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STRUCTURE OF RISK TRANSFER IN INDONESIAN PUBLIC ROAD PROJECTS

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ABSTRACT

Managing risks during and after road construction could reduce early damage of road pavement. This is always a prominent issue to provide steady road service and achieve lower life-cycle costs in Indonesia. A road project is full of a high degree of risks which are associated with forecasting and handling traffic load/volume and dealing with water and soil/geotechnical conditions. Thus, it is important for each party to be responsible for transferred risks. In practices in Indonesia, however, some of transferred risks are retransferred at one stage of project life cycle, and these retransferred risks are further accumulated at the following stages, which force road users to endure poor road performance and/or to pay unnecessary repairing costs. The objectives of this paper are, thus, to identify the structure of the current risk transfer among key parties and to discuss a direction of its improvement in road projects in Indonesia. First, a set of potential risks during and after construction for each party was identified from literature study and brainstorming with experts in Indonesia. Second, the current structure of risk transfer among key parties was identified. Finally, a direction of improvement of the current structure of risk transfer is discussed.

Keywords: Early damage of road pavement, Risk identification, Risk transfer.

1. INTRODUCTION

Prevention of early damage of road caused by inadequate risks management during and after road construction has been an important issue in Indonesia. Since many socio-economic activities, for example, goods distribution, depend on roads, potential losses from prolonged early damage of road can easily extend from direct losses such as reduced road user safety, delay in distribution of goods, increased travel time and transportation costs, to indirect losses such as slowdown in the social economic growth in Indonesia. Statistics show that 82.22% of national roads are in good conditions; however, this ratio in provincial and city roads drops to 38.89% and 46.99%, respectively (Dardak 2010, Mulyono 2011). These public roads are developed with taxes; thus, they are expected to operate effectively without fear of early damage due to poor road quality and lack of maintenance

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program. It is needed to deal with the tolerable risks with a well anticipated risk management since the beginning of road project through cooperation among all parties involved in road project management.

Major risks in road projects are commonly involved with projecting traffic volume/load, predicting water debit, and facing variation of soil conditions along road alignment. These can be considered technical risks. Since situation related to road projects becomes increasingly complex in terms of finance, policy, and social-economy, there are also other non-technical risks associated with road projects. Previous research has identified and categorized those risks such as project management risks, construction works risk, public participation risk, financial and monetary risk, socio-economic change risks and other external risks (Mulyono 2010; 2011, RAMP 4, PMBOK). Here it should be noted that some risks have little precedent and thus that they are difficult to identify their occurrence pattern, that is, probability distribution of occurrence. For example, road drainage system is designed to discharge certain water debit, but reckless waste dumped into the ditch will reduce the drainage capacity. Determining appropriate correction factor for drainage capacity depends on designer's judgment and experience because no certain patterns for such behavior.

Complete data is not necessarily available in road project management. Thus, it is needed for the client to transfer risks to the party best able to do and for each party to make the best decision under uncertainty. Cooperation among parties with clear role, responsibilities and authorities is necessary. Better understanding of effectiveness and appropriateness of risk transfer can be an initial step towards better road project risk management in Indonesia for preventing early damage of road. The objectives of this study are first to identify the risk inherent from planning, design and construction to operation and maintenance stages of road development in Indonesia, to identify the structure of the current risk transfer among key parties, and to discuss a direction of its improvement in road projects in Indonesia.

2. ROAD PROJECT MANAGEMENT IN INDONESIA

In the Act of the Republic of Indonesia number 38 of 2004 on Road, road development is defined as all of the activities to build a road including programming and budgeting, design, construction and operation and maintenance (Figure 1). In this study, road development is referred to as road project. In Indonesian governmental organization, the responsibility to execute a road project is given to the Directorate General of Highway (DGH) and the Ministry of Public Works. The DGH mission for 2010-2014 is to improve movement of people and goods.

In implementation of this mission, the DGH selects designer and contractor through its procurement system. The DGH also needs to cooperate with other government institutions/ministries, for example, the Ministry of Transportation to discuss traffic control management systems and the Ministry of Finance to discuss budgeting and planning of roads. Many parties are involved in road projects. In this paper, four parties which are considered most influential under traditional scheme of a road project, would be focused: DGH, designer, contractor and road users.

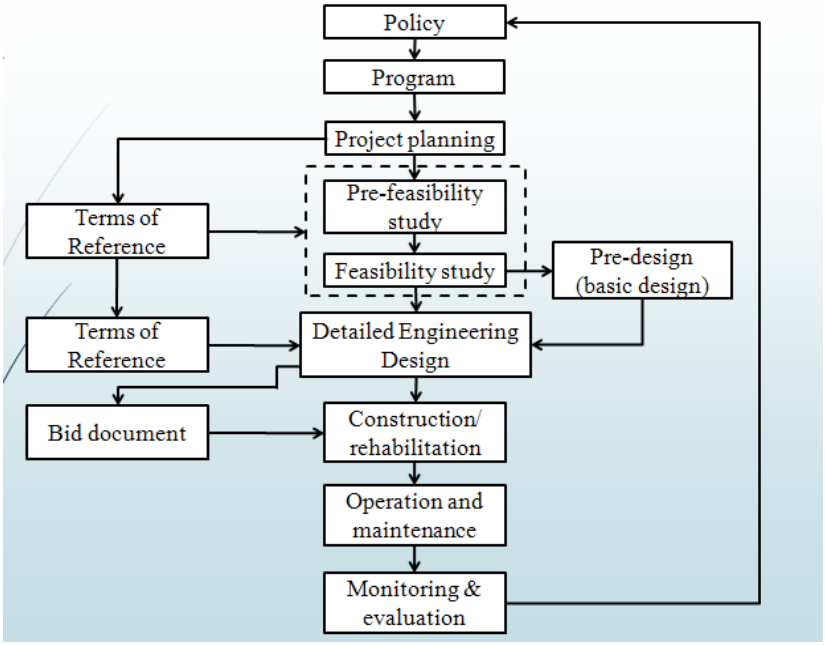

Figure 1: Stages of road (development) project in Indonesia

3. PROJECT RISK MANAGEMENT

Various kinds of definition of uncertainty and risk in construction project management exists. In this study, project risk is defined as an uncertain event or condition that, if it occurs, has a positive or negative effect on the project objectives (PMBOK). A source of uncertainty is a lack of knowledge about an event that reduces confidence in conclusions drawn from the data. It is stated that the goal of project risk management is to increase the probability and impact of positive events and decrease the probability and impact of negative events in the project.

Managing risks continue to be a major feature of the project management of a construction project in an attempt to deal effectively with uncertainty and unexpected event and to achieve project success (Banaitiene and Banaitis, 2011). Construction projects are always unique, and risks arise from a number of different sources due to complex and dynamic process, and multi-discipline expert (Oyegoke 2006, Uher 2004). The nature of a construction project which involve multiple parties with different expectations and interests creates problems and confusion for even the most experiences project managers.

It is useful for an organization to develop risk list and classify risks in several categories. One classification is into two major groups: internal risks and external risks. Risk categories published by Institution of Civil Engineers of the UK consists of six categories of factors: social, economic, administrative, natural, technological and formulation of a consensus. PMBOK mentions some common categories of risk as technical, quality, or performance risk; project management risks; organizational risks; and external risks. In general, such categories can be classified in many ways.

Procedure of risk management is identification, assessment and prioritization of risks followed by coordinated and economic application of resources to minimize, monitor and control the probability

and/or impact of unfortunate events or to maximize the realization of opportunities. The strategies to manage risk typically include transferring the risk to other party, avoiding the risk, reducing the negative effect or probability of the risk, or even accepting some or all of the potential or actual consequences of a particular risk. This study focusses on risk transfer strategy. Risk transfer is to shift the consequence of a risk to a third party together with ownership of the response. Risk transfer does not eliminate the risk. It just transfers responsibility for its management. Insurance or an insurance-like arrangement such as bonding is often available to deal with some categories of risk. Procurement, acquiring goods and/or services from outside of the project client, is often an appropriate transfer measure to some types of risk.

4. RESEARCH METHOD

Potential risks during and after construction in an Indonesian road project are collected from books, magazines/newspaper articles, journals and a final workshop report from a research institute in Indonesia. Questions are asked and brainstorming is made with practitioners who have been involved in road projects in Indonesia. Contents of questions and discussions are who perceived the risk, what causes the risk, who create the risk, when the risk identified, and what respond to the risk. Based on these results, the structure of the current risk transfer among key parties is identified, and a direction of its improvement is discussed.

5. RESULTS AND ANALYSIS

Risks must be managed at the early stages of construction projects (Banaitiene and Banaitis 2011). Although there is anecdotal evidence that risk management concept is effective for a construction project in achieving its objectives, only a few construction practitioners used this concept in a road project in Indonesia.

Risks in public road projects take many forms and are perceived differently by each party. Interaction between each party accompanies risk transfer/sharing among parties. In this study, risks perceived by Directorate General of Highway (DGH), Designer, Contractor and Road user were collected. Based on the literature review and brainstorming, some potential risks in public road in Indonesia were identified which classify into three major categories:

1. Risks involved with designing a road (Table 1)

   These risks are resulted from a construction contract between the DGH and designer. They are defined as all risks that influence adequacy of detailed design at planning and design phases. Common risks that occur in this interaction are usually related to availability of data such as incomplete data, insufficient time or fund to do proper investigation or underestimation of natural conditions. In most cases, data are given by DGH to designer. During detailed design stage, requesting additional investigation is unlikely to be accepted since the DGH is restricted to make fundamental changes exceeding the approved budget by the Ministry of Finance and completing the project beyond the due date. High ability to identify scope of work and

complexity of site conditions at early stage and to plan reasonable budget and time duration will widen the flexibility of parties to make necessary and important changes during implementation. Admittedly in the same time, it might increase the risk of fraud or corruption.

Table 1: Identified potential risks involved with designing a road

	Party who perceived the risk		
	DGH	*Designer*	*DGH and Designer*
Risk influencing adequacy of detailed design at planning and design phase.	1. Designer's performance 2. Sufficiency of planning and programming result to the actual condition 3. Effect from non-permanent job recruitment system in consultant company	1. Type of soil 2. Adequacy of data/ investigation: ・ Soil investigation data, ・ Rainfall data, ・ Actual condition of drainage system, ・ Traffic volume/ repetition data ・ Weather data, ・ On site temperature data, ・ Available testing methods 3. Availability of time 4. Schedule of planning and design 5. Sufficiency between standard design method and actual condition 6. Sufficiency of total budget 7. Payment mechanism 8. Designer's chance to get next job 9. Request of late changes	1. Policy controls 2. Public participation 3. Fraud/corruption 4. Dispute

2. Risks involved with constructing a road (Table 2)

   These risks are resulted from a construction contract between the DGH and contractor. It includes risks influencing the quality of road construction to perform required road service. Common risks that occur in this group are difference between actual conditions and conditions assumed in detailed design. These risks may inherit from inadequate planning and design process. During the construction stage, reviewing the detailed design is unlikely to do due to the restriction to make fundamental changes exceeding the approved budget by the Ministry of Finance and completing the project beyond the due date. As consequence, proper respond to the occurrence of problem on site depends on the engineering judgment and coordination among parties in road project management.

Table 2: Identified potential risks involved with constructing a road

	Party who perceived the risk		
	DGH	*Contractor*	*DGH and Contractor*
Risks influencing the quality of road construction to perform required road service.	1. Contractor's performance	1. Accuracy between design and actual condition (e.g design error, contradictions' documents, standard-actual differences, different traffic condition, different soil condition)	1. Political controls (e.g. decentralization)
	2. Contract system and time frame	2. Availability of required material/equipment/labor resources in the market	2. Monetary effects
	3. Recruitment system in contractor company	3. Request for review design or change order	3. Force major /Natural hazard
	4. Contractor's claim	4. Distance between source place and site	4. Accident
	5. Failure in completion of works (e.g. delays, over cost, poor quality)	5. Project management performance (e.g. scheduling errors, project team conflict, delays delivery, project cash flow management, credit/insurance problem)	5. Fraud
		6. Problems at Asphalt Mixing Plant	6. Fiscal policy
		7. Failure to comply with requirement in construction works (e.g. paving, asphalt thickness, compaction)	7. Public participation
		8. Weather	8. Dispute
		9. Payment mechanism	
		10. Owner's commitment (late permit)	
		11. Contractor's chance to get next job	

3. Risks involved with operating and maintaining a road (Table 3)

   These risks involve the DGH and road users. There is no clear contract between the DGH and road users. Since the DGH builds the public roads using public tax, however, it is important to recognize this interaction. These risks consist of risk influencing the road service performance to meet the needs of road users. Some of these risks are caused by lack of maintenance program which involves coordination and collaboration with others parties, such as the Ministry of Finance, the Ministry of Transportation and even the road user. However, road can trigger changes in socio-economy activities. Good data record may improve the assumption made at planning and design process.

Table 3: Identified potential risks involved with operating and maintaining road

	Party who perceived the risk		
	DGH	*End user*	*DGH and End user*
Risk influencing the road service performance to meet the needs of road users.	1. Weather 2. Budgetary scheme 3. Maintenance programs and time frame 4. Maintenance staff's commitment 5. Fraud/corruption	1. Road safety 2. Road comfort	1. Hazards (deforestation, erosion, earthquake, explosion, etc) 2. Road durability 3. Spatial change (e.g. utility relocation, growth of local activity) 4. Garbage management 5. Growth of traffic volume 6. Actual standard axle load 7. Fiscal policy 8. Public participation 9. Dispute

In a public road project in Indonesia, utilization of tax fund and construction contract mechanism are used as risk transfer mechanisms. Risk transfer is likely designed to ensure that road users receive steady road service and to achieve lower life cycle costs by sharing tasks and responsibilities with designer and contractor who have abilities to design and construct a road. The underlying tenet behind this risk transfer mechanisms are to take a specific risk and pass it from one party who does not wish to take this risk to a party who is willing to take on the risk for a certain price of fund/contract. As for construction contract, there is certain period of time for this risk transfer which is depend on contract provision on construction defect liability period and building failure liability period (Act No. 18 year 1999 article 34). The current structure of risk transfer in Indonesian road projects under traditional contract is described in Figure 2.

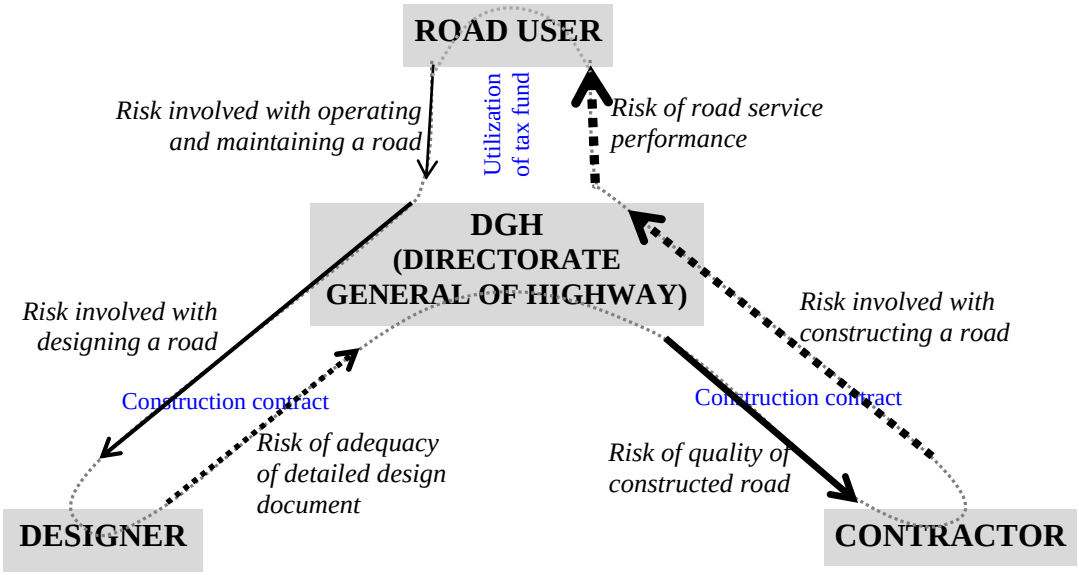

Figure 2: Structure of risk transfer in current practice in Indonesian road project (under traditional contract)

A vice cycle of risk transfer is exist in Indonesia. Such loop risk transfer are common in all over the world. Actually the risks might aggravate along the risk transfer. In case of incomplete design which is mainly originated from incomplete data and incapable designer may become one of the source of contractor performing poorly due to differences between detailed design and actual conditions. In the end road user may have to pay and paying excessively because eventually road user have to take risks by using road with low service performance. Moreover since requesting additional data investigation and reviewing detailed design document are unlikely to conduct, "retransfer" risks of product at the end of construction contract could give impact on no encouragement for innovation and in long term it may endanger professional ethics.

For future direction in Indonesia, it is important to describe how to eliminate this causes of the poor loop. Further studies on how to select designer, how can public client accurately evaluate the performance of designer, evaluation of risk management plan and giving performance can lead to improvement of the current structure of risk transfer. Developing such feedback scheme are beneficial for improvement in the next job. Innovation of contract also has been considered as one solution to better risk transfer.

6. CONCLUSIONS

The lesson to be learned from this structure of risk transfer is not that we should be more aggressive with transferring risk. Risks are specific to the project, its location and the availability of information; therefore, they should be analyzed and allocated on a case by case basis. Fundamental change in public road project always imposed with budget and time matter and its flexibility to change decrease along the stage. Well-conducted planning and design supported by good data recorded will increase the accuracy of detailed design documents, which eventually could reduce the possibility problems in next stage which eventually affecting the risk of early damage of road. Development of feedback scheme and innovation contract can offers improvement of current structure of risk transfer.

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