RISK MANAGEMENT IN BUILD-OPERATE-TRANSFER (BOT) FOR ROADS AND HIGHWAY PROJECTS IN MALAYSIA

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ABSTRACT

Construction projects are risky. However, the characteristics of the risk highly depend on the types of procurement adopted to manage the project. A Build-Operate-Transfer (BOT) project is recognized as one of the most risky project schemes The Malaysian government is increasingly using the Build-Operate-Transfer (BOT) model of project development across a number of sectors in its drive to privatize major public projects. It gives the government the benefit of more infrastructure projects being built especially construction of roads and highways, without the burden of additional public borrowing. This paper aims to describe the level of awareness among relevant participants in the implementation of BOT projects in Malaysia and to identify the risks associated with Malaysia's BOT infrastructure projects especially roads and highway projects. Literature reviews on the concept of risk management and the features of BOT projects have been used to identify the risk factors in the implementation of BOT for roads and highway projects which include several risk categories such as political risks, construction risks, operating risks, market & revenue risks and financial risks. The mitigation measures for each source of risks were also discussed. Questionnaires were sent to project sponsors or concession companies, government agencies, consultants and contractors to evaluate the ranking of these risks. At the end of this paper, some conclusions were drawn to improve the implementation of BOT projects in Malaysia.

Keywords: build-operate-transfer (BOT), risk management, risk identification.

1. INTRODUCTION

In a BOT contract, the private entities receive a franchise to finance, build and operate the project for a fixed period of time, after which ownership would revert to the host government (Finnerty, 1996). The main purpose of the BOT approach is the private sector instead of the government to implement a given project: in short, too temporarily, or permanently, transfer responsibility for certain services or operations from the public sector to a private sector (Stein, 1994). The concept of BOT was first introduced by Turgut Ozal in 1984, the Prime Minister of Turkey, within the framework of privatizing Turkey's public projects (Bueker, 1988). The idea immediately captured the world's attention, especially in developing countries such as Malaysia and Thailand, which see BOT as a way of reducing public borrowing, and at the same time promoting direct foreign investment in their countries' infrastructure or industrial projects (Tiong, 1992). According to Tiong, (1990), under the BOT arrangement, the private sector is required to finance, design, build, operate, and manage the facility, and then transfer the asset free of charge to the host government after a specified concession period. This unique method represents a step forward in meeting the world's need for more infrastructure development, especially in the rapidly developing countries. At the same time, the BOT concept opens up opportunities for foreign as well as local

ISSN 1675-5022

contractors and developers to penetrate an expanding market for infrastructure project construction and operation, thus reducing government involvement.

This type of procurement usually begins with a contractor taking the initiative to approach the government and propose a certain scheme with private sector finance as the major attraction. The contractor normally takes up the role for the design and construction of the project, and thus assumes the high risks. Timely completion is essential to all parties involved, especially the concession company and the lenders, who are expecting the loans to be repaid out of the revenue, which is not forthcoming until completion. The risks inherent in this type of project do not end with physical completion. Initial predictions on utilization and revenue stream may not be achieved. Government's policy on the cost of the projects often changes following a change in the government composition itself. All these factors are difficult to predict as they are out of the promoter's control. Despite all these risks, it is likely that this type of procurement method is gaining popularity, especially in developing countries like Malaysia.

Thus it is important to understand that it is not easy to win a BOT contract since the whole process of project development is a complex, time-consuming, and expensive business. The financial risk is high, competition is keen, negotiations are extensive and opportunity costs are considerable. Undertaking BOT projects in Malaysia presents its risks and obstacles. Therefore, the effective application of risk management principles to projects is especially crucial for a successful investment, and risk strategies have to be incorporated in the development of projects. Choosing the right path for a BOT project investment is laudable since each project involves different obligations and different risk implications. Due to the characteristics of the BOT concept, it is meaningful to study in details the risks associated with its application in Malaysia and to identify the level of awareness in risk management among the relevant participants in the implementation of BOT infrastructure projects.

This paper aims to describe the level of awareness among relevant participants in the implementation of BOT projects in Malaysia and to identify the risks associated with Malaysia's BOT infrastructure projects especially roads and highway projects.

The research methodology adopted for this research included a comprehensive literature review to identify initial lists of risks associated with BOT for roads and highway projects. Unstructured interviews and discussions were used to filter the risks. Questionnaires were distributed to project sponsors or concession companies, government agencies, consultants and contractors to evaluate the ranking of these risks and to identify the level of awareness of risk management in the implementation of BOT roads and highway projects in Malaysia.

2. OVERVIEW OF BOT PROJECTS (ROAD OR HIGHWAY) IN MALAYSIA

In Malaysia, road development was traditionally undertaken and financed by the public sector based on a three-pronged strategy, namely, to increase road network particularly to improve inter-urban linkages, alleviate capacity constraints and increase road network to open up new growth centres and rural areas (Hassan, 1999). The tremendous growth of private vehicles in all major urban centres is attributable to the increasing affluence and higher standards of living as well as high level of trading and commercial activities. This situation called for an efficient and effective road system, the need to increase road capacities as well as to improve traffic flow. Because there are limited public sector resources, the Malaysian Government has adopted a new approach through privatization by encouraging the private sector to be actively involved in the development of road and highway projects.

Most of the privatized road and highway projects in Malaysia were undertaken through build-operate-transfer (BOT) method where the private sector would construct the facility using its own funds operate and maintain the facility for a period of time and eventually, transfer the facility to the Government at the end of the period. During the concession period, the private sector is allowed to collect toll from the users of the facility. The privatization of the North-South Highway (847 kilometers), costing approximately RM6.2 billion which was completed 15 months earlier than scheduled, was signified as a milestone in the privatization of road projects in Malaysia. The project has also exposed Malaysia to new skills and expertise in the construction of highways. In addition, collaboration of local construction companies with international specialists/ consultants in construction technology has also benefited the local companies.

Other successful road projects constructed through the privatization concept using the BOT method are the New Klang Valley Expressway, the Malaysia-Singapore Second Crossing Expressway, the New Pantai Expressway, the Cheras-Kajang Expressway, the Ampang Elevated Highway, and etc.

2.1 The Fundamental of BOT scheme

Tiong, et al (1992), listed the fundamental of the BOT scheme as follows; i) the use by the concession company of its own capital as well as the use of finance provided by lenders for the project; ii) the grant to the concession company of a right to operate the completed structure or system and change the use of it; and iii) the imposition of a time limit after which the right to operate the monopoly or concessionary right will expire and after which the concession company must transfer the structure or system to the Government free of charge. According to Tiong, (1991), BOT can be divided into five phases which are pre-investment, implementation, construction, operation and transfer. He further explained that the roles and responsibilities of the project sponsors at each phase of the project could be as consultants to carry out the feasibility study during the pre-investment phase and engineering design during the implementation phase, or/ and as project sponsors to negotiate favorable concession agreements from the government and as project promoters to raise equity and borrow loans during the implementation phase. Furthermore, the project sponsors can act as contractors to build the facility, usually on a fixed turnkey basis, during the construction phase, or/and as the operator and owner of the facility, using the project revenues to retire the loans during the operation phase.

3. REVIEW ON RISK MANAGEMENT

The construction industry is subject to more risk and uncertainty than many other industries. The process of taking a project from initial stage to completion and into use is complex and entails time-consuming design and production processes. The industry requires a multitude of people with different skills and interest and the co-ordination of a wide range of disparate and interrelated activities. In construction projects each of three targets of cost, time and quality is likely to be subject to risk and uncertainty. Project managers should undertake or propose actions which reduce or eliminate the effects of risks or uncertainty. There should ensure that the remaining risks are allocated to the responsible parties to optimize project performance. To achieve this aim, it is best that they follow a systematic approach called the process of risk management.

Risk management is a system that uses structured techniques and judgment to enable decisions to be made within predetermined and acceptable risk parameters (CSM, May 1997). Smith, (1999) defined risk management as a particular form of decision making within the project management. Risk needs to be managed in any event to ensure the project objectives are materialized. Because of the complex nature of construction business activity, process, environment, and organization, the participants are widely exposed to a high degree of risk. However, risk management techniques are not so well developed in the construction industry. Almost all participants approach risk management in terms of individual intuition, judgment, and experience gained from previous contracts (Al-Iabtabai and Diekmann, 1992).

Perry and Haynes (1985) suggested a simple and systematic approach for construction management, which consists of three stages: risk identification, risk analysis; and risk response. Flanagan & Norman (1997) developed the risk management process which involve risk identification, risk classification, risk analysis, risk attitude and risk response. Risk management adapts a pro-active role rather than reactive. Risk can be handled in an effective and efficient manner by establishing an effective early warning system, performing contingency planning, and implementing project management methodology, reusing components, improving process and applying training.

3.1 Risks associated in BOT for roads and highway projects

Wang, et al (1999), had listed the risks associated with BOT infrastructure projects which focused on roads and highway projects under the following categories; i) political risk, ii) construction risk, iii) operating risk, iv) market and revenue risks, and v) financial risk.

i) Political risks

Wang, et al (1999) mentioned that in order to ensure the success of the project, support from the government is of prime importance. The roles of the government should cover the following matters such as; i) authorize the project in requiring special legislation and specific government approvals; ii) provide support throughout the duration of concession period such as partly financing the project in which the government acts as the guarantor; and iii) provide a clear framework for resolving the regulatory and other issues which might arise. Political risk describes the risk of government actions which may endanger a project. It includes change in law, corruption, delay in approval and expropriation.

ii) Construction risks

At the construction phase, the risks exist in delay in completion, abandonment, problems of land acquisition and compensation, compensation to landowner, environmental risk, cost overruns and failure to achieve stipulated performance levels. The construction contractors and the concession companies should assume those risks.

iii) Operating risk

Csizmadia (1998) said that operation risk involves the possibility that the operation expenditure will increase beyond what was budgeted and will affect the projected revenue of the entire project. Since the projected revenue is derived from anticipated operation expenditure at inception stage, it is important to control the expenditure. It includes operating cost overrun, interfacing with third party development, and technology risk.

iv) Market and revenue risk

Revenue risks have a direct effect on the viability of the BOT projects. These risks are driven by toll charges. To some extent these risks have proven to be public sensitive. The sensitivity of toll charges to the public is managed by the government. Market and revenue risks also include inadequate traffic volume due to inadequate traffic forecasts or subsequent deviation and competing routes particularly free or under-priced ones.

v) Financial risks

Financial risks can be divided into interest rate risk and inflation risk. The risk on interest rates will arise after the financing fixed thereby resulting in higher financing costs than earlier anticipated. The risk is magnified by the fact that the loans will be outstanding for a long period. With respect to operating period, the operation costs are sensitive to inflation and the project needs some protection against the impact of inflation on operating costs. Inflation will be incorporated in the toll charges mechanism to be agreed upon in the concession agreement.

Attention to risk is essential to ensure good performance. Risks have to be identified, classified and analyzed before any response is made. Risk management is the right tool to achieve those processes. A risk management system must be practical, realistic and cost effective. It is important for every professional participating in the implementation of BOT projects to be aware of risk management. The risks that will be encountered by the concession company under various categories during inception, construction and operation phases will have to be analyzed and mitigated where possible and where

appropriate. In most cases the involvement of the government is necessary and crucial to ensure the project progresses with minimal encumbrances and disruptions.

4. ANALYSIS & FINDINGS

This section presents the survey results of the level or risk awareness, sources of risks and risk management in BOT for roads and highway projects in Malaysia. The survey was conducted on participants involved in the implementation of these projects. During the primary stage, about 40 in 5 categories of risks associated with BOT roads and highway projects were identified. As the initial list of risks is long, it is necessary to reduced to a number that allows meaningful evaluation and ranking. Hence, only the major risks associated with BOT projects were chosen to be studied. The filtration was carried out, based mainly on the literature reviews and experiences of some professionals who were directly involved in the implementation of these projects.

The survey questions were divided into four sections; Section A on Demography, Section B on the Awareness and Knowledge on Risk Management, Section C on the Sources of risks in BOT projects and Section D on the Risk Allocation. 100 questionnaires were sent to selected government agencies, concession companies, contractors and consultants either by post of by hand. A total of 40 valid responses were received which account for a 40% response rate. The questionnaires were analyzed using the Statistical Package for the Social Science (SPSS) and the Analysis of Variance (One-way ANOVA) tests were used to run a test of independence to relate two variables. The test was conducted at the significance level of 0.05 which is widely adopted and accepted in the social science research.

The results of the Demography of the respondents in Section A showed that all of them had adequate knowledge on the theme of this study and had experiences in BOT road and highway projects.

4.1 Level of awareness and knowledge on risk management

The result of the analysis showed that 60% and 20% of the respondents responded to high and very high knowledge and awareness on risk management respectively. It was tested that there were no significant differences among the participants with respect to level of awareness and knowledge on risk management (F statistic= 1.412, sig. 0.225). According to Edwards (1995), in the early 1990s the construction industry generally became more aware of a management approach in dealing with hazards, already assimilated by certain other areas of commerce and industry, called risk management. He also mentioned that to those who have studied the subject and have increasingly undertaken risk-related tasks, it has become apparent that risk management can be an effective formalized system with which to address and manage a whole range of hazardous activities to which an organization can be subjected.

According to Farmer (1996), there were many means and mechanisms that could be adopted to educate the participants to increase the level of awareness such as conferences and seminars. He believed that by bringing together a wealth of knowledge and expertise in international conferences or seminars, the results would definitely raise the level of awareness of risk management in the construction industry.

4.2 The roles and the need of Risk Management in BOT projects

In relation to the role of risk management, 97% of the respondents agreed to the statement that risk management supplements project management and it is also an important component in the process of decision making. Only 3% of the respondents disagreed that risk management was a project strategy to achieve success. All (100%) respondents agreed that risk management was needed in the implementation of BOT projects. The ANOVA test proves that both agreed statements are unrelated to the organization of the participants at significance levels of 0.05 each.

4.3 Steps taken during project implementation

In order to find out whether the respondents practiced risk management processes within their organizations, the activities which were normally undertaken in the implementation of projects, were

highlighted to them. The activities included preparing work planning, conducting risk analysis to solve problems, preparing contingency planning, considering cost consequences and brainstorming on foreseen problems.

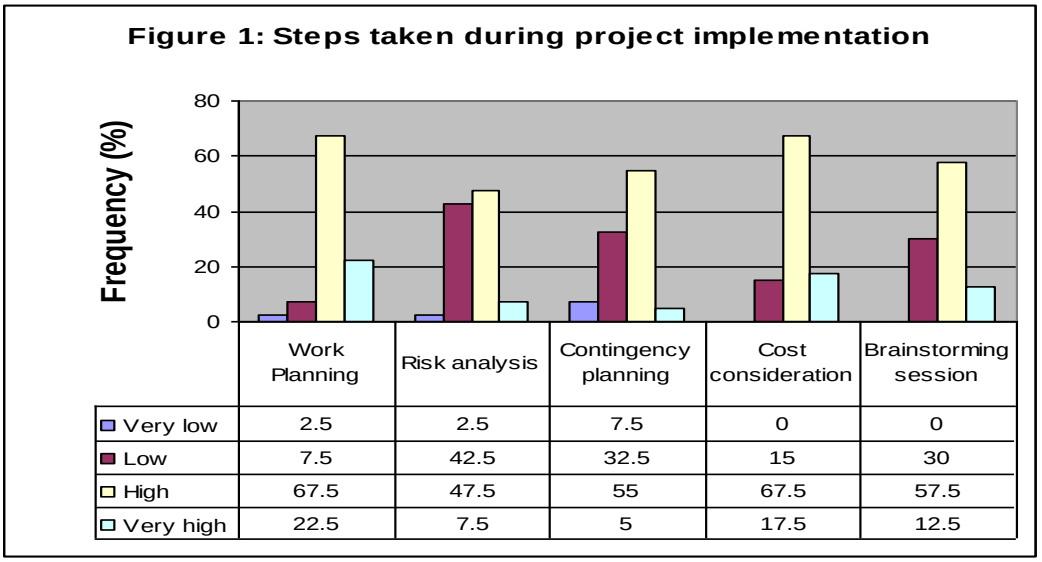


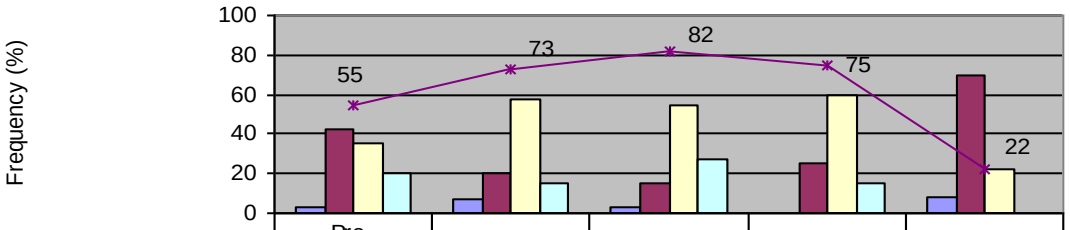
Figure 1: Steps Taken During Project Implementation

Figure 1 shows that about 90% of the respondents frequently prepared work planning schedule before executing the projects. This indicates that most of the respondents planned their works to ensure that they were smoothly carried out. More than half (56%) of the respondents frequently practiced risk analysis in solving their project problems. The result also shows that 60% of the respondents agreed in preparing contingency plan and about 85% of them frequently considered the cost consequences in decision making. This is a good sign as decision making is important in risk management. Only 30% of the respondents ignored brainstorming session in project meeting as a prerogative measure in the risk management process. The ANOVA test proves that there are no significant differences among respondents with respect to steps of activities taken during project implementation except for preparing work planning which is not at 0.05 significance level. The ranking of activities considered most important are; i) prepare work planning, ii) consider cost consequences, iii) conduct brainstorming session on foreseen problems, iv) conduct risk analysis to solve problems, and v) prepare contingency plan. Sawczuk (1996), mentioned that the awareness of risk, and steps taken to minimize the share of risk, would determine the likelihood of a problem occurring. Based on this survey, it seems that the respondents agreed with Sawczuk where they took necessary steps by preparing work planning, considering cost consequences although there are low applications of brainstorming sessions, conducting risk analysis and preparing contingency planning.

4.4 Extent of risk in BOT projects at different project phases

Generally, the BOT projects are divided into several stages, i.e. the pre-investment stage, implementation stage, construction stage, operation stage and transfer stage. Based on the results shown in Figure 2, the construction stage is at the highest rank where 82% of the respondents indicated high to very high extent of risks. This is followed by operation stage (75%), implementation stage (73% and pre-investment stage (55%). Transfer stage is at the lowest rank with only 22% of the respondents indicating high to very high extent of risks during that stage. The result is also supported by statistical ANOVA test that there are no differences in the extent of risk with respect to the organization of the respondents for each phases except for the implementation stage which is not at 0.05 significance level.

Figure 2: Extent of risk problems at different BOT project phases



	Pre-investment	Implementation	Construction	Operation	Transfer
Very low	3	7	3	0	8
Low	42	20	15	25	70
High	35	58	55	60	22
Very high	20	15	27	15	0
Total (H & V.H)	55	73	82	75	22

Figure 2: Extent of Risk Problems at Different BOT Project Phases

4.5 Sources of risk in BOT for roads and highway projects in Malaysia

Twenty four (24) sources of risks from five (5) common categories of risks associated with BOT road and highway projects summarized from published literature were listed for respondents to indicate the frequency of occurrence of risk. The five (5) categories are political risks, construction risks, operating risks, market and revenue risks, and financial risks.

i) Political risks

The political risks have been divided into four common risks. Most (80%) of the respondents indicated high and very high risk for delay in approval for BOT projects. Corruption was ranked the lowest with only 25% of the respondents indicating it as high and very high risk. Based on the results the political risks were ranked as; i) delay in approval, ii) changes in statutory requirements, iii) expropriation, and iv) corruption. Tiong, R.L.K. (1991) mentioned that the political risk is probably the most significant risk faced by a BOT financial project as it in turn has a significant impact on all the other risks to be considered.

ii) Construction risks

Most (10) of the risks listed in the questionnaire are under the construction risks. It shows that 68% of the respondents indicated high and very high for problems of land acquisition and compensation during the implementation of BOT projects. Only 14% of them indicated high and very high risks for Act of God (e.g. inclement weather, etc.). The sources of risks under construction risk were then ranked, starting with; i) problems of land acquisition and compensation, ii) delay in completion, iii) poor project management, iv) inexperienced concession company, v) inexperienced contractor, vi) lack of resources, vii) faulty design, viii) supply risks, ix) complexity of works, and x) act of God.

iii) Operating risks

Operating risks are divided into four common sources of risks and the result of the analysis shows that increase in operating costs was at the highest (40%) risks, followed by maintenance risk (23%), technology risk (18%) and interfacing with third party development (17%).

iv) Market & revenue risks

The result also shows that most (93%) of the respondents indicated high and very high risks for inadequate traffic volume due to inadequate traffic forecast. These market and revenue risks were ranked from the highest to the lowest frequency; i) inadequate traffic volume, ii) restrictions on toll charges, and iii) competing routes particularly free or under-priced ones.

v) Financial risks

According to Tiong, R.L.K. and McCarthy, S.C. (1991), one key area to the successful implementation of the BOT concept is the raising of finance. However, the most difficult issue faced by the concession companies in raising debt for projects in developing countries is the lender's requirement of host government's support. Financial risks are divided into inflation, interest rates and foreign currency exchange rate. The result shows that 68% of the respondents indicated high and very high risk for problems regarding currency exchange rate and ranked it as the highest risk compared to interest rates (62%) and inflation (52%).

For the purpose of this study, all risks under these five categories were ranked by comparing their mean scores. The results show the top ten sources of risks, ranked from the highest mean to the lowest mean, and they were considered the main sources of risk in the BOT road and highway projects in Malaysia. The first ten risks with the highest mean score are: 1. Delay in approval, 2. Problems of land acquisition and compensation, 3. Inadequate traffic volume, 4. Foreign currency exchange rate, 5. Interest rates, 6. Competing routes particularly free or under-priced ones, 7. Restrictions on toll charges, 8. Changes in statutory requirements, 9. Inflation, and 10. Increase in operating cost.

4.6 Risk allocation for different stages in BOT projects

The allocation of, or the response to risk is one of the steps in risk management process. The respondents were surveyed on proper allocation of risk management process during implementation of BOT projects. It shows that all (100%) respondents agreed that the sources of risks could be reduced, transferred, retained or avoided when risk management processes were fully carried out.

4.7 Parties responsible to bearing risks under different categories

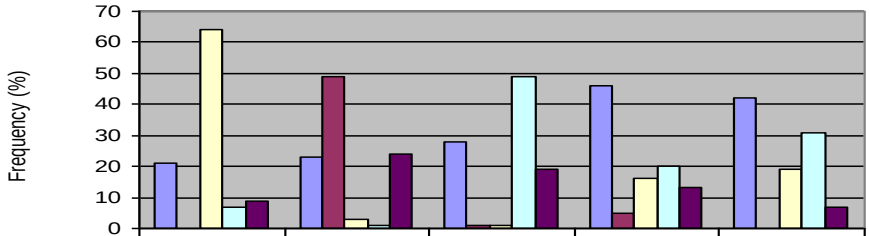
The respondents were asked on the parties responsible to bearing the risks under different categories i.e. political risks, construction risks, operation risks, financial risks, and market and revenue risks. The parties responsible were divided into concession companies, contractors, government, operator and insurer.

Figure 3 below shows that most (64%) of the respondents indicated that the government is the main party who was responsible to bear political risks. Under the construction risks the main parties who were responsible to bear the risks were the contractors (49%), the insurer (24%) and the concession companies (23%). While the operator (49%) and the concession companies (28%) were responsible to bear the risks under the operation risks. The figure also shows that under the financial risks and the market and revenue risks, the concession companies and the operator were the main parties to bear the risks.

4.8 Mitigating measures

The following mitigating measures discussed are just for top five sources of risks associated with BT road and highway projects in Malaysia. Delay in approval which is considered a political risk is the main source of risk in BOT road and highway projects where it ends up with serious effects such as failure to achieve completion dates and also failure of one party to meet his obligation as determined by the concession agreement. Levy, (1996) said that the risk of delay in approval can be minimized by obtaining approvals in advance where possible and also ensuring clear division of responsibilities in the contract.

Figure 3: Parties responsible to bear risks under different categories



	Political	Construction	Operation	Financial	Market & Revenue
Concession companies	21	23	28	46	42
Contractor	0	49	1	5	0
Government	64	3	1	16	19
Operator	7	1	49	20	31
Insurer	9	24	19	13	7

Figure 3: Parties Responsible to Bear Risks under Different Categories

Wang, et al (1999) in his research had come out with some mitigating measures for risks related to delay in approval. The mitigating measures to: i) establish joint-venture with local partners especially the central government agency or state-owned enterprise, ii) maintain good relationship with the government, iii) ask the government to establish a one-stop agency for all approvals, and iv) obtain government's guarantees to adjust tariff or extend concession.

The problems of land acquisition and compensation, which are identified among the main sources of risks, are warranted to have a special attention before any package of the project is to commence. Wang and Tiong (1999) in their research mentioned that for acquisition of the site and access to it and performing preliminary contract works, the government should give its support and would maintain the site free from all liens and encumbrances, which do not have material adverse effect on the rights and obligations of the concession company, so that the concession company has the right to the free and exclusive use thereof for the concession period. They further explained that, during the construction period, the government would be responsible for; the delivery of the site and completion of the preliminary contract works and the access road; coordinating and facilitating all dealings with the appropriate government authorities during the construction period; and obtaining in a timely manner, and thereafter maintaining, the approvals required for construction.

The third in the ranking is inadequate traffic volume which is normally due to inadequate traffic forecast during the pre-investment phases where the feasibility study should be done. According to Preston, (1996) in his paper, the feasibility study was done to ensure the viability of the project at the early stage which commonly involved the estimation of the following; a) hourly and daily traffic flows, b) ramp flows at interchanges, c) flows through toll plazas; and d) daily and annual toll revenues. He further mentioned that, the forecast would be key inputs to determine the following: a) toll road design standard, b) toll road alignment, c) location and configuration of interchanges & toll plazas, d) tolling system and strategy; and e) financing plans (which include estimated construction cost, payback period, concession period and toll rates). Therefore, in order to ensure the viability of the road and highway privatization (BOT) projects, there should be a comprehensive feasibility study including adequate traffic forecast.

Financial risks are common to most construction projects. The next main source of risk is the problems relating to foreign currency exchange rates which according to Wang, et al (1999) were the result of the mismatch between revenue of the currency and payment obligations for taxes (usually in local currency), operating expenses (sometimes in hard currency), debt service payments (mainly hard currency) and dividend payments and profit repatriation (mainly hard currency). Therefore, Tiong, and McCarthy, (1991) suggested that the project sponsors (concession companies) should negotiate assistance and incentives from the government in providing foreign exchange guarantees. He also mentioned that guarantees of foreign exchange convertibility and availability should also be obtained from the

government. In the Malaysian North-south Highway, the government provided the operating company with the guarantee that it would make up the shortfall if the exchange rate dropped by more than 15% against the rates at the time of drawdown of funds.

Finally, the fifth source of risk is the interest rate risk. The risk on interest rates will arise after the financing is fixed thereby resulting in higher financing costs than that earlier anticipated. According to Bueker (1988), fluctuations in interest rates should be minimized by the concession company by negotiating the fixed rate loans with the government.

5. CONCLUSION

Based on the analysis done, it can be concluded that most of the respondents had experiences in BOT road and highway projects. Generally most of them realized that BOT project was a high-risk sector. Their level of awareness in risk management and knowledge on risks for BOT projects were quite high. They also agreed that BOT projects needed risk management. They also managed risks in their organization but not more than half of them used formal risk management practices. The whole process of BOT project implementation is a complex, time-consuming, and expensive business. Those making BOT proposals must be willing to take calculated risks, be flexible with their attitudes and stance, and their proposals must be adaptable to changing situations. The lesson learned from the study is that if the government and the investors intend to arrive at a win-win situation, BOT projects must be operated under the following conditions (Tam, 1999):

1. First, the project must offer a reasonable rate of return in order to attract private investments. The government must guarantee a proper business environment.
2. There must be a proper mechanism to fix and adjust toll rates which should be free of political influences in the decision-making process.
3. The projects need a reliable, committed and strong concession company, in which operation will not be affected by any short-term suffering. It needs a large, reputable and financially sound company.
4. BOT projects need a strong and technically competent construction company, which can guarantee a timely delivery of the project. They should have to know-how and resources to complete the project on time and according to the quality standards.
5. An equitable and experienced government authority is a must. The legal framework and contractual conditions should protect both parties' interests.
6. Finally, an uncorrupted government is the key factor in the success of BOT projects.

Although risk management techniques have been used in other industries for a long-time, the construction industry has approached risk management in terms of individual intuition, judgment, experience gained from previous contracts and ad hoc responses to random events. To minimize the chances of failure of BOT road and highway projects, risk management techniques must be incorporated into the project implementation.

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