CHAPTER – 2

LITERATURE SURVEY

2.1 INTRODUCTION

Public–Private Partnership (PPP) in construction is gaining in popularity [12]. Project delivery method of Build-Operate-Transfer (BOT) increases the commencement probability of public construction works through private investments. Public construction works worldwide that adopt the BOT model as their project delivery method are increasing gradually. Although many BOT projects have been implemented at various stages, some projects encounter major obstacles for advancement. The importance of Infrastructure has been summarized as under:

1. Infrastructure increase economic output directly by making private capital more productive, by increasing the attractiveness of a region, and by the stimulation of the construction market.
2. As the infrastructure network expands, national economic and financial efficiencies grow.
3. Infrastructure has long term effects on the type of social structure which will be developed – in particular the growth of urban centers and their linkages.
4. Inadequate infrastructure maintenance can cause an increase in costs to producers and, in extreme cases, a breakdown in economic activities.
5. Badly planned sequencing of infrastructure provision can tie up capital unnecessarily.

In the vast majority of cases the infrastructure is delivered or, at least, facilitated by governments. Infrastructure is too central to the health and wealth of the nation.
Government agencies will often rank potential projects in accordance with their benefit-cost ratio and build facilities as money becomes available. Contracts with private companies for the design and construction are common, sometimes with some degree of contractor cash flow financing. The facility will then be handed over to the government agency responsible for operation and maintenance. This will continue to be the most common means of delivery for infrastructure that fulfils a social need but is not capable of generating a profit to a private investor.

For increasing private participation by providing them incentives, in recent years, governments have been increasingly adopting Build–Operate–Transfer (BOT) contracts for large infrastructure projects. [13]

Many fundamental issues significantly distinguish PPPs from traditional design-bid-build contracts. These include: (1) a broad range of uncertainties and risks associated with the long-term PPP contract; (2) radical realignment of risks, responsibilities, and rewards among multiple project participants; (3) the private-sector partner undertakes far more responsibilities and assumes much more and deeper risks than a mere contractor; (4) nonrecourse or limited recourse and off-balance transactions; and (5) Complicated contractual arrangements between project participants [14][8][15][16].

Studies in this chapter have been focused in addressing the following issues.

- Risks and uncertainty associated with large infrastructure projects.
- Delays in completion of construction projects.
- Critical success factors for traditional construction projects.
- Critical success factors for BOT construction projects.
- Prequalification and selection of contractor/promoters/concessionaire.
- Financing BOT projects.
2.2 RISK AND UNCERTAINTY

2.2.1 General

A review of the literature reveals that the concepts of uncertainty and risk are often used interchangeably. However, risk is said to exist in situations where each outcome has a known probability of occurrence, whereas uncertainty arises where the probability of the outcome of events is unknown.

According to Oxford Dictionary of English the term “risk” means: “hazard, chance of a bad consequence, loss, exposure to chance of injury or loss.” Accordingly this definition illustrates one problem with the term risk – its ambiguous use as a synonym of probability or chance in relation to an event or outcome. Further, Hillson argues that the common usage of the word “risk” only centers on the downside negative outcomes. Risk is often related with adversity, things that may go wrong and threats to the project. With such a conception, project risk management tends to focus on processes and methods that reduce the effect of threats. More lately, however, it has become more common to conceive risk as encompassing both upside and downside effects.

For example: in the guide to the Project Management Body of Knowledge (PMBOK) published by PMI [17] risk is defined as “an uncertain event or condition that, if it occurs, has a positive or negative effect on a project objective”.

2.2.2 Risk Associated With Major Infrastructure Projects

Merna and Smith [18] classified risks first into two broad categories of global and elemental—the first being those deemed to be generally outside the control of the project parties (including political, legal, commercial, and environmental factors), and the second including project risks (such as construction, design, technology, operation, finance, and revenue risks).
Songer et al. [19] demonstrated a Monte Carlo risk assessment methodology for revenue dependent (privatized) infrastructure projects.

Akintoye et al. [20] noted the conscious transfer of risk to the private sector in the U.K.’s PFI (Private Finance Initiative) and conducted a survey on perceptions of the relative importance of 26 postulated risk factors, such as design risk, construction cost risk, environmental risk, and legal risk. They presented rankings of the importance of such risks by the different groups surveyed, i.e., contractors, clients, and lenders, as well as a consolidated all respondents ranking.

Tam and Leung [21] found that political risks were the most difficult to handle in comparison with financial risks, while technical risks were the easiest to handle, even on projects incorporating innovative technologies.

Lam [22] made a sectoral review of risks associated with major infrastructure projects as number of these projects had run into daunting risks resulting in their cancellation, serious delay and cost overruns.

Charoenpornpattana and Minato [23] presented a detailed identification of privatization-induced risks in transportation projects in Thailand. Their risk classification itself grouped risks under five broad headings of political, economic, legal, transaction, and operation.

Salzmann and Mohamed [24] identified families of risks (containing factors and sub-factors) found to need addressing in Build-Own-Operate-Transfer (BOOT) projects. Their identification of 12 risk factors (such as project characteristics) together with 58 risk sub-factors in the development phase and 11 risk factors with 39 risk sub-factors in the operations phase was based on a detailed survey of available literature.
Shen et al. [25] studied the construction industry in China which is developing fast towards the international procurement practice, and such development has attracted many foreign firms into the Chinese construction market through the formation of Sino-foreign joint ventures. Joint ventures have become an important sector in the Chinese construction industry. A significant degree of risk is involved in joint venture investments. Thus, foreign firms increasingly intend to spend more effort in studying proper strategies of managing risks in their joint venture businesses.

A process to cope with these varied risks was proposed by Miller and Lessard [26]. They pointed out that risks first need to be dissected into categories such as (1) market-related: demand, financial and supply; (2) completion: technical, construction and operational and (3) institutional: regulatory, social acceptability and sovereign.

Cano and Cruz [27] developed a generic project risk management process that had been particularized for construction projects from the point of view of the owner and the consultant who assists the owner.

An appropriate combination of tariff structure and adjustment mechanism can be effective to manage key risks of BOT projects. Ye and Tiong [28] had done simulation that shows that a well-designed tariff can create a “win-win” solution for both project promoter and the host government.

Ghosh and Jintanapakanont [29] reviewed the literature to identify essential risk variables associated with infrastructure projects. Based on these risk variables, conducted a survey to isolate and assess the critical risk factors for a mass rapid-transit underground rail project (Chaloem Ratchamongkhon Line) in Thailand. Nine critical factors with 35 items were extracted. Critical risk factors obtained through the factor analysis were assessed to gain better understanding of their importance and impact on project management.

Gupta [30] demonstrated the effects of major risks by way of some case studies (Table 2.1 and Table 2.2)
<table>
<thead>
<tr>
<th>Project name/ location</th>
<th>Risk mitigation measures</th>
<th>Residual risks</th>
<th>Risk consequences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Akkuyu Power plant, Turkey</td>
<td>• Electricity authority undertook to purchase power from the concessionaire at fixed price</td>
<td>Absence of sovereign guarantee on: • Repayment of external debt • Purchase of minimum amount of electricity • Exchange rate • Convertibility of revenues into hard currencies</td>
<td>• Export credit agencies unwilling to provide export credits • Sponsors and lenders unwilling to proceed</td>
</tr>
<tr>
<td>Dabhol Power Plant, India</td>
<td>• Central-government counter-guarantees that State Electricity Board pays for electricity supplied. • State Electricity Board commits to take 90% of power even in non-peak hours. • Free repatriation of dividends and interest on foreign equity and loans.</td>
<td>• Fuel has to be imported with bureaucratic procedures for clearances and approvals. • Many locals are not used to paying for power supply, making it politically awkward to enforce collection. • Lack of competitive tendering aroused skepticism of accountability.</td>
<td>• 1st phase changed to use local naphtha as fuel • Legal challenge by trade union body (cleared). • Successive State governments reviewed contract, nearly scrapping it. • Work interrupted for over 1 year before being</td>
</tr>
<tr>
<td>Pagbilao Power plant, Philippines</td>
<td></td>
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<td>----------------------------------</td>
<td></td>
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<td></td>
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<tr>
<td>• Protection from forex fluctuations</td>
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<td></td>
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<tr>
<td>• Guaranteed return on equity for a specified minimum availability</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>• Tax holidays</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Multilateral agencies (IFC, CDC, and ADB) invested equities and provided loans</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Electricity authority undertook to construct transmission facilities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Bonus for early completion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Capacity and energy fees payable in US$ and pesos</td>
<td></td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Legality</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Environmentalist’s objection</td>
</tr>
<tr>
<td>• Allegedly high capital costs and tariffs</td>
</tr>
<tr>
<td>• Tax holidays</td>
</tr>
<tr>
<td>• Alleged high capital costs and tariffs revived in Dec 96 after a compromised reduction of capital cost and tariffs</td>
</tr>
<tr>
<td>• State government obtained right to take a 30% stake in the project</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Legal battle</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Legal battle challenging the proper issuance of the environmental compliance certificate</td>
</tr>
<tr>
<td>• Injunction sought by local groups against the project agreement on ground of public interest, public safety and health.</td>
</tr>
<tr>
<td>• 16% of cost spent on pollution control</td>
</tr>
<tr>
<td>• Delay start-up</td>
</tr>
<tr>
<td>• Expansion plan at odds for fear of rekindling</td>
</tr>
</tbody>
</table>
Karachi Power Plant, Pakistan

The government had issued guidelines for 3 other projects as follows:
- Guaranteed return on equity
- Guarantee against currency depreciation
- Guarantee payment by power purchasers

Government insisted on the use of local coal, which investors feel uncertain as to quality and quantity
- Slow progress of geological survey offered little help to verify local coal reserve.
- Promoter chose site near coast for import of coal, but government objected

Alternative inland site locations offered by government, but these require substantial investment in building connecting roads.
- Impasse affected progress of negotiation.

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**Table 2.2: Risk Aspects of Expressway Projects**

<table>
<thead>
<tr>
<th>Project name/location</th>
<th>Risk mitigation measures</th>
<th>Residual risks</th>
<th>Risk consequences</th>
</tr>
</thead>
</table>
| North-South Highway, Malaysia | • Government guarantees to reimburse concessionaire for traffic volume shortfall, foreign exchange and interest rate losses  
• Obligatory contribution to                                                  | • Difficult terrains: the highway construction ran through abandoned tin mines with unknown condition, jungles, mountains and swamps.  
• Design changes to overcome                                                | • Cost overruns entailed additional loan and equity financing  
• Completion 15 months ahead of schedule brings additional toll               |
<table>
<thead>
<tr>
<th>Equity by the 48 participating subcontractors, effectively providing completion incentives</th>
<th>unexpected technical difficulties</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Inflation on cost due to construction boom in Malaysia</td>
<td></td>
</tr>
<tr>
<td>• Allegation of political patronage</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Second Stage Expressway, Thailand</th>
<th>Disputed broke out on the following issues:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Government willing to share revenue from existing toll road system</td>
<td></td>
</tr>
<tr>
<td>• A decree was issued to facilitate acquisition of land</td>
<td></td>
</tr>
<tr>
<td>• Corporate income tax relief</td>
<td></td>
</tr>
<tr>
<td>• Tax exemptions on dividends</td>
<td></td>
</tr>
<tr>
<td>• Upon adversities in interest rates, economic conditions, relocation of utilities, government interference, unanticipated</td>
<td></td>
</tr>
</tbody>
</table>

| Revenue (upside result)  |
|---|---|
| • Banks suspended loan in 1993 halting project  |
| • Completed stretch of 20 km closed for 5 months due to row.  |
| • Government obtained court order to force open completed stretch.  |
| • Concessionaire claimed that US$80 million was owed from the defunct revenue sharing agreement  |
| • Major share- |
| Ground conditions, force majeure etc., concessionaire would be entitled to adjust revenue sharing proportions, toll levels, and extension of concession period. | Kumagaigumi, pulled out by selling its 65% share to Thai contractor and bankers in 1994 • Shock-wave sent across the international financing community, posing questions of financiability of subsequent projects | Gtrangzhou-Shenzen-Zhuhai Highway, China • Project guaranteed by GITIC, the investment arm of the Provincial government • Peoples’ Insurance Co. of China covers political risk of policy change and nationalization • No dividend or Financial close delayed for 2 years due to Tiananmen event in 1989 • The land acquisition process (8000 acres) took 6 years and US$132 million to complete. • The 16 km Boca Figris Bridge, which forms an essential link of the Delayed commencement but Phase I was opened to traffic earlier than agreed with financiers. • Developer applied for doubling of toll due to depreciation of local currency. |
repayment of subordinated loans to be made until Performance Test criteria are met.
- Bonus clause for early completion

entire route, was under threat of take-over by competitor
- Design changes and abortive work (e.g., widening span of bridge already constructed).
- Depreciation of local currency
- Post-completion traffic management not fully in concessionaire’s control.
- Frequent accidents within the first 2 months of operation
- Pilferage of road signs and trespassers
- Non-payment by local authorities and vehicles, leading to accounting problems and revenue loss.

Han, Diekmann and Ock [31] described findings from experiments done to investigate the risk attitude and bid decision behavior in the selection of international projects.

Bing et al. [32] conducted a questionnaire survey to explore preferences in risk allocation. They concluded that some risks should be retained within the public sector or shared with the private sector. As per World Bank(2006) table 1.6 shows some of the abandoned projects in India.

Ng and Loosemore [33] analysed the rationale behind decisions about risk distributions between public and private sectors and their consequences. They also demonstrated the complexity and obscurity of risks faced by infrastructure projects and the difficulties in distributing them appropriately, and gave recommendations to better manage risks in such projects.
Zeng and Smith [34] presented a risk assessment methodology to cope with risks in complicated construction situations and applied fuzzy reasoning techniques to handle the uncertainties and subjectivities that arises in the construction process. They also modified analytical hierarchy process to structure and prioritize diverse risk factors.

Zou, Zhang and Wang [35] prioritized risks according to their significance of influences on typical project objectives in terms of cost, time, quality, safety and environmental sustainability, and scrutinized them from a joint perspective of project stakeholders and life cycle. The study was conducted for construction projects in China.

Ebrahmnejad et al [36] in their paper, made an attempt in identifying common risks in BOT projects. A novel hierarchical structure of risks is presented on the basis of the project-oriented point of view; next, some effective criteria for risk ranking in BOT projects are introduced. The proposed model is used for identifying and assessing risks in Iran BOT power plant project. Finally, the rankings of high risks are determined.

## 2.3 Causes of Delay (Time Overrun) in Construction Projects

Delay in construction projects is considered one of the most common problems causing a multitude of negative effects on the project and its participating parties. Construction delays are for the most part costly, and completing projects on time is beneficial to all project parties. Therefore, it is essential to identify the actual causes of delay in order to minimize and avoid the delays and their corresponding expenses.

Assaf & Al Hejji [7] defined construction delay as “the time overrun either beyond completion date specified in a contract, or beyond the date that the parties agreed upon for delivery of a project.” Delay is also defined as an “act or event which extends
required time to perform or complete work of the contract manifests itself as additional days of work”.

Many researchers have worked to find the causes of delay in construction projects. The major causes of delay identified are summarized in Table 2.3.

**Table 2.3: Causes of Delay in Construction Projects**

<table>
<thead>
<tr>
<th>Researcher</th>
<th>Country</th>
<th>Major causes of delay</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baldwin &amp; Manthei [37]</td>
<td>U.S.</td>
<td>• Weather conditions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Shortages of labour</td>
</tr>
<tr>
<td>Okpala and Aniekwu [38]</td>
<td>Nigeria</td>
<td>• Shortages of materials</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Payment problems</td>
</tr>
<tr>
<td>Al-Barak [39]</td>
<td>Saudi Arabia</td>
<td>• Lack of experience</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Bad decisions in regulating company’s policy</td>
</tr>
<tr>
<td>Mansfield et al. [40]</td>
<td>Nigeria</td>
<td>• Improper financial &amp; payment arrangements</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Poor contract management</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Shortages of materials</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Poor estimates</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Increase in cost</td>
</tr>
<tr>
<td>Semple et al. [41]</td>
<td>Canada</td>
<td>• Increase in scope of work</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Inclement weather</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Restricted access</td>
</tr>
<tr>
<td>Assaf et al. [42]</td>
<td>Saudi Arabia</td>
<td>• Slow preparation and approval of shop drawing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Delays in payments to contractors</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Changes of design/design error</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Shortages of labour supply</td>
</tr>
<tr>
<td>Al-Ghafly MA [43]</td>
<td>Saudi Arabia</td>
<td>• Cash flow problems / financial difficulties</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Difficulties in obtaining permits</td>
</tr>
<tr>
<td>Authors and Location</td>
<td>Country</td>
<td>Issues</td>
</tr>
<tr>
<td>----------------------</td>
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<td>--------</td>
</tr>
</tbody>
</table>
| Ogulana S.O. [44]    | Thailand | - Changes in design & scope and variations  
                            - Delay in making decisions by owner  
                            - Coordination & communication problems  
| Chan and Kumaraswamy [45] | Hong Kong | - Shortage of material  
                           - Changes of design  
                           - Coordination & communication problems  
| Kaming et al. [46]   | Indonesia | - Poor risk management & supervision  
                           - Unforeseen ground conditions  
                           - Poor decision making involving all project teams  
                           - Variations in scope of work  
| Al-Momani [47]       | Jordon   | - Design changes  
                           - Poor labour productivity  
                           - Inadequate planning and resources shortages  
| Augustine and Mangvwat [48] | Nigeria | - Poor design  
                           - Change orders / design and variation  
                           - Inclement weather  
                           - Unforeseen site conditions  
                           - Variation in scope of work  
| Rehman et al. [49]   | Malaysia | - Financing & late payment for completed works  
                           - Improper planning  
                           - Under-estimation of time for projects  
                           - Frequent changes in design & materials  
                           - Poor site management  
|                      |          | - Financial problem  
                           - Clients influence  
                           - Manpower problem  
                           - Poor site management  |
<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Location</th>
<th>Problems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tommy Y. Lo et al. [50]</td>
<td>Hong Kong</td>
<td>Approvals by authorities, Sub-contractors, Design Problem, Construction method, Additional work and variation in scope of work</td>
</tr>
<tr>
<td>Ajibade A. A. &amp; Henry A. O. [51]</td>
<td>Nigeria</td>
<td>Unrealistic contract duration, Poor site management &amp; supervision, Shortage of working capital, Exceptionally low bid, Unforeseen ground conditions, Inexperienced contractor, Works in conflict with existing utilities</td>
</tr>
<tr>
<td>Assaf S.A. &amp; Al – Hejji S. [7]</td>
<td>Saudi Arabia</td>
<td>Change orders by owner, Delay in progress payments by owner, Ineffective planning &amp; scheduling by contractor, Poor site management, Shortage of labour, Difficulties in financing</td>
</tr>
<tr>
<td>Iyer K.C. &amp; Jha K.N. [52]</td>
<td>India</td>
<td>Conflict among project participants, Hostile socioeconomic environment, Owner incompetence, Indecisiveness of project participants, Harsh climatic condition at site</td>
</tr>
<tr>
<td>Authors</td>
<td>Location</td>
<td>Critical Success Factors</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>----------------</td>
<td>----------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Murali S. & Y.W. Soon [53]    | Malaysia       | • Contractors improper planning  
• Contractors poor site management  
• Inadequate client finance and payments for completed work  
• Problems with sub-contractors  
• Lack of communication between parties  
• Poor quality of work requiring reworking |
| Yang, Cheng & Kao [54]        | Worldwide      | • Improper contract planning  
• Debt problem  
• Uncertainty on political issues  
• Government-finished items |

2.4 CRITICAL SUCCESS FACTORS FOR CONSTRUCTION PROJECTS IN GENERAL

Success or failure of any project is greatly influenced by the performance of cost, time, and quality aspects of a project.

The identification of the critical success factors (CSFs) will enable the limited resources of time, manpower and money to be allocated appropriately [55].

Ashley et al. [56] identified 46 factors contributing to project success and grouped them into five areas including (1) management, organization and communication: (2) scope and planning: (3) controls: (4) environmental, economic, political, and social: and (5) technical, Based on the study of eight projects with average performance and eight outstanding projects, they found significant differences between the average and the outstanding projects in six factors including planning effort in construction and design,
project manager goal commitment, technical capabilities, scope and work definition, and control systems.

Schultz et al. [57] classified critical success factors in two groups and concluded that these groups affect project performances at different phases of implementation. The first group is referred to as the strategic group that consists of factors like project mission, top management support, and project scheduling. The other group is the tactical group, which consists of factors like client consultation and personnel selection and training.

Pinto and Slevin [58] identified ten critical factors including project mission, top management support, project schedule/plans, client consultation, personnel, technical tasks, client acceptance, monitoring and feedback, communication and trouble-shooting. All of them were considered as critical for success at various stages (conceptual, planning, execution and termination) of project life cycle.

Mohsini and Davidson [59] examined the effect of six variables of inter-organizational conflict on project performance in the traditional building process.

Larson [60] stated that project success can be better assured if participants work together as a team with established common objectives and defined procedures for collaborative problem solving.

Songer and Molenaar [61] identified 15 characteristics of successful projects through literature review and unstructured interviews of academia and public sector agency representatives. Eighty-eight public-sector representatives were asked to rate the importance of these characteristics through a questionnaire survey. They found that the top five important project characteristics were well-defined scope, shared understanding of scope, owner construction sophistication, adequate owner staffing, and established budget.

Mo and Ng [62] conducted a survey on architects and builders views on the D&B procurement method in Hong Kong. Their results showed that the quality of the client’s
brief was rated as the most important project success factor, while the client’s and the contractor’s experience in D&B, good working relationship, and proper channel of communication were also critical.

Chitkara [63] pointed out inadequate project formulation and the improper management of the projects as the primary reasons for project failures.

Rowlinson [64] stated that critical success factors are those fundamental issues inherent in the project, which must be maintained in order for team working to take place in an efficient and effective manner. They require day-to-day attention and operate throughout the life of the project.

Chua et al. [55] maintained that success of a construction project was determined by four aspects, namely: project characteristics, contractual arrangements, project participants, and interactive processes. Project characteristics include external (e.g., political and economical risks, impact on public efficiency of technical approval authorities, adequacy of funding, and site limitation and location) and internal characteristics (e.g., constructability, pioneering status, and project size).

Abdul Aziz [65] studied Malaysia’s privatized national sewerage project and expressed some of the major concerns of the public towards infrastructure privatization.

Zhang and Kumaraswamy [1] identified and discussed various issues that governments need to deal with, for the BOT mechanism to work smoothly. Those issues were further illustrated by relevant examples from Hong Kong experience in evolving an effective BOT project management framework for transportation/tunnel projects.

Chan et al. [67] asserted inter-organizational teamwork as a major factor in ensuring project success.

Lim and Ling [68] found that the client’s role is an important ingredient in achieving the project success.
Abraham [69] also studied critical success factors for the construction industry.

Gupta [30] considered external and internal project characteristic aspects independently, and also made emphasis on elements of monitoring and control aspect for the success of a project.

### 2.5 CRITICAL SUCCESS FACTORS FOR BOT PROJECTS

Research and discussions about CSFs for BOT projects have been previously conducted by Berry [70], Tiong et al. [71], and Morledge and Owen [72].

Tiong [71] had identified six CSFs in winning BOT contracts: (1) entrepreneurship and leadership; (2) right project identification; (3) strength of the consortium; (4) technical solution advantage; (5) financial package differentiation; and (6) differentiation in guarantees.

It has also been shown that there is a positive agreement between promoters and governments on the importance of these six CSF’s even though the order of ranking on importance of the CSF’s may be different.

Tiong and Alum [73] had further identified distinctive elements of winning proposals in competitive BOT tendering from the subfactors of the CSFs of technical solution advantage, financial package differentiation, and differentiation in guarantees.

Gupta and Narasimham [74] identified additional CSFs for promoters to win BOT contracts: ability to provide a suitable transfer package, built-in flexibility for future growth and changes, supportive and understanding community, and short construction period.
Tam [75] had analyzed the successful and failing examples of BOT projects in Hong Kong and Bangkok and concluded the ingredients of a successful BOT project.

Zhang [76] studied critical success factors for public-private partnerships in infrastructure development. Various success factors have been identified through case studies, literature review, and interviews/correspondence with worldwide PPP experts and practitioners. These success factors are further analyzed, distilled, coded, and finally classed into five main CSF aspects: (1) economic viability, (2) appropriate risk allocation via reliable contractual arrangements, (3) sound financial package, (4) reliable concessionaire consortium with strong technical strength, and (5) favorable investment environment.

Iyer and Jha [52] identified 55 attributes responsible for impacting performance of the projects. These attributes were then presented to Indian construction professionals in the form of a questionnaire. Statistical analysis of responses on the attributes segregated them into distinct sets of success attributes and failure attributes. Factor analysis of sets of success attributes and failure attributes separately grouped them into six critical success factors and seven critical failure factors. To understand the extent of contribution these factors have on the outcome of a construction project, a second stage questionnaire survey was also undertaken. The analyses of responses of the second stage questionnaire concluded that two success factors and one failure factor: commitment of project participants; owner’s competence; and conflict among project participants contribute significantly in enhancement of current performance level of the project. The extent of their contribution was, however, been observed to vary for a given level of project performance.

Ahmed Aziz [77] studied two common approaches that have been used by governments for the implementation of public-private partnerships (PPPs): a finance-based approach that aims to use private financing to satisfy infrastructure needs, and a service-based approach that aims to optimize the time and cost efficiencies in service delivery. The implementation of PPPs, however, may suffer from legal, political, and cultural
impediments. In the United States, the federal government enabled a number of acts to ease the impediments and promote PPPs for infrastructure development. Based on a detailed analysis of PPPs in the United Kingdom and British Columbia, Canada, this paper describes principles that would characterize the implementation of PPPs at the program level (e.g., whether the implementation is successful). The principles pertain to the: availability of a PPP legal framework and implementation units; perception of the private finance objectives, risk allocation consequences, and value-for-money objectives; maintenance of PPPs process transparency; standardization of procedures; and use of performance specifications. Guidelines for successful implementation are explained and discussed in the context of the United States PPPs experience and impediments.

According to Weisheng [78] gaining or maintaining a “contractor’s” competitive advantage is not easy as it is determined by a large number of factors. Identification of critical success factors (CSFs) allows one to reduce the vast number of factors to some manageable few but vital ones. Based on the CSFs, contractors’ limited resources such as money and manpower can be allocated and aligned appropriately for yielding a maximum outcome of overall competitiveness. This paper describes the CSFs identified from a survey study carried out in Mainland China. The ranking analysis of the survey results shows that 35 factors are rated as critical for determining the competitiveness of a contractor. Factor analysis reveals that the 35 CSFs identified can be grouped into eight clusters, namely, project management skills, organization structure, resources, competitive strategy, relationships, bidding, marketing, and technology. The CSFs in this study provide a vehicle for guiding a contractor in managing its resources in order to improve competitive advantage. The study also provides insights into the management of competitiveness for contractors that are operating in the particular context of the Chinese construction industry.

Kumaraswamy and Morris [79] reviewed recent BOT projects and developments in Hong Kong, China (mainland), Laos, Malaysia, India, Sri Lanka, the Philippines, Thailand and concluded that:
Careful evaluation of the suitability of a project for BOT type procurement is critical at the outset, for example, with stable political and legal regimes and suitable socioeconomic conditions with the project being clearly in the public interest, capable of sustaining steady cash flows, and being provided with adequate safeguards against the various risk factors;

A reasonable but not excessive rate of return is needed, with any useful safeguards such as sensible toll adjustment mechanisms to achieve the desired balance;

A proactive, stable, and reasonable (including non-corrupt) sponsor (e.g., government/public sector body) is needed; and

A financially strong, technically competent, and managerially outstanding consortium is required as a franchisee, who should hopefully be attracted by the foregoing conditions.

Bakatjan et al. [80] presented a simplified model to determine the optimum equity level for decision makers at the evaluation stage of a BOT hydroelectric power plant (HEPP) project in Turkey, which takes place immediately after the completion of the feasibility study. The model is the combination of a financial model and a linear programming model that incorporates an objective of maximizing the return of the project from the equity holder’s point of view.

Senturk et al. [81] studied the problems that arose during the implementation of the Izmit Domestic and Industrial Water Supply Project, the biggest privately financed water supply project procured under the BOT model in the world at the time and the first in Turkey. The problems identified were- the scope of the project, equity debt ratio, return on equity, principles of accounting, coordination of State departments, land access, determination of the optimum operation period, & the sale price of the water. To overcome those problems, they suggested that:
• Scope of water production and distribution projects have to include the delivery of the product to the end user.
• Equity debt ratio, must not be enforced to get an optimum total investment cost.
• Return on equity should be based on certain criteria rather than negotiations.
• Conditions dictated by the financers have to be more tolerant in order to achieve an optimum investment cost.
• Principles of accounting have to be declared in advance.
• Coordination of State departments must be achieved.
• Money must be allocated within the finance structure for expropriation.
• Sale price of water must be fixed or ascending with time with the use of refinancing opportunities negotiated at the beginning of the project.

Ayed and David [82] studied that infrastructure in the United States is in need of a large and immediate investment. The funds provided by public agencies are not nearly sufficient to face such a challenge. Build-operate-transfer (BOT) is a delivery/financing system that can be a solution to this problem. A questionnaire survey of large municipalities and state departments of transportation was conducted to determine the extent to which they are using BOT in their large projects, to investigate the implementation of BOT, and the reasons why some government agencies avoid using BOT. The findings indicate that very few agencies use BOT. The reasons why most do not use BOT were reported by the respondents to be the availability of proven alternatives and enough funds, the existence of political barriers, and resistance to change both on the part of government agencies and private sponsors.

Zhen Yu Zhao et al [83] studied Chinese electric power industry which has adopted Build–Operate–Transfer (BOT) approach in a number of projects to alleviate the pressure of sole state-owned investment. Using an extensive literature survey, this paper identifies 31 success factors under 5 categories for Chinese BOT electric power projects. This is followed by a questionnaire survey to exam relative significance of these factors. The
results reveal the different levels of significance of success factors for BOT thermal power projects versus wind power projects.

2.6 PREQUALIFICATION AND SELECTION PROCEDURE

In project management, the problem of choosing the best alternative (or best course of action) or making a complete ranking of a finite set of alternatives is usually encountered. It involves decision making under conditions of risk and uncertainty. In most cases, the problem is focused on the estimate of benefits and costs. It also includes environmental, social and regional objectives as well. The decision has to be taken during the conceptual and the early design phase when the information available is not complete and the decision making environment is governed by uncertainties. Two major problems encountered are:

1. Selecting a suitable project during project appraisal.
2. Selection of a concessionaire/promoter.

2.6.1 Project Appraisal

According to several surveys [84][85], project appraisal in the private sector has systematically concentrated on establishing the financial and technical feasibility of a project.

The emphasis on the financial and technical aspects of projects is understandable from two points of view. First, for private sector companies, the requirement for ensuring financial viability is ultimately related to the survival of the organization; an objective which can never be subjugated. In association, a project that is not technically viable is effectively unfeasible, and in turn would lead to financial problems. Second, and more
pragmatically, both aspects can, to a large extent, be quantified and manipulated. This in turn, leads to an over-confidence in the ‘numbers’.

Lopes and Flavell [86] have criticized the emphasis placed on the financial and quantitative side of projects, defining it as myopic and misplaced. According to them, the methodology of project appraisal should assess the overall viability of a project.

As per Mohamed and McCowan [87] the analysis of a project should be broadened to include other dimensions, such as the organizational and managerial aspects, political aspects, social acceptability, environmental problem etc., depending on the precise nature of the project. These are all risk dimensions which can cause the failure of a project. The view is supported by the result of an large number of audits, conducted by both practitioners and academicians, examining the reasons for success and failure of projects. These studies have suggested that many non-financial factors such as organizational and managerial, political, social and environmental issues can cause the failure of a project despite favorable financial or technical components. Therefore they should be assessed along with the financial aspects when appraising projects. They showed that the three techniques: the net present value, internal rate of return and pay back period investment appraisal techniques have formed the major component of feasibility studies. These techniques are based upon the time-cost-of-money principle and use slightly varied procedures to forecast the expected monetary returns on an investment. The reliability of their output depends upon the accuracy of the deterministic cash flow values and their timings as estimated by the organization. In addition to the crucial uncertainty factor, the above techniques do not allow for the non-monetary (qualitative) factors to be considered in assessing the investment option. These uncertainties are not just prevalent in international projects but also involve the complex risks that are particular to international transactions. A number of authors have described the risks specific to international construction projects [88][89][90][91][92][93].
Messner[91] developed the information framework analysis process model which focused on qualitative tools and does not provide a computational methodology to evaluate the project conditions.

Han and Diekmann [94] developed a comprehensive approach for making stable and systematic go/no-go decisions for international projects. The model developed by them does not concentrated on expert knowledge elicitation and model validation through full-scale experimental case studies by industry participants. Moreover, the model developed caters only to the traditional competitive public sector projects, which are either financed by governments or funded by international agencies. It is not suitable for international design/build projects, international BOT projects, and international private sectors.

The techniques used for evaluation of BOT proposals by government are the NPV method, the score system and the Kepnoe-Tregoe method [95]. Some governments evaluate the commercial and financial package by performing an NPV calculation to discount the project cash flows due to the promoters. The lower is the NPV, the cheaper the offer. The advantage of using the NPV method is that the proposals could be compared based on calculated numbers. The method, however, ignores the relative advantages and disadvantages of the technical solution in different proposals.

In score system, points are given to the selection criteria and the proposals containing the financial package, technical designs and others are evaluated based on the scores obtained. The proposal with the highest score is considered to be the best overall proposal. The advantage of this method is that several criteria are used in comparing the proposals. The disadvantage of the score system is that it assumes that all the criteria are of equal importance.
The Kepnoe-Tregoe decision-making technique has been used in projects to evaluate the BOT proposals. In this technique, the major elements consist of the evaluation statement, the MUST criteria, the WANT criteria and the evaluation matrix. The MUST criteria are mandatory and they must be achieved to guarantee a successful decision and any proposal that cannot fulfill a MUST criterion would be discarded. The WANT criteria are not mandatory. The proposals would be judged on their relative performance against a set of WANT criteria, not on whether or not they fulfill them. The function of these criteria is to give the assessors a comparative picture of proposals. Each MUST and WANT criterion could also be sub-divided into its own set of sub-criteria. Each WANT criteria is weighted by the Selection Committee. The most important criterion would be identified and given a weight of 10. All other criteria would then be weighted in comparison with the first, from 10 (equally important) down to a possible 1 (not important). Evaluations are done on the basis of the MUST and WANT criteria. The total weighted score would give the government a tool for selecting a tentative choice.

Many countries are still at the lower ends of their learning curves on BOT arrangements. Various BOT-type procurement protocols are not yet proven and are still being tried and tested. Therefore, there is a need to benchmark the best practices. There are three key problems associated with BOT projects [96]: (1) availability of experienced developers and equity investors; (2) the ability of governments to provide the necessary support; and (3) the viability of corporate and financial structures. Problems 1 and 3 indicate that the selection of an appropriate concessionaire is critical to the success of a BOT project. Therefore, it is necessary to formulate a workable and efficient selection framework.

Negotiated tendering, invited tendering, and open competitive tendering have been used in the international concessionaire selection practices, among which the open competitive tendering is a trend. The NPV method, simple scoring system, multi-attribute analysis, and Kepner-Tregoe decision-making analysis technique have been used in open competitive BOT tender evaluation. In prequalification and tender evaluation, the
potential concessionaires should be assessed against package criteria that include financial, technical, managerial, safety/health, and environmental aspects.

Tiong and Alum [95] identified that the selection of a suitable concessionaire depends on three elements: (1) the quality of the definition of project-specific criteria; (2) the quality of evaluation of the available tenders; and (3) the quality of the understanding of what these tenders can achieve. The use of a suitable tender evaluation method and the derivation of project-specific tender evaluation criteria are two important issues in the concessionaire selection process.

Zhang et al. [97] analyzed the concessionaire selection process for BOT tunnel projects in Hong Kong and observed that the Hong Kong government had formulated a well-structured concessionaire selection framework, supported by the Kepner-Tregoe technique. BOT characteristics, client objectives, and project attributes were taken into consideration in this framework.

For the better use of the Kepner-Tregoe technique, other supplemental decision-making tools (e.g., brainstorming, group decision methods, and Moody’s precedence charts) can be incorporated to facilitate the generation of a realistic decision statement, the identification of appropriate MUST/WANT criteria, the derivation of their corresponding weights and maximum achievable score points, and the judgment of alternative tender proposals against the MUST and WANT criteria.

The Kepner-Tregoe technique is much more complicated than the simple scoring method, NPV method, or even the multi-attribute analysis. It takes time and effort to determine appropriate decision statement, MUST/WANT criteria, and the relative importance of the WANT criteria. Furthermore, it was recognized that it was forever impossible to determine empirically whether the selection made was better than the one not made, because the project can only be done once.
Zhang [2] had discussed a number of tender evaluation methods and their applications in some countries. These include the simple scoring method, NPV method, two-envelope method, multi-attribute analysis, and Kepner-Tregoe decision analysis technique. These methods can be modified and combined to suit a particular project.

Multiple tender evaluation criteria used in different types of PPP projects worldwide had been explored and generated four evaluation criteria packages for PPP projects in general. They are (1) financial, (2) technical, (3) managerial, and (4) safety, health and environmental.

During tailoring these criteria packages for a specific PPP project, adjustments should be made to reflect the revised risk allocations in that particular PPP project, the uniqueness of the specific concession and the composition of the concessionaire, the resources and capabilities of, and the role played by, each constituent company.

The Chinese construction practice has its own characteristics, such as governmental regulations, professional qualification systems, and procurement systems. These characteristics present a different practice in awarding construction contract from that in the West. Shen [98] investigated the characteristics of construction business environment in China and identified the key parameters used in assessing contractor’s competitiveness for awarding construction contracts in the market. The parameters are useful tools for assisting contractors in identifying their strength and weakness, thus reengineering actions can be adopted for improving competitiveness.

Zhang [99] proposed a core concessionaire selection protocol that incorporates public procurement principles, best-value selection approach, competitive selection process, and multi-criteria tender evaluation. He concluded that the successful selection of the most suitable concessionaire depends on a number of issues, which include the quality of (1) the general arrangement of the selection process, (2) the definition of project objectives
and core requirements, (3) identifying and defining project-specific criteria, (4) the prequalification and tender evaluation methodology, (5) the understanding of what these tenders can achieve, and (6) the negotiation skills.

Wibowo [100] in his discussion on Zhang [2] submitted additional methods viz. least present value of revenue, lowest tariff/tolls, the shortest concession duration, highest fee paid to the government, least cost to the government, the minimum required amount of government supports in investment and present value method for evaluation of proposals submitted by the concessionaires.

Tiong the proposed contractor selection method employs the fuzzy set theory to deal with the uncertainty and vagueness surrounding the subjective nature of the decision making and multiple attributes decision method to cater to the simultaneous consideration of the multiple decision criteria and multiple decision makers. The expected marginal contribution of each of the decision criteria to the overall goal of decision making, that is, to select a contractor who is technically and financially sound enough to deliver the project as specified, is obtained by using the Shapley value formula. A hypothetical problem is analyzed to illustrate the data requirements, mechanics, and solution nature of the proposed method. It is to develop a valid theoretical framework for the future development of a computer based fuzzy decision model for contractor selection.

The public sector has a long tradition of using the lowest bid as the award criterion for contracts, reliance on non-price criteria is increasing. The purpose of this paper is to describe and explain how public owners use multiple criteria for the award of construction contracts. It is likely that non-price criteria support the alignment of owner and contractor interests, and that bidder behavior should be affected by the likelihood of repeated contracts, and by the transparency of owners’ evaluation procedures. Data from 386 bidding documents reflecting practice in Swedish municipalities in 2003 are analyzed. A typical pattern is a 70% price weight combined with three non-price criteria. Price formulas, translating bid prices into scale values, were found to be based on the
lowest bid, bid spread, or average bid. Non price criteria were evaluated on either relative or absolute merits. Owners should be aware of the incentives that their selection practices create and view this in a policy perspective, whereas contractors should be ready to assess the short and long term values of non price features.

Li [11] proposed a fuzzy framework-based fuzzy number theory to solve construction contractor prequalification issues, which include decision criteria analysis, weights assessment, and decision model development.

Magdy [101] presented a method to assist government agencies in selecting the best contractor(s), the research results shared in this paper are relevant to both academics and practitioners. The paper provides practitioners with a tool for ranking contractors based on best-value and provides academics with selection parameters, a model to evaluate this best-value, and a methodology of quantifying the qualitative effect of subjective factors.

### 2.7 Financing BOT Projects

Zhang [16] suggested that project finance refers to the development of a stand-alone project on a nonrecourse or limited recourse financing structure, where debt and equity used to finance the project are paid back from the cash-flows generated by the project. Unlike corporate finance where lenders examine a company’s general credit and use the cash-flows generated by its entire asset portfolio for debt service, in project finance, lenders look primarily to the revenue stream generated by the project for repayment and to the assets of the project as collateral for their loans. Lenders have no recourse or only limited recourse to the general funds or assets of the project sponsors. The project company is a distinct legal entity; project assets, project-related contracts, and project cash-flows are segregated to a substantial degree from the sponsoring entities [14].
Also develops a methodology for capital structure optimization and financial viability analysis that reflects the characteristics of project financing, incorporates simulation and financial engineering techniques, and aims for win–win results for both public and private sectors. This quantitative methodology defines the capital structure of a privatized project in four dimensions, examines different project participants’ perspectives of the capital structure, optimizes the capital structure, and evaluates the project’s financial viability when it is under construction risk, bankruptcy risk and various economic risks—that are dealt with as stochastic variables!, and is subject to other constraints imposed by different project participants. This methodology also evaluates the impact of governmental guarantees and supports, and addresses the issue of the equity holders’ commitment to project success by initiating the concepts of equity at project risks, value of governmental loan guarantee, and project bankrupt probability during construction. A framework and a solution algorithm are provided for this proposed methodology.

Grimsey and Lewis [102] presented a framework for evaluating the risks of public private partnerships for infrastructure projects and used as illustration a case study of a waste water treatment facility in Scotland which is typical of most PPP projects.

Schaufelberger and Wipadpisut [103] suggested that project risk, project conditions and availability of financing are the major considerations in selecting a financing strategy. The project risks that were determined to be most significant in financing strategy selection were political, financial, and market risks. Based on the study findings, a decision model was developed that can be used by BOT project sponsors in selecting appropriate financing strategies.

Wibowo [100] presented a stochastic approach in infrastructure investment evaluation in his studies. Table 2.4 shows the summary of previous works on stochastic approach in infrastructure investment evaluation. He suggested that If a project is implemented using
a project-finance approach, the debt service payment relies solely on the project cash flows and its assets. His paper identifies, quantifies, and evaluates major financial risks associated with project-financed toll road projects in Indonesia. Ordering payments by priority level, subject to cash availability, enables risk to be evaluated from the different perspectives of multiple parties involved. The paper makes use of Latin Hypercube simulations for risk analysis because they deal with problems involving large and complex systems. To better illustrate the concept, a case study is presented. A sensitivity analysis of the impact of delay-in-adjustment risk and of the adoption of a new regulation related to the toll adjustment is performed and discussed. Simulation results show that the project sponsor fares worse as delay-in-adjustment risk increases but that the creditor can fare better, given that the risk level is low or moderate. Output statistics also reveal that the adoption of the new regulation has negative impact on the project cash flows from both the project sponsor’s and the creditor’s perspectives under different scenarios associated with delay-in-adjustment risk.
**Table 2.4**: Summary on previous works on stochastic approach in infrastructure investment evaluation.

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Sector</th>
<th>Key Areas</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chee and Yeo (1995)</td>
<td>Power</td>
<td>The authors used the Monte Carlo simulation for risk analysis of a BOT power project. Risky variables include electricity generation, unescalated capital expenditure, tariff, O&amp;M cost, etc.</td>
<td>The authors evaluated risk from both equity and project perspectives. No risk to the creditor is presented. It is unclear which assumption is used in setting the discount rate.</td>
</tr>
<tr>
<td>Seneviratne and Ranasinghe (1997)</td>
<td>Road</td>
<td>The authors conducted the Monte Carlo simulation to evaluate alternatives within transportation infrastructure financing. Risky variables include traffic volume at the start of operation, traffic growth, project cost, toll growth, and cost escalation rates.</td>
<td>The authors evaluated risk from equity perspective. In analyzing risk, the authors focused on standard deviation or expected value of the project’s IRRs. No risk to the creditor is presented. It is assumed that debt service is made on an equal installment basis.</td>
</tr>
<tr>
<td>Javid and Seneviratne (2000)</td>
<td>Airport</td>
<td>The authors identified three risks associated with total investment risk in the parking facility development, namely project risk, competitive risk and market risk. The authors proposed the use of Monte Carlo simulation technique. Risky variables considered are demand, parking duration, parking charges, consumer price indexes, interest rate and total investment. Financial decisions were derived from NPV analysis.</td>
<td>The authors performed risk analysis from equity perspective. They applied the present value analysis and defined risk as the probability of the project’s NPV being lower than the target value. No risk to the creditor is presented. It is assumed that debt service is made on an annual equal installment basis, which is then included to the total project expenditure.</td>
</tr>
<tr>
<td>Malini (1999)</td>
<td>Road</td>
<td>The author employed the Monte Carlo simulation for risk evaluation of BOT bridge projects. The simulation outputs include NPV, IRR and payback period. Risky variables include construction cost, O&amp;M cost, and traffic volume. The author examined cash-flows adequacy under different scenarios related to options of project financing.</td>
<td>Risk analysis is performed from equity perspective. It does not address risk to the creditor. It is assumed that the debt repayment is to be made on an annual installment basis.</td>
</tr>
<tr>
<td>Kakimato and Seneviratne (2000)</td>
<td>Port</td>
<td>The authors identified three factors as determinants of financial risk, namely project risk, competitive risk and market risk. The authors conducted the traditional Monte Carlo simulation for risk analysis of port investment and evaluated risk under three different scenarios, namely low-risk, medium-risk, and high-risk scenarios.</td>
<td>The authors evaluated risk from equity perspective. They defined risk as the probability of the project’s IRRs being lower than the target return. In their work, the application of the CAPM theory in determining the MARR of an investment, referred to as cost of equity or the hurdle rate, is also discussed.</td>
</tr>
<tr>
<td>Ye and Tiong (2000)</td>
<td>General</td>
<td>The writers developed the NPV at risk method that incorporates the weighted average cost of capital and dual risk-return methods. This method is applied in decision-making of investment appraisal of projects under uncertainty. The work presents a clearer definition over the used discount rate. Risk variables include construction cost, completion time, O&amp;M cost, market demand, etc.</td>
<td>The use of WACC for discounting cash flows indicates that the risk evaluation is performed from the project perspective. The NPV at risk method is one of criteria available in the financial decision-making under uncertainty. Alternative methods include: mean-variance, mean lower confidence, mean semi-variance, mean-aspiration, mean-entropy, and stochastic dominance (Kira and Ziemba 1977). In some respects, Ye and Tiong’s method resembles mean-lower confidence or mean-aspiration.</td>
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</tbody>
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