A PROPOSED FRAMEWORK FOR GOVERNMENTAL ORGANIZATIONS IN THE IMPLEMENTATION OF BUILD-OPERATE-TRANSFER (BOT) MODEL

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The experience of most developing countries is that benefits of private sector participation models are only achievable under the existence of some prerequisite conditions associated with the legal arrangements, economical and political environments prevailing in a country. The Build-Operate-Transfer (BOT) model, which was developed as a way to acquire necessary infrastructure investments, without affecting a government's budget, had some unsuccessful applications in Turkey as a result of insufficient legal framework, ineffective tendering and evaluation procedures and the inexperience of client organizations in implementing BOT projects. It has been widely accepted that some legal and organizational refinements should be made so that the BOT system could operate in a better way.

The objective of this paper is to propose an effective strategy for governmental institutions involved in BOT projects. In this research, a systematic approach will be introduced to enhance the decision-making process of client organizations. The proposed framework covers; identification of objectives, determination of project viability, development of an effective tender evaluation mechanism, proper risk allocation through contractual arrangements and measurement of project success.

Keywords: BOT, multi-criteria decision making, tender evaluation.

INTRODUCTION

Infrastructure investments play a key role in the acceleration of growth in developing countries. However, most developing countries, particularly Turkey, are experiencing bottlenecks in the utilization of public funds and foreign debt for infrastructural development, which makes the private sector participation models inevitable for the financing of such projects. The BOT model is a method of private sector financing in which a project company is established to plan, finance, design, construct and operate the facility for a concession period before the facility is transferred to the government. Turgut Ozal, Prime Minister of Turkey, was the first in Turkey to use the BOT approach, in 1984 as a part of the Turkish Privatisation Program. However, many urgent energy and transportation projects planned as BOT failed because of:

- poor organization of governmental agencies in packaging the projects,
- insufficient legal arrangements,
- lack of co-ordination between private and public sectors and
- unwillingness of the Turkish Government to provide guarantees against the risks originating from Turkey's unstable economical and political environment.

Although the Turkish Government's May 1996 plans demonstrate that 179 BOT projects amounting to US$32.4 billion are planned for the coming years, it has been reported that only 4 power plant projects of about US$126 million are under

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construction. A working paper of the World Bank (WPS 498) prepared by Augenblick and Custer (1990) revealed that BOT system could be applicable in Turkey if the organizational and legal problems are solved urgently. The objective of this paper is to propose an effective strategy for client organizations to enhance their decision-making processes and solve organizational inefficiencies.

A regulatory framework is proposed to help client organizations answer the following questions, and is structured in five stages;

- Stage 1. Identification of objectives (The right procurement method).
- Stage 2. Determination of project viability (The right project).
- Stage 3. Tender evaluation (The best proposal).
- Stage 4. Contractual arrangements to allocate risks (Allocate risks).
- Stage 5. Measurement of project success (Improve the decisions).

A DECISION-MAKING FRAMEWORK FOR CLIENT ORGANIZATIONS IN THE IMPLEMENTATION OF BOT

Stage 1-Identification of objectives

The objective setting stage that constitutes the initial stage of choosing appropriate procurement method and evaluation procedure is of vital importance in successfully packaging projects, since success of tender evaluation depends on how well the priorities are defined initially.

As most of the client organizations in Turkey (Ministry of Energy and Natural Resources, General Directorate of Highways, etc.) are on the learning curve of implementing private sector participation models, regulatory frameworks that are currently in use have some deficiencies and clear rules that will guide private investors for packaging BOT projects are missing. In fact, in the early applications of BOT schemes realized during 1980s, the public sector anticipated that all of the infrastructure projects could be realized by this “magic” model by means of transferring all the risks to the private sector and thus getting rid of all their responsibilities. However, after a series of unsuccessful applications of the BOT model, government agencies realized that BOT mechanism hardly works unless the government gives bureaucratic support, prepares an adequate legal ground, ensures the right political and commercial environment and gives guarantees so that a balanced risk-return structure can be maintained. As a result of these shortcomings, the BOT mechanism has started to be questioned and ways to improve the functioning of this model are being investigated. Moreover, alternative private sector participation models such as (Build-Own-Operate) BOO, reverse BOT (where the focus is on “financing”) and management and lease contracts (where the focus is on “operation”) come into the agenda of Turkish Government. Consequently, identification of institutional and governmental objectives is critical for the choice of appropriate procurement method as well as the effective evaluation procedure to be utilized if a specific procurement model is chosen.

Stage 2-Determination of project viability

It has been a widely accepted idea that it is essential for the investors to prepare checklists in order systematically to assess the project viability. Preliminary checklists provide the potential investors with critical factors related with technical, economical, and socio-political viability of the project which facilitate identification of the market, technical, financial, political, legal, environmental and country risks associated with a particular project (Ozdogan, 1996). Similarly, public authorities should carry out necessary market researches and pre-feasibility studies in order to assess the applicability of the BOT model to a specific project. Client organizations could share the gathered information with the potential bidders and guide them in preparing their bids. It is proposed that government authorities should ask the following questions in the determination of project viability;

- Is there a real need for the project?
- Can realistic demand projections be assessed to determine long term performance?
- Is the investment cost within the limits that private sector can afford?[4]
- Can the project be funded in an acceptable way?
- Is the project likely to yield a sufficient return to repay the loan?
- Can the public afford to pay for the end product?
- Is the project socially acceptable (positive public reaction)?
- Is the project politically acceptable?
- Does the project necessitate the use of unproven technology?
- Is the project consistent with environmental issues?

The client organization should examine the project's feasibility in the light of the above stated questions and unless the project is proved to be appropriate for BOT implementation, the project should be terminated. The importance of each criterion considered in project feasibility is dependent on institutional objectives and sensitive to governmental policies. For example, in case that a project is not proved to be financially viable because it is anticipated that capital costs cannot be recovered by the generated revenues due to high prices not affordable by end-users, still the government may proceed with the project if political will for the realization of such a project is high. Then, under this circumstance, government should provide the investors with the guarantee that it will make up the shortfall if demand is lower than the expected, give the right to operate existing facilities or subsidize the prices so that payback risk is eliminated. Consequently, client organization should determine the importance of each criterion related with project viability, compare socio-political benefits (non-price factors) with financial and technical viability and find out alternative strategies to reduce risks in case that project is viable for the government but not for the private sector. The potential investors should only be called for bidding, in case that the project is found feasible and in conformance with predefined objectives.

Stage 3-Tender evaluation

Most BOT projects have been delayed or cancelled as a result of ineffective and time-consuming negotiations held between the potential tenderers and authorities of the Turkish Government (Ozdogan, 1996). Pre-qualification and bid evaluation stages are the critical decision-making processes that appear within the overall procurement strategy. So far, the Turkish Government is known to use a tender evaluation procedure that considers only the price of the end product (tariff rate) in energy investments. It is obvious that other objective criteria (concession period, financial status of the project company, risk sharing instruments etc.) as well as subjective

[4] "One of the reasons of Turkey's repeated failures is said to be the unrealistic expectations of what the private sector can undertake"(Tiong, Yeo and McCarthy 1992) is a very sound observation.

criteria (capability, experience, reputation etc.) should be incorporated into tender evaluation through the utilization of a Multi-Attribute Utility Analysis (MAUA) for a more reliable selection process (Walker and Smith, 1995).

Many researchers agree that no consensus has been reached yet on the set of common criteria for bid evaluation (Hatush and Skitmore, 1997). Technical ability, financial soundness, management capability and reputation of the contracting firm could be considered as the outstanding criteria, which are common on most evaluation processes. In the case of BOT projects, evaluation becomes more complicated as the potential bidder is a project company having only one field of activity, which is the realization of a BOT project, and having no other assets or previous performance records. The project is financed on a “project finance basis” instead of corporate financing and on “non-recourse basis”, that is only the cash flows of the project are looked for the repayment of the debt service. Moreover, as the time horizon is usually too long to forecast future changes, assumptions stated in each tender should be evaluated carefully and calculations on tariff/toll structure should be questioned whether they depend on realistic data or not. As the infrastructure project realization with BOT concept brings huge numbers of both objective and subjective considerations, an effective strategy which takes into account all subjective and objective goals should be developed by the governmental organizations. In a study carried out by Tiong (1995), it has been concluded that governments consider the financial package as the most important factor provided that a proper technical solution is settled initially. The most frequently used criteria in the evaluation process of BOT projects could be listed as the initial and future levels of tariffs, financial commitments of bankers, fixed construction schedule, rate of return on investment, guarantees by promoters, concession period, construction costs, equity/debt ratio, land acquisition costs, interest rate for loans, revenue sharing by government and no foreign currency risk exposure (Tiong and Alum, 1997). In this paper, a decision making framework will be developed to guide the client organizations in comparing proposals across multiple criteria which depends on preference and trade-off determination principles as proposed by Keeney and Raiffa (1976).

Proposed evaluation procedure

In this research, a quantitative method has been proposed for incorporating decision-makers’ preferences (priorities) into the bid evaluation process when multiple (both subjective and objective) criteria are to be considered. The initial stage of the model is to structure the previously defined objectives in a more detailed way by using a hierarchy. Constructing a hierarchy of objectives covers subdividing an objective into lower-level objectives of more detail. The decision-maker (authority responsible for evaluating bids) should decide on the level of specification. After generation of a hierarchy, an attribute is selected for each lower-level objective (x_i). Attributes should be objective measures. However, if it is not possible to define an objective scale, a subjective index may be used. The next task is to list the proposals with respect to pre-defined criteria. At the second stage, performance of each proposal for each criterion should be calculated ($p_i(x_i)$). If the attribute is subjective, a scale of performance (equivalent numerical index) should be found to define the performance of an alternative. As the units are different for each criterion, value functions ($v_i(x_i)$) that will reflect the decision-maker’s attitudes and map performance values into a common scale should be determined. The qualitative attribute measurement scale and proposed value functions for different criteria will be demonstrated in the next section. At the final stage, weight of each criterion (w_i) should be calculated for ranking the evaluators with respect to relative importance. Finally, the proposal which gives the maximum overall value should be selected where the overall value is found by the addition of ($w_i * v_i(x_i)$) over all i, for each alternative.

After selecting the proposal that satisfies the objectives of the client organization, the negotiation phase should begin. Governmental organizations should declare the level of guarantees they are willing to provide before the submission of bids so that effective bids which take into account the risk-reducing effects of government guarantees can be prepared by the potential bidders.

An illustrative application of the proposed evaluation procedure

In this section, the procedure will be applied to a hypothetical energy investment. This is the result of brainstorming sessions carried out with participants from the Ministry of Energy and Natural Resources; the client organization responsible for energy investments by BOT in Turkey. A four-level hierarchy of objectives, prepared in the light of expert opinions is presented in Figure 1. Explanations related with each criterion together with their attributes are also given in Table 1. While determining the evaluators, objective attributes are utilized where possible; however, subjective attributes depending on some sort of objective data are inevitably used. It should be noted that proposals which only demonstrate acceptable technical and financial capabilities are compared at this stage since unacceptable ones are already being eliminated during pre-qualification. Performance of a proposal is easy to quantify when an objective measure is used as in the case of tariff rate and concession period; whereas, a scale should be used to quantify the subjective performance of proposals. To facilitate this purpose, a performance scale adapted from Saaty (1980) is used. In fact, only the odd levels are utilized to evaluate performances, as this level of detailing is found to be sufficient for practical reasons (Figure 2). Next step is to evaluate the performance of each proposal on each criterion either by using performance scales for subjective evaluators or using quantitative measures for objective evaluators. Consequently performance on each criterion has different units ($, years, a subjective index, etc.) and decision-makers have different preferences about the level of performance of each criterion. The performances should be determined in terms of a common measure, which is called as “value”. Within the context of this study, out of the 14 value curves constructed, only two of them are presented for demonstrative purposes, in Figure 3. Value curve for an objective attribute such as X1 (initial tariff rate) is given in Figure 3a, demonstrating that the decision-maker evaluates tariff rates below and above the average rate differently.

Tariff rates higher than the average are assigned smaller values than they would be in case that decision-maker was indifferent between tariffs above and below the average rate. This attitude is demonstrated by utilizing two different slopes above and below the average rate creating a discontinuity at the average rate whose value is decided as 0.25, by the decision-makers. Similarly, value curve, which is used for all, the attributes evaluated by subjective indices is presented in Figure 3b. The shape of the curve demonstrates that decision-maker assigns smaller weight to performance below neutral than it would be if he/she were indifferent between performances above and below the average. Moreover, desirable performance levels are highly appreciated.

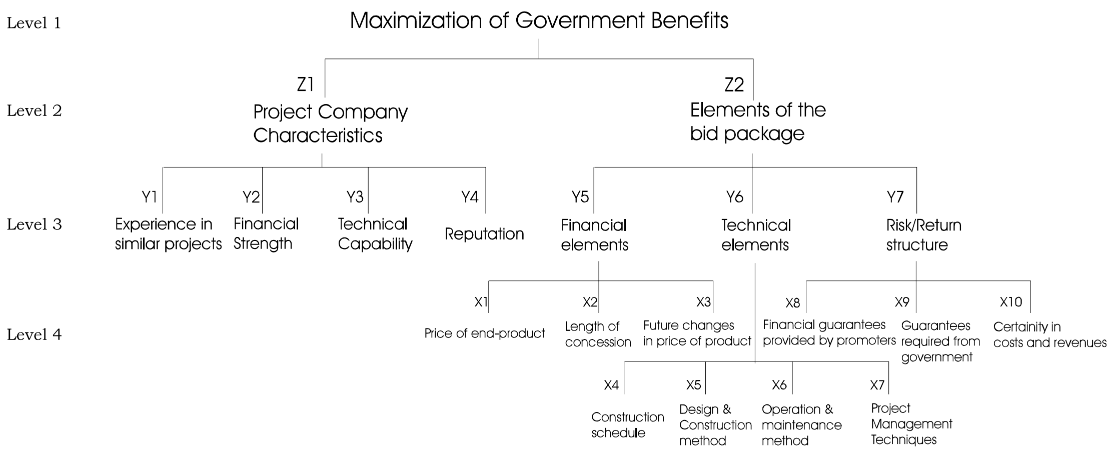

Figure 1: Hierarchy of attributes

Finally, the decision-maker should state his/her preferences about each criterion by making tradeoffs between objectives. For this purpose, a procedure employing a matrix of pair-wise comparisons for all criteria is used. Matrices at which, each row and each column of the matrix represent a criterion are constructed so that each element of the matrix indicates the decision-maker's subjective estimate of the relative importance of row criterion over the column criterion. As recommended by Saaty (1980), a scale of 1 to 9 is used for representing parity comparisons where 1 corresponds to equal importance, 5 strong importance and 9 absolute importance. In order to find relative importance of each criterion, all criteria at the same level under the same heading are compared first and final importance weight of each lower-level criterion is found by multiplying the relative importance of all criteria on the same branch. Resulting importance weights after the calculation of normalized Eigen values of each matrix are given in Table 2. Finally, for each proposal, value from each criterion should be multiplied by the weight of each criterion and added together to find the total value of that proposal. The proposal that gives the maximum value should be chosen as it maximizes the overall benefits of the client organization.

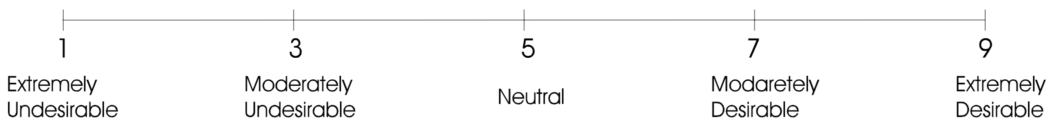

Figure 2: Performance scale for the subjective index

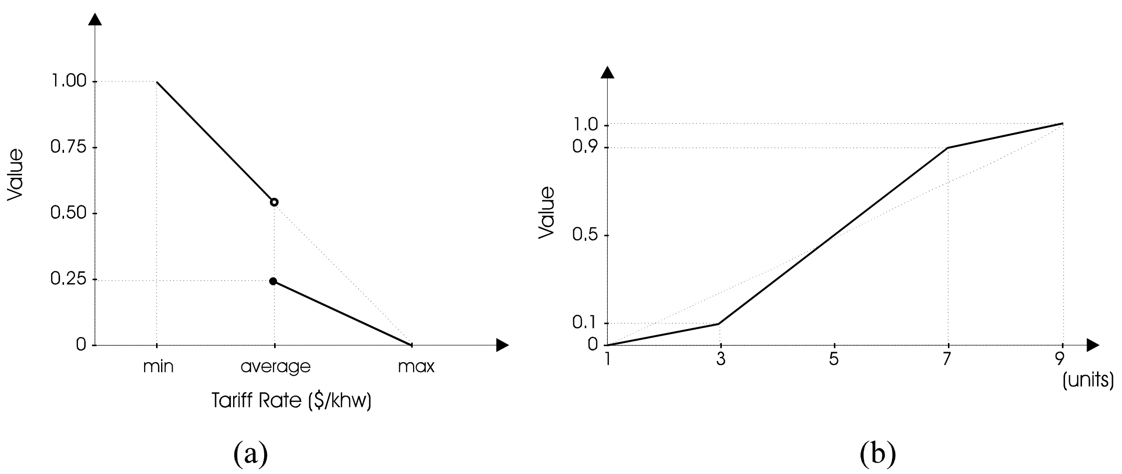

Figure 3: Value curves for objective and subjective criteria

Table 1: Description of evaluation criteria and associated attributes

	Explanation	Evaluator (attribute)
Y1	Experience of project company members in financing, construction and operation of similar projects. Number of BOT projects realized before	Investment cost of similar projects realized within last 10 years ($)
Y2	Financial ratio analysis.	Annual revenues ($)
Y3	Availability and achievability of resources (plant, equipment, personnel etc.) necessary to carry out the project	A subjective index
Y4	Claim history, governmental relations	Number of court decisions against company within last 10 years
X1	Initial price of end-product	Initial tariff rate ($/kWh)
X2	The time when the facility will be transferred to the government	Concession period (years)
X3	Fixed rate or rate adjustments with respect to an escalation formula. (adjustment rate = LIBOR, inflation, etc.). Commercial freedom to change tariffs	Expected tariff rate during the concession period ($/kWh)
X4	Short construction period so that facility comes into service early	Construction period (years)
X5	An innovative design, technically proven technology, technology transfer leading to higher quality in services	A subjective index
X6	Effective operation and maintenance methods increasing the quality of services	A subjective index
X7	Effective scheduling, resource planning, quality control and management practices increasing the quality of services	A subjective index
X8	Proper identification and allocation of risk elements, attractive financial solutions to decrease financial risk exposure, availability of emergency loan arrangements by lenders	A subjective index
X9	Level of political, commercial, financial guarantees required from government	A subjective index
X10	Realistic assumptions about future demand, financial parameters. Certainty in schedules, a well-prepared technical and financial package removing uncertainties in cost calculations	A subjective index

Table 2:. Importance weights

Criteria	Importance Weight
Experience in similar projects	0.1165
Financial strength	0.0825
Technical capability	0.0395
Reputation	0.0115
Price of the end-product	0.2721
Length of concession	0.0433
Future changes in the price of product	0.1713
Construction schedule	0.0284
Design and construction method	0.0114
Operation and maintenance method	0.0114
Project management techniques	0.0028
Guarantees provided by promoters	0.1356
Guarantees required from government	0.0628
Certainty in costs and revenues	0.0109

Stage 4-Negotiation stage: Contractual arrangements to allocate risks

For a successful BOT project, host government cannot withdraw or adopt a passive role, instead it has to ensure the right political and commercial environment to advance projects (Tiong, 1990). As there will be no direct government guarantees for the repayment of loans, contractual undertakings will serve as project's fundamental credit support for the lenders. Guarantees against financial and commercial risks are vital for the success of a BOT project as well as the existence of political and logistical support, a proper legal framework and adequate regulatory arrangements. Government guarantees against financial, commercial and force majeure risks could take one of the following forms;

- Foreign exchange guarantees.
- Protection against unexpected economic fluctuations (guarantees against high inflation and interest rates).
- Offshore escrow account as a guarantee for lenders.
- Partial tax relief and exemptions.
- In case that project imposes positive effects on local economy (benefits more than expected), concessionaire can be rewarded with cash dividends (Levy, 1996).
- Government compensation to eliminate financial loss when land acquisition delays occur.
- Government compensation when changes occur in the current monetary laws or new regulations affecting the investment come into scene.
- Government compensation when engineering and design changes are affected by the government.
- Right to extend concession period in case of force majeure.
- Support loans (subordinated loans) and "emergency loan facilities" in case of problems not a fault of the project company.
- Minimum operating income guarantee for the project company to reduce commercial risks.
- Concession to operate existing facilities to decrease financial burden.
- Commercial freedom to adjust tariffs or tolls.
- "No second facility guarantee" as a protection from competition.
- Off-take agreement which guarantees the purchase of the product on defined terms (in energy investments, energy sale agreement guarantees the purchase of the electricity produced by the company).
- Feedstock agreement with the suppliers of fuel and raw materials on predetermined conditions.

Governmental guarantees given in the form of the above stated options could affect the feasibility of BOT projects in a positive manner. In Turkey, most BOT projects are either delayed or cancelled due to reluctant attitude of governmental agencies in providing guarantees against commercial risks. For instance, in the pre-negotiation stage of Canakkale Bridge project, which is planned as a BOT project, the consortium of a Spanish Company, Fabricanos Militares and a Turkish Company, Alarko required from the General Directorate of Highways to give some "no-second facility guarantees". In this respect, the consortium demanded that no highways, motorways or railroads should be built passing from any other parallel routes. Due to reluctance of the Turkish Government in providing such a guarantee, parties could not conclude a deal yet.

Stage 5-Measurement of project success

After the contract is awarded to a project company, the client organization should start to evaluate the success of the project. Effects of various contractor selection criteria on project success, the consequences of governmental guarantees and the validity of pre-defined objectives should be assessed by investigating the project outcomes. Measurement of project success factors under a given level of government guarantees, contractual arrangements and evaluation procedure make it possible for the decision-maker to re-evaluate the strategies used throughout the decision-making process. For this purpose, project success factors (in accordance with predefined objectives) in terms of time, cost and quality should be determined and factors that reduce the project success should be examined so that the procedures that are used as a part of the regulatory framework can be enhanced. Feedback of this information should be used as a correction tool for improving the decision-making process.

CONCLUSIONS

So far, the BOT model is known to perform inefficiently in many of the urgent infrastructure projects of Turkey, due to poor organization, lack of adequate regulatory framework and insufficient tendering and evaluation procedures employed by client organizations. As a way to improve the applicability of this model, a systematic decision-making framework to be implemented by governmental agencies is proposed. Within the context of this research, the importance of objective setting in choosing the appropriate procurement method and evaluation criteria is emphasized and it is recommended that client organization should determine the project's viability before tendering stage so that the model can be applied only to feasible projects. Moreover, a multi-criteria evaluation system in which proposals are ranked by considering both objective and subjective criteria is proposed. It must be stressed that the aim of the study is limited with the application of a multi-criteria evaluation procedure to a hypothetical BOT project. In this respect, importance weights given to objective and subjective attributes as well as value functions derived for each criterion should not be interpreted as universal solutions applicable to similar decision-making cases, encountered elsewhere.

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