771	0.078	Extreme
Concessionaire composition and culture	3.13	0.80	3.08	1.18	10.04	4.96	-0.524	0.652	High
Institutional influences	3.29	0.86	3.25	1.19	11.17	5.58	-0.348	0.454	High
Effect of terms of reference	3.21	0.72	3.21	0.88	10.75	4.75	-0.190	0.739	High
Corporate governance	3.58	0.72	3.25	0.90	11.79	4.34	0.397	0.272	High
Center state relations	3.79	0.88	3.17	1.05	12.33	5.99	-0.045	0.007	Extreme
Continuity of political leadership	3.42	0.93	3.33	1.09	11.92	6.67	-0.735	0.512	High
Local political activism	2.96	0.95	3.13	1.15	9.79	5.60	0.021	0.511	High
Demand	3.46	0.72	3.33	0.76	11.71	4.08	2.324	0.379	High
Price	3.46	0.66	3.21	0.88	11.13	4.05	1.297	0.457	High
Cost escalation	3.33	0.76	3.33	1.05	11.50	5.04	1.017	0.343	High
Staffing	2.83	0.92	2.71	1.20	8.33	5.83	-0.460	0.271	High
Labor unions	2.92	0.97	2.88	1.12	9.13	5.80	-0.164	0.438	High
Coordination between governmental agencies	3.00	0.83	3.04	0.69	9.25	3.58	0.028	0.001	High
Classification and licensing	3.17	1.05	3.00	0.93	9.79	5.49	2.298	0.001	High
Revenue sharing	3.25	1.15	2.75	0.85	9.71	5.25	0.711	0.106	High
Risk country and risk politic	3.38	1.01	3.58	1.14	12.63	5.76	-2.515	0.348	Extreme
Risk enclave (civil and military)	3.38	1.01	3.71	1.04	13.00	5.91	-2.856	0.708	Extreme

overruns, schedule slippage, or project failure; High risk (H) – could substantially delay the project schedule or significantly affect technical performance or costs, and requires a plan to handle; Medium risk (M) – requires identification and control of all contributing factors by monitoring conditions and reassessment at project milestones; Low risk (L) –normal control and monitoring measures are sufficient¹¹. Table 5 is a risk ranking which is based on the Relative Importance of Risk (RRI) is the highest to lowest.

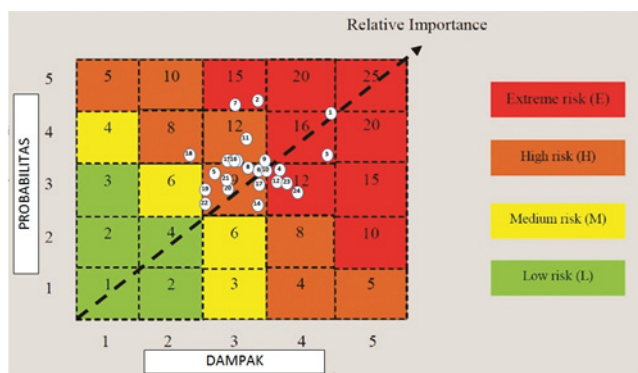


Figure 2. Probability-impact matrix¹¹.

Table 5. Risk ranking

Risk Ranking	Description	Risk Relative Importance (RRI)	Baseline
1	Land acquisition	18.58	Extreme
2	Capacity and site expandibility	15.63	Extreme
3	Airside and terminal design	14.54	Extreme
4	Capital cost estimates	14.42	Extreme
5	Changes in aircraft mix	13.75	Extreme
6	Risk enclave (civil and military)	13.00	Extreme
7	Risk country and risk politic	12.63	Extreme
8	Center state relations	12.33	Extreme
9	Continuity of political leadership	11.92	High
10	Corporate governance	11.79	High
11	Demand	11.71	High
12	Cost escalation	11.50	High
13	Institutional influences	11.17	High
14	Price	11.13	High
15	Airline Alliances	10.96	High
16	Effect of terms of reference	10.75	High
17	Concessionaire composition and culture	10.04	High
18	Competing airport	09.92	High
19	Local political activism	09.79	High
20	Classification and licensing	09.79	High
21	Revenue sharing	09.71	High
22	Coordination between governmental agencies	09.25	High
23	Labor unions	09.13	High
24	Staffing	08.33	High

Best on the Table 4 and 5, the first rank risk is the problem of Land Acquisition with RRI index reached 18.58, the next ranking second with an index of 15.63 RRI is Capacity and Site Expandibility, while Airside and Terminal Design in the third rank with RRI index of 14.54, and the last on the fourth ranking with an index of 14.42 RRI is Capital Cost Estimates. Therefore, there is a needed more study to reduce the risks of extreme category by means making the best fit of its risk strategies.

5. Conclusion

In this study, all the risk indicators in PPP Airport Infrastructure are categorized as ‘extreme’ and ‘high’ which are highly potential to immediately avoid of. Below are the top 4 risk indicators that mostly matters for the succession of implementation of PPP Airport Infrastructure as follows:

- Land acquisition
- Airside and terminal design
- Capacity and side expandibility
- Change in aircraft mix

Therefore, these risk indicators are needed strategies to lower the impact and the probability of them towards the succession of PPP Airport Infrastructure which will be defined in the future studies.

6. References

1. Sakti Adi Adjisasma, PPP Scheme in Airport, Jakarta; 2010.
2. Magagi R. Increasing Trend towards Airport PPPs in Emerging Markets. IFC's Global Airport PPP Seminar, Dubai; 2011.
3. Pemerintah Republik Indonesia, KPS dan Panduan Bagi Investor untuk Investasi, Bappenas. Jakarta; 2010.
4. Project Management Institute. A Guide to the Project Management Body of Knowledge, USA; 2013.
5. Asian Development Bank, Airport and Air Traffic Control, ADB. Philippines; 2000.
6. Dewey and Lebouf, PPP in Airport Infrastructure. University Press, Pulkovo; 2006.
7. Republic of Indonesia, Public - Private Partnership Infrastructure Projects in Indonesia 2010 - 2014, National Development Planning Agency, Jakarta; 2010.
8. Craig V. Risk and Due Diligence in Airport Privatization. Air Transport, Malaysia; 2010.
9. Varkey B. Public Private Partnership in Airport Development, Oxford University Press, New Delhi; 2002.
10. Latief RU. Risk Assessment on Public Private Partnership (PPP) in Indonesian Airport Infrastructure Development. International Seminar on Infrastructure Development in Cluster Island Eastern Part of Indonesia (ISID 2014), Balikpapan, Indonesia; 2014.
11. Azar, Adel et al. Assessing and understanding the key risks in a PPP power station projects. *Journal Advances in Management and Applied Economics*. 2013; 3(1).