

Source Risks of Transportation BOT Projects in Thailand

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Build-Operate-Transfer (BOT) is regarded as a potential device for the development of infrastructure. To be implemented in place, however, it needs huge amount of money and time. Moreover, all of participants, especially investors, confront “risks” due to highly complex legal and financial structures of the host country.

This research explores to identify risks of transportation BOT projects in Thailand. Emphasis is placed on primary “source risks,” particularly country specific risks in Thailand, at each phase of BOT projects. The results include formulation of expert’s subjective assessment into graphical models that incorporate interrelationships among the risk factors. The outcome of this study is expected to disseminate invaluable knowledge among people who relate to BOT projects in Thailand.

Key Words: BOT, risk identification, source risk, modeling, Thailand

1. Introduction

For decades, Thailand has been facing shortage of infrastructure, especially transportation, communication, and flood control and water supply facilities. One of the most crucial factors that have caused this situation is undeniably the monopoly of public sectors in infrastructure development.

With the passage of time under the nation’s economic expansion and progress, however, the demand has exceeded the capacity of public sectors. In the meantime, private sectors have become increasingly capable of mobilizing the funds and providing qualified personnel and modern technologies for huge infrastructure projects. As a result, private sectors have begun to play increased roles in the investments and operations of infrastructure projects in this country.

BOT has been one form of privatization with which the involvement of private sectors was accelerated, and Thailand has adapted this scheme in its infrastructure development. The reasons why Thailand has accepted BOT can be seen as follows.

1) **Shortage of government financial resources or budget constraint:** Table-1 includes the interim adjustments to the Seventh Plan by National Economic and Social Development Board (NESDB) for the public investment on transportation and energy projects. As can be seen in the trend, Thai government has encouraged private sectors to participate in public infrastructure projects more and more. Mostly, such situation has arisen from the

shortage of government financial resources or budget.

2) **Increasing cumulative debts:** The cumulative debts, particularly the foreign debts, have been rapidly increasing for the last years (Table-2). As a result, privatization scheme has been paid more and more attention as a tool to ease government’s burdens than before.

3) **Inefficient public sectors:** Private sectors have higher efficiencies than before. Therefore, attempts have also been made to implement privatization scheme.

BOT is a device in which government gives concessions to private companies so that they are entitled to take charge of infrastructure projects. Within the system, the concession company not only designs and constructs the projects, but also finances and operates the facility. Then, the facility is transferred back to the host government when the concession period ends.

The innovative BOT scheme, however, takes as long as thirty years to be completed from concept to operation phase. The process is very complex because it involves many parties in the projects, and needs huge capital.

Typical concession by the host government necessitates the sponsor company to undertake major responsibilities in managing risks. However, risks arising from BOT projects are sometimes invisible from a traditional construction point of view. Therefore, more rigid risk management is necessary in expecting successful BOT projects.

Table-1. Seventh Plan Public and Private Infrastructure Investment (Million Baht)

	1992	1993	1994	1995	1996	Planned Total*	Interim Total**
Transportation							
• Government	33,450	60,000	77,530	79,423	80,257		
• Gov't Agency	41,840	30,630	54,030	35,123	42,717		
• Private	8,516	22,630	19,294	19,294	8,878		
						613,613	613,613
Telecom							
• Government	453	700	1,288	830	413		
• Gov't Agency	15,178	15,700	9,289	5,375	4,380		
• Private	6,725	32,560	32,350	32,350	31,125		
						188,426	259,410
Utilities							
• Government	366	1,750	4,380	6,750	6,052		
• Gov't Agency	15,177	24,071	29,983	26,205	20,893		
• Private	15,543	25,821	34,364	32,955	26,945		
						135,628	100,110
Energy							
• Gov't Agency	35,736	55,652	77,593	71,704	86,514		
• Private		1,246	7,994	9,952	13,372		
						359,765	499,825
Total						1,297,431	1,472,958

Source: NESDB *1991, **April 1995, Baht 1= US\$ 0.04

Table-2. The Government Debt Position (Billion Baht)

Fiscal year	1991	1992	1993	1994	1995
Total debt outstanding	589.8	600.5	620.7	624.7	685.4
(percent of GDP)	(23.5)	(21.2)	(19.6)	(17.4)	(16.5)
Domestic debt	308.1	297.5	286.5	267.8	298.2
• Government's direct borrowing	235.2	210.6	164.0	110.4	74.6
• Government's guarantee					
	72.9	86.9	122.5	157.4	223.6
Foreign debt	281.7	303.0	334.2	356.9	387.2
• Government's direct borrowing	94.0	99.2	106.0	114.2	121.0
• Government's guarantee					
	187.7	203.8	228.2	242.7	266.2
(Debt repayments as percent of the total budget)	(14.3)	(12.7)	(11.2)	(9.4)	(6.2)

Source: Bank of Thailand, Annual Economic Report 1995

2. Motivation

The motivation for this research is due to the insights obtained from authors' previous study on privatization projects in Thailand¹⁾. One result from this pilot study presents that inherent risks of transportation BOT projects in Thailand are summarized into four aspects of *political*, *legal*, *financial*, and *technical* risks as follows. (Those descriptions marked by (*) are cited from annual report by Bangkok Bank²⁾.)

Political Aspect

Frequent changes of Governments(*): "There have been frequent government changes for the last decades. This caused disruptions of project implementation due to changes of national policy associated with politician's actions which attempt to obtain popularity among voters."

Intervening action by politicians: There are

politicians who intervene state operations in order to gain personal benefits.

Legal Aspect

Land Use: Foreigners cannot own land and some facilities built in this country. Actually, the present practice of BOT in Thai may be actually termed as *B- (T)-O-T* (Build, Partial Transfer, Operate, and Transfer).

The Private Participation Act B.E. 2535 (enacted April 9, 1992): This was the first major piece of legislation that provided private entities with participation in public works in Thailand. The process is very unique as described in **Figure-1**. In the Act, *three preconditions* are required before any private sector participation is commenced in public works. The preconditions are,

- 1) Project company informs government agency or state enterprise that it has financial contract with lenders.

- 2) The Board of Investment (BOI) formally informs the project company that the project is given privileges of BOI.
- 3) Government agencies or state enterprises have completely transferred the land acquirement to the project company.

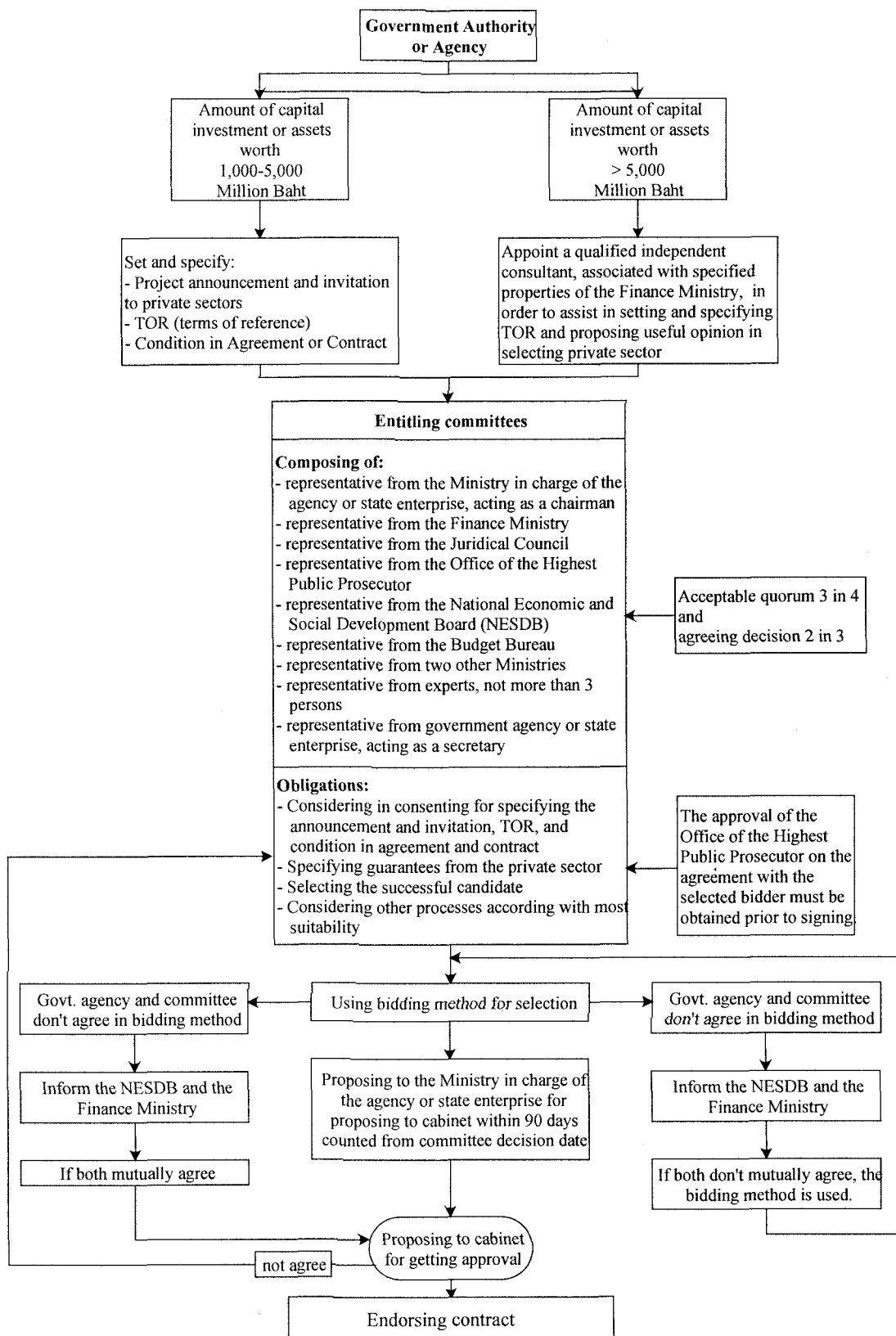


Figure-1. Process of controlling and monitoring by state

Lack of management efficiency^(*): “State operations are governed by numerous laws and regulations and, to undertake some activities, it is necessary to follow complicated and time-consuming work procedures and processes.”

Lack of central authority^(*): “Several infrastructure projects are undertaken by a number of operational units. They, however, lack a central policy body to coordinate their planning and the networks to implement these policies. Each operation unit operates individually on its own.”

Financial Aspect

Currency: In the past, *Thai Baht* was freely convertible and there have been no remittance abroad and no restrictions if authorization was given. However, the situation may change in the future.

Finance: Infrastructure projects mostly depend on loans in foreign currency. For information, the *equity/loan ratio* of BOT projects in Thailand is approximately 20: 80.

Incentives: *BOT privileges* given by government include *incentives* as follows:

- 1) income tax exemption for 3 to 5 years (8 years exceptional)
- 2) accelerated depreciation.
- 3) authorizations to lease or otherwise exclusively occupy and use land otherwise prohibited under Land Code
- 4) work permits
- 5) exemption from import duties
- 6) guarantees from *nationalization*

Technical Aspect

Sub-standard quality^(*): “The quality of infrastructure is still below compared to international standard level.”

Construction environments: Some of the factors that impede project implementation, particularly in Bangkok areas, are as follows:

- 1) very clayey soil conditions
- 2) traffic congestion
- 3) restricted time for material delivery
- 4) difficulty in land acquisition
- 5) difficulty in relocation of public utilities
- 6) difficulty in constructing facility along crowded central Bangkok area
- 7) existence of public/politic pressure group

A premise obtained from the results of the pilot study indicated that “some critical risk factors in BOT projects in Thailand were recurrent in occurrence and could be categorized as *common factors* that arise from Thai specific conditions of

BOT projects as a whole.” It was then thought that the risks could be structured into a “model,” using logical procedures.

3. Objective

According to Ashley and Bonner³⁾, risk factors can be classified into two categories: *source variables* and *consequence variables*. In this classification, “consequence factors directly impact the project objectives, while source variables indirectly affect the project through their influence on the consequence variables.”

Then, the major objective of this research is to identify primary source risks at each phase of BOT projects. For the purpose, special attentions are placed on the following tasks.

- 1) Identify country specific risks in transportation BOT projects in Thailand.
- 2) Structure them into graphical quantifiable models phase by phase.

4. Methodology

“*Knowledge map*, as an analytical modeling tool, can map knowledge or fragment pieces of information that may exist in one person or among several people⁵⁾.” The model, consisting of only *chance node* (oval) and *relevance* (arrow), can represent the knowledge about uncertain events, or risks as shown in Figure-2. The relationship represents that probabilities associated with random variable-B depend on the outcome of random variable-A.

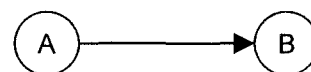


Figure-2. Relationship in Knowledge Map

The basic concept of this tool was used to capture risks and formulate their interrelationships through eight phases of BOT projects defined by UNIDO⁴⁾ as follows.

- 1) **project identification**
- 2) **government preparation for bidding**
- 3) **sponsor's preparation of a bid**
- 4) **selection**
- 5) **project development**
- 6) **project implementation**
- 7) **operation**
- 8) **transfer**

To develop graphical models incorporating all BOT risks and their interrelationships, a series of interviews and questionnaires were conducted with people who have previously experienced BOT projects for *Bangkok Mass Transit System Project*, *Don Muang Tollway Project*, *Second Stage Expressway Project*, and/or *Hopewell Project*²⁾. Within the projects, the personnel were thought to be “specialists” acting as project consultants for all the participants in the projects, including project company, government authorities, and contractors.

Graphical model was developed in such a way as described below.

- 1) Lists of key source and consequence risks were collected from mainly newspapers and other scanning data in Thailand. Then, the authors developed a preliminary knowledge-map model, showing causal interrelationship among those risks.
- 2) Interviews were conducted with the specialists to combine their knowledge of specialists onto the preliminary model. Then “general model” was developed as shown in Figure-3. The formulation depended on the *subjective* knowledge of these respondents. It should be noted that *Delphi technique*⁶⁾ was employed to eliminate biases included in subjective assessment. The interview and analyses were repeated until the specialists became familiar and comfortable with the representation of their knowledge using knowledge map.
- 3) The general model was broken into eight sub-models according to the UNIDO BOT phases. The risk factors were then classified into two categories of source variables and consequence variables.
- 4) Questionnaires were conducted to identify significant source risks. Finally, eight compacted sub-models were developed phase by phase as shown in Figure-4 through Figure-11.

5. Results

The results have shown that the uncertainty of BOT projects could arise from *political*, *public*, *legal* and *economic* events that were common to BOT projects in Thailand as a whole (Table-3). Particularly, political and public influences were heavily rated by the respondents as crucial factors that affect the success of BOT projects in This country.

The results have also indicated that, the risks

specific to individual projects were considered to be less important than the common factors because the specialists believed that specific project risks could be under control of private companies. Based on this reasoning which was widely accepted by the majority of the respondents, the specific project risks that arise mostly from construction difficulties may be lessened by technology development and global co-operation with foreign contractors.

As a result, it can be said that critical source risks of BOT projects in Thailand consist of “common” factors that may be inherent in any BOT projects. With this conception of country specific conditions in this country, further observations and discussions will be made more in detail in the following paragraphs.

Table-3 Key source risks for transportation BOT projects in Thailand

Phase	Risk Factors
Identification:	Political influence Political support Bureaucratic system
Gov. preparation for bidding:	Political influence Transparency
Selection:	Political influence Transparency Bureaucratic system
Development:	Inappropriate risk-allocation among project teams
Implementation:	Inflation & interest rate Exchange rate & convertibility Changes in Gov. policy Political influence Bureaucratic system Public
Operation:	Tariff adjustment risk Exchange rate & convertibility Inflation & interest rate Expropriation & nationalization Changes in Gov. policy Political influence Public Government default
Transfer:	Country legal risk Political risk

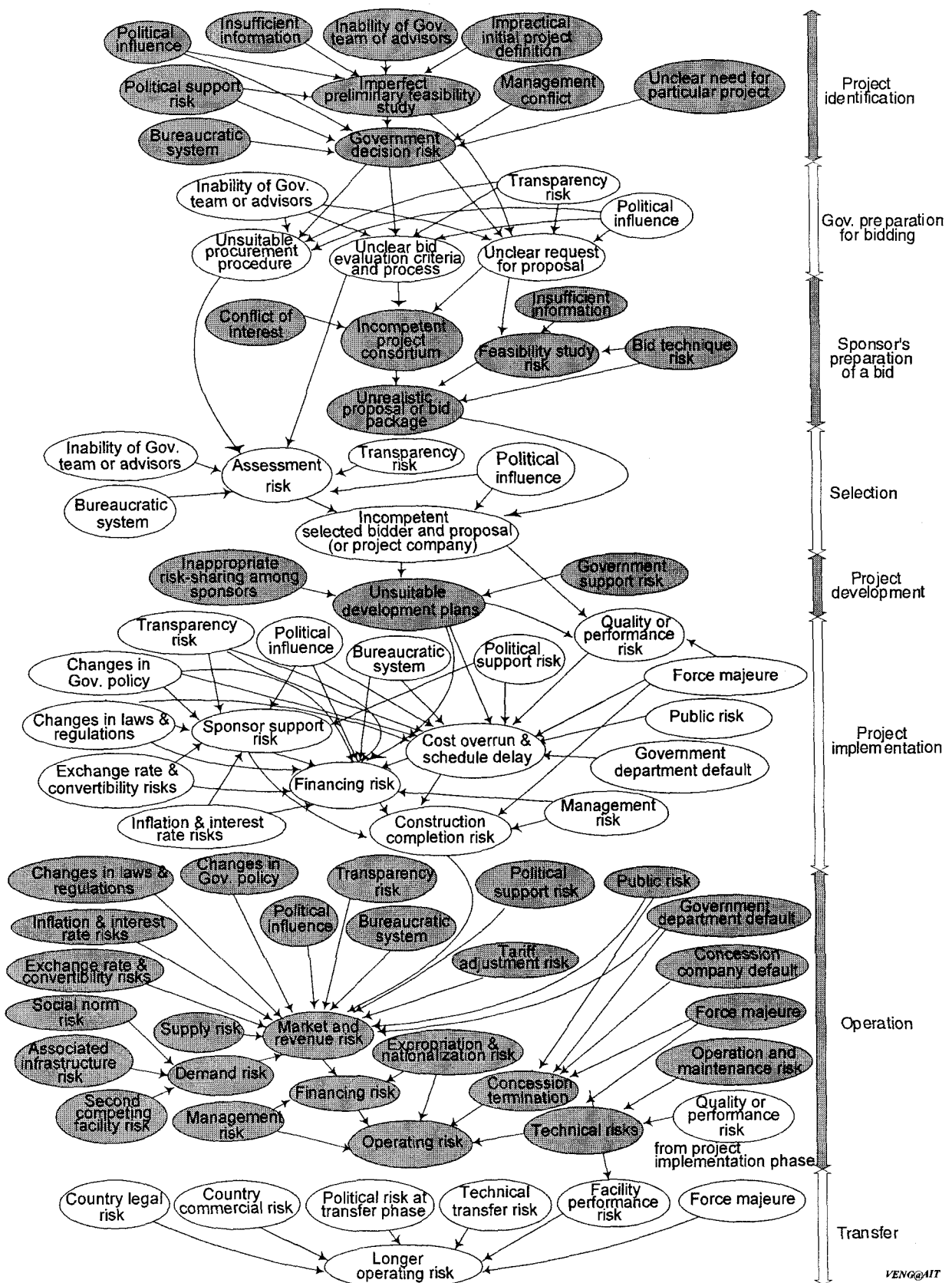


Figure-3. General Model of BOT Risks

Project identification phase:

The major task of project identification phase is to analyze feasibility of the proposed project and make decisions on whether to pursue the project under BOT scheme. Once the decision to go is made, it is then necessary to define project scope and objectives so that the project may be started.

In Thailand, however, the kick-off is not always easy because of such factors as *lack of political support*, *political influence*, and *bureaucratic system*. In this phase, private companies may suffer from time-consuming and complex approval processes across state's authority units and a stream of changes due to political influences. In Thailand, there are numerous approvals needed during project, and those approvals belong to different regulatory authorities depending on the types of jobs. The authorities generally tend to manage their territory dictatorially, asking complex and independent agendas for contractors. In addition, government organizations are likely to be reluctant to accept private sector participation in public works; therefore, obtaining their supports is very difficult.

Other risk to be considered in this phase is *information availability*, with which reliable analysis for estimations and cashflow forecasting becomes difficult. "*Inability*" of government teams or their advisors sometimes causes serious problems, too. Because government people lack of experiences of BOT projects, it is not surprising that they make mistakes leading to delay of projects.

Government preparation for bidding phase:

At this phase, government authorities in charge of the proposed project initiate the bidding procedure. Here, specific attentions should be put on *transparency risk* and *political influence*. These are caused by some politicians who try to hide and distort important project information in order to gain personal benefits. It should also be remembered that inability of government teams or their advisors is a potential problem in this phase as identified in project identification phase.

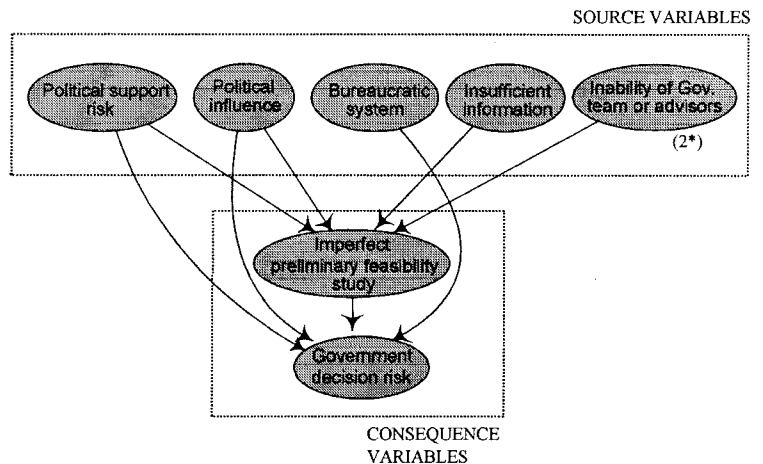


Figure-4. Project Identification Phase

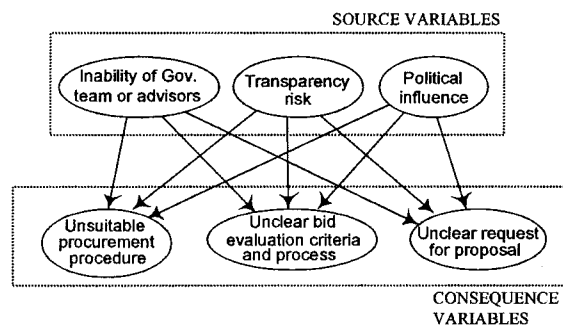


Figure-5. Government Preparation for Bidding Phase

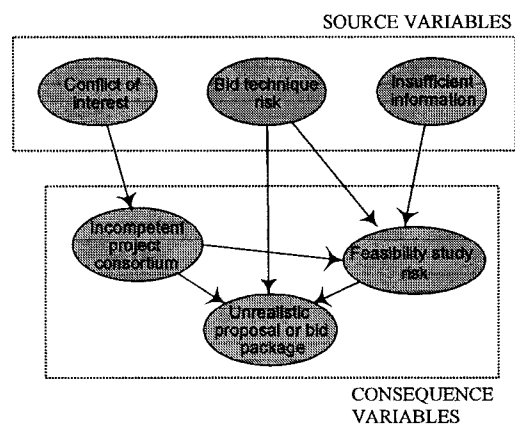


Figure-6. Sponsor's Preparation for Bid Phase

Sponsor's preparation of bid phase:

The source risks in this phase mainly arise from private companies, or sponsors. They are *conflict of interests* among the members of the sponsor company, *unethical bid package* submitted by the company and *insufficient information* hidden by the company. When private firms form a joint venture or consortium, it often occurs that each member wants to be the "head" of the organization so that it holds the "power" to control the whole project.

Other problem in this phase is that sponsor companies do not disclose important information and conditions included in their estimation. These adverse attitudes of private company often result in unrealistic proposal or bid package that lead to project failure.

Selection phase:

During selection phase, the government authority evaluates bids, negotiates with the investors, and selects the BOT company. The influential factors in this phase are *bureaucratic system*, *transparency*, and *political influence*. It is recognized that these factors, as identified in previous phases, sometimes lead to time-consuming evaluation and approval as well as the changes of project scope and objectives.

Development phase:

The major task in this phase is to develop rigid financial solutions. Accordingly, allocation of risks and benefits may also be defined in contracts or agreements. One of critical factors in this phase is *inappropriate risk sharing among sponsors*. *Government support* is also a key to success so that the sponsors can pave the way into country laws and regulations. It should be understood that the consequences of these factors affect development plans and the following activities in project implementation and operation.

Project implementation phase:

In this phase, actual construction starts. The risks in this phase are *inflation and interest*, *exchange rate and its convertibility*, *changes in government policy*, *political influence*, *bureaucratic system*, and *public*.

The fluctuation of economic factors such as *inflation*, *interest rate*, and *exchange rate* sometimes become devastating. Thai have experienced approximately 50% of baht devaluation in the last year. While such drastic change may not happen very often, it should be understood its consequence is sometimes detrimental.

From political aspects, *changes of government policies* as a result of cabinet reshuffle could lead

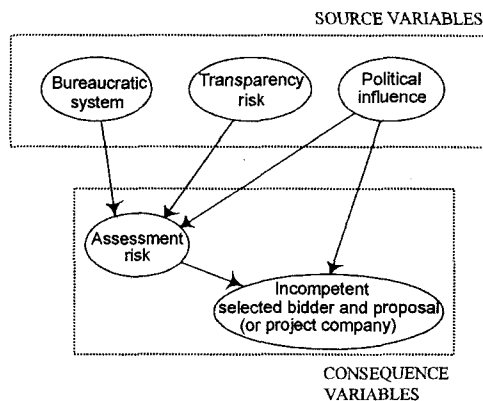


Figure-7. Selection Phase

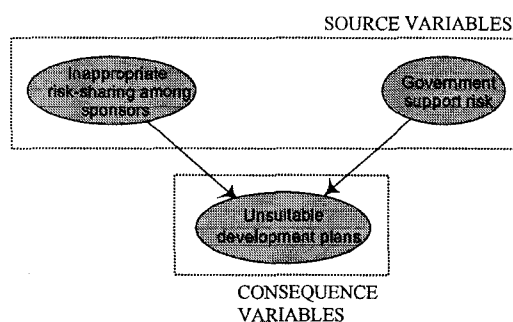


Figure-8. Development Phase

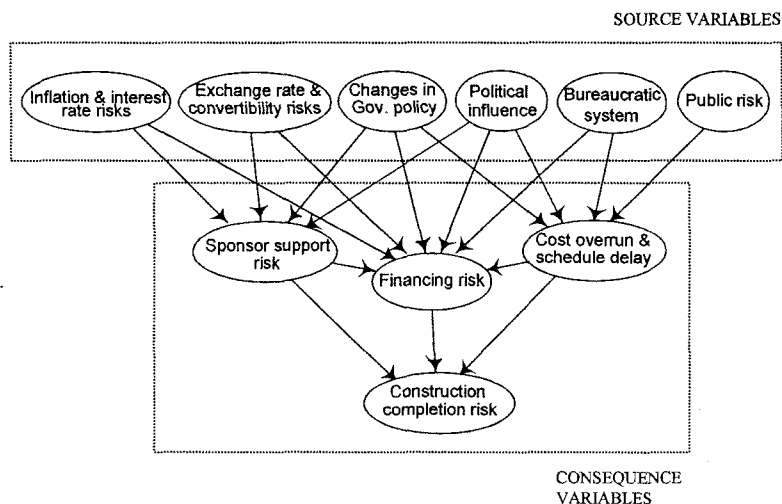


Figure-9. Project Implementation Phase

to the disruption of on-going projects. This may be really a distinctive phenomenon of this country. With respect to country legal process, the *bureaucratic system* is also an influential factor that would affect delay of construction.

Environmental and safety concerns protested by public, or non-government organization (NGO) should be given special attention during construction. The protests often result in changes of project scope and objectives, and force the contractors to do costly additional work in order to satisfy the protesters' requirements.

Operation phase:

The major concern of sponsor company in operation phase is earning revenues out of the services. Therefore, any risks arising from market conditions become critical during this phase. Many of such risks are normally external factors that are uncontrollable from investor's standpoint (Table-10).

In this regard, the specific attention should be first given to *changes of government policies*. This is a driving factor that leads to instability of market conditions directly. It may sometimes causes breach of initial contracts or agreements by the government. In the worst case, changes of government policies could happen in two forms: *expropriation* and *nationalization*, which involves the taking of all business and property from private enterprises.

Macro economic indices such as *exchange rate and its convertibility* are always of concern during operation. Since the loan may be paid back in foreign currency such as Japanese yen and U.S. dollars, not only the fluctuation in exchange rate, but the *convertibility of local Baht* to these foreign currencies is also a factor considered by investors. The fluctuation of *inflation and interest rates* is also critical market risks in repaying the loan and dividends to investors as understood easily.

In addition to the macro economic factors, *public opinion* such as opposition against raising toll fees is of concern in this phase. This event as actually observed in some BOT projects would lead to difficulty in cashflow management. It is interesting to know *social norm* of Thai in travelling, that is, Thai people prefers using cars or buses to trains when they move. If the services were not convincing enough to change people's preference, the operation would fail.

Transfer phase:

The transfer of BOT projects has not taken place in Thailand yet. Therefore, all the risks shown in Figure-11 are "agnostic." Although the government

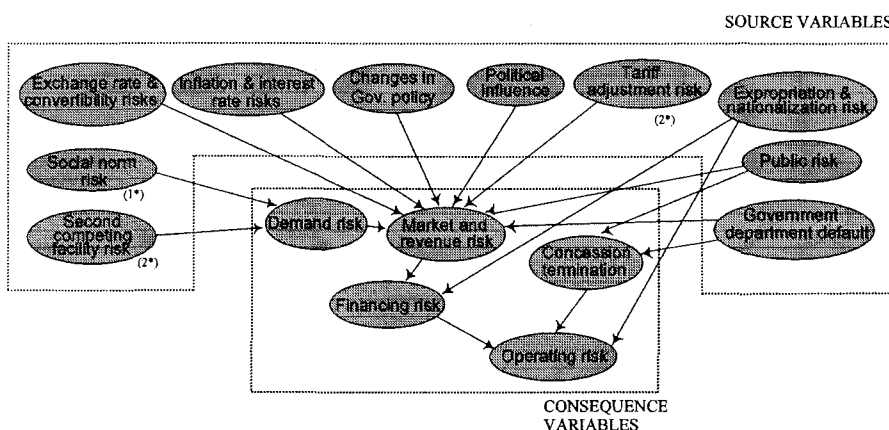


Figure-10. Operation Phase

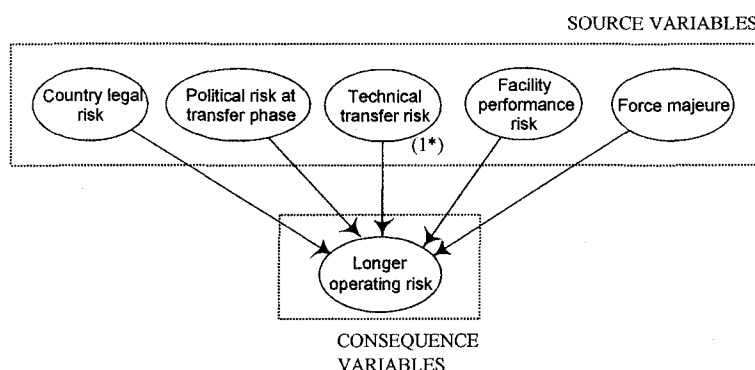


Figure-11. Transfer Phase

may ask to return the facilities back, they may find it advantageous to allow the old sponsor company to operate and maintain the facilities under a negotiated extension, or tender a new concession. In any way, further study will be necessary to analyze anticipated risk factors in the future.

6. Conclusion and Future Research

One of the conclusions obtained by this research is that risks are potentially inherent to political and public reasons. The political and public risks are crucial because of its potentiality to affect other economic as well as social problems both directly and indirectly. In addition, they may lead to default of government departments under which the government agency can not conform to the initial agreements given to project company.

Frequent change of government and public influence should be given much attention as driving influences that bring about source risks for BOT projects in Thailand. The frequent changes of government exacerbate, for example, political influence, transparency, changes of government policies and regulations, bureaucratic system that include complex and time-consuming approval

procedures, as principal source risks that indirectly affect projects. These risks are particularly crucial until actual construction ends. Environmental and safety concerns protested by public or non-government organization become major source risks during implementation phase.

After commencement of construction, the amount of risks begins to increase sharply as funds are advanced to purchase materials, labor and equipment. Interest charges on loans to finance construction also begin to accumulate. The risks would peak in the early operational years when the projects are under the greatest pressure of interest burden in repaying the debt. During these phases, *interest rate, inflation rate, and exchange rate with its convertibility to foreign currency* become crucial source risks on which heavy attention is always paid.

It is assumed that the country specific, common risks will be repetitive while project specific risks may change over time from one project to another. The underlying characteristics of common risk factors as identified in this research won't change quickly. Therefore, it is expected that the findings in this research serve project sponsors or investors who intend to join BOT projects in Thailand in the future.

For future research, the following studies are recommended. First, quantitative analyses can be

done based on the models developed in this research. The analysis may include probabilistic calculation of ranking the identified source risks in order. Then, depending on this analysis, risk management strategies could be developed. This may include research on risk sharing in contracts and financial solutions, focusing on, for example, *partnering* with foreign private sectors.

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タイ国におけるBOT方式による交通インフラプロジェクトのリスクについて

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本研究は、タイ国におけるインフラ整備事業の中でBOT方式による交通施設建設におけるリスクの抽出を行ったものである。本研究の特徴は、1)タイ国に特有の政治、社会および経済状況から発生するリスク要因に着目した点、2)BOTの各建設段階(phase)ごとに、様々な問題を誘発するような「素因」(source risks)の抽出を行った点、および3)素因とそれから発生する帰結(consequence)の関係を、BOT事業の専門家および経験者の知識によりモデル化した点、にある。

研究の結果、タイ国で民活事業を行う場合、問題を誘発する素因として、1)頻繁な政府の交替による政策・規準の変更、2)政治家の各建設段階での意思決定への介入、3)複雑で時間のかかる許認可プロセス、4)特に、交通施設の場合、タイ国民の交通手段に対する選好、に留意することが重要であることが示された。

BOT方式は、タイ国を始めとするアジア諸国で、民間の技術力や資金調達力を“公共工事”に導入できる手段として、国家予算不足を補う方法として導入がなされてきた。本研究は、タイ国を例として、BOT事業のホスト国の政治社会状況を中心としたマクロ的なリスクの関連を構造化した。その結果は、本国内だけでなく、海外の投資家のBOTリスクに対する知識の向上に貢献できるものであると考えられる。