



Analytical comparison between BOT, BOOT, and PPP project delivery systems

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Abstract

Selection of a project delivery system which enhances quality, reduces cost, and speeds up the project is one of the best ways of optimization and prevention of wasting national funds. Consequently, it is essential for every owner to select appropriate project delivery system considering her financial, managerial, and expert capabilities, as well as level of other parties' commitment to the project to accomplish the project with best quality, least time, and cost. In this paper, three project delivery system including BOT, BOOT, and PPP are examined according to their nature, advantages, disadvantages, scope of application, and an analytical comparison is made between them. Since, every project is unique and has its own specification, it is concluded that optimized project delivery system should be selected according to owner requirements, project specifications and characteristics, environmental conditions, and project's practical principles.

Introduction

Nowadays, major changes are being occurred in the methods of project execution around the world. Research and experience indicate that selection of best project delivery system can reduce project's cost and time up to twelve and thirty percent respectively. Therefore, selection of project delivery system is one of the most important project strategic decisions which will be conducted at the end of feasibility studies and coincident with making decision about method of project's financial provisions. Hence, considering this important point and in order to select the appropriate system that best complies with the owner's and project's requirements, studying and distinguishing different project delivery systems is necessary.

Project Delivery System, Project delivery system is a general term which describes method of combination and organization of design, procurement, and construction services of project in addition to operation, commissioning, and maintenance which can be executed by owner or other parties. In other words, project delivery system determines sequence of project's processes, contractual relationships, and area of obligations and commitments of main parties. The main difference between various types of project delivery system is distribution of project's risks between different parties who are involving in project [1].

Build Operate Transfer, BOT

In recent years, a growing trend emerged among governments in many countries to solicit investments for public projects from the private sector. The main reasons for this trend are a shortage of public funds and a hands-off approach of government agencies. The Build Operate Transfer (BOT) approach is an option for the government to outsource public projects to the private sector [2].

Background, The first official private facility development under the name “Build Operate Transfer” was used in Turkey in 1984, by Prime Minister Ozal, as part of an enormous privatization program to develop new infrastructure [2]. However, the BOT approach was used as early as 1834 with the development of the Suez Canal. This revenue-producing canal, financed by European capital with Egyptian financial support, had a concession to design, construct, and operate assigned to the Egyptian ruler Pasha Muhammad Ali [3]

Definition, In the BOT approach, a private party or concessionaire retains a concession for a fixed period from a public party, called principal (client), for the development and operation of a public facility. The development consists of the financing, design and construction of the facility, managing and maintaining the facility adequately, and making it sufficiently profitable. The concessionaire secures return of investment by operating the facility and, during the concession period, the concessionaire acts as owner. At the end of the concession period, the concessionaire transfers the ownership of the facility free of liens to the principal at no cost [4].

BOT projects are very useful in bidding situations. By implementing these methodologies, the company or the government can share the risk of the project [5].

BOT projects include a wide array of public facilities with the primary function to serve public needs, to provide social services and promote economic activity in the private sector. The most common examples are roads, bridges, water and sewer systems, airports, ports and public buildings [2]. Figure 1 shows stages of BOT projects.



Figure 1: stages of BOT project

Major Participants in BOT Projects

Five major participants are identified in every BOT project.

Principal: The principal is usually a government agency, a local or federal government body that recognizes the need for a public facility but is unable to financially support the project.

Concessionaire: The concessionaire is the owner of the facility during the concession period and realizes profits on the initial investment through the usage of the facility.

Investors: Financing is supplied by the private sector and the investors include both shareholders and lenders.

Contractor: The contractor is responsible for the construction of the project and for hiring subcontractors, suppliers and consultants.

Operator: The operator is in the concessionaire's service and manages the operational stage of the facility [6].

Advantages, The most important advantages of BOT are: utilization of private sector's investment instead of public sector's, transferring all the risk to private sector, transferring technical knowledge is one of the most important benefits of this method for developing countries, political resistance in using private sector is less than other methods because project will owned by the government finally [7].

Disadvantages, These kinds of projects are very complicated from the viewpoint of technical and financial issues and need high level experts and consultants, increasing expenditures of users in operation time, contrast between benefits of private sector with public sector.

Risk distribution in BOT, Each sector risk transfer in BOT is shown in the below table.

Table 1: Risk distribution in BOT

Development risks	Construction risks	Operation risks	Financial risks	Income risks
1. Tender Risks 2. Delays 3. Environmental law	1. Completion in time 2. Technology 3. Supplier contracts 4. Access to material, energy and transports 5. Lack of competent labour 7. Permits 8. Cost overruns	1. Lack of competent operators 2. Lack of performance 3. Unexpected interruptions	1. Repayment 2. Payments from the lenders 3. Rate of interest 4. Currency rates 5. Inflation	1. Demand for the service 2. Competition 3. Out of date services



BOOT

There are many factors that make BOOT attractive and suitable for governments as a project delivery method includes stable political system, predictable and proven legal system, government support for a project that is also clearly in the public interest, Long term demand, limited competition, reasonable profits, good cash flows, predictable risk scenarios.

Definition, Build-Own-Operate-Transfer is a founding model and a form of concession in which a public authority makes an agreement with a private company (concessionaire) to Design Build, Own and Operate a specific piece of an infrastructure such as power, transport, water, and telecom industries, within receiving the right to achieve income from the facility under a period of time (concession period approximately 15-25 years), and later transferring it back into public ownership through a single organization or consortium (BOOT provider) [8]

The earned income can be based on a variety of arrangements, ranging from a fixed annual fee (flat rate) to the measured quantity supplied (unit rate) and "Take-or-pay" arrangements are effectively two part tariffs expressed in a different manner.

The objectives of BOOT's participants including Government, Special Purpose Company (SPC), the Contractor, the Lenders, the Operator, and the Sponsors are reducing the capital expenses and government's role in build, operation and maintenance of infrastructures, making new jobs for unemployed citizens and accountable atmosphere for a reliable and appropriate quality, providing opportunities for a comparative or competitive climate and a sympathetic cost benefit for both parties, introducing innovative and alternative technology.

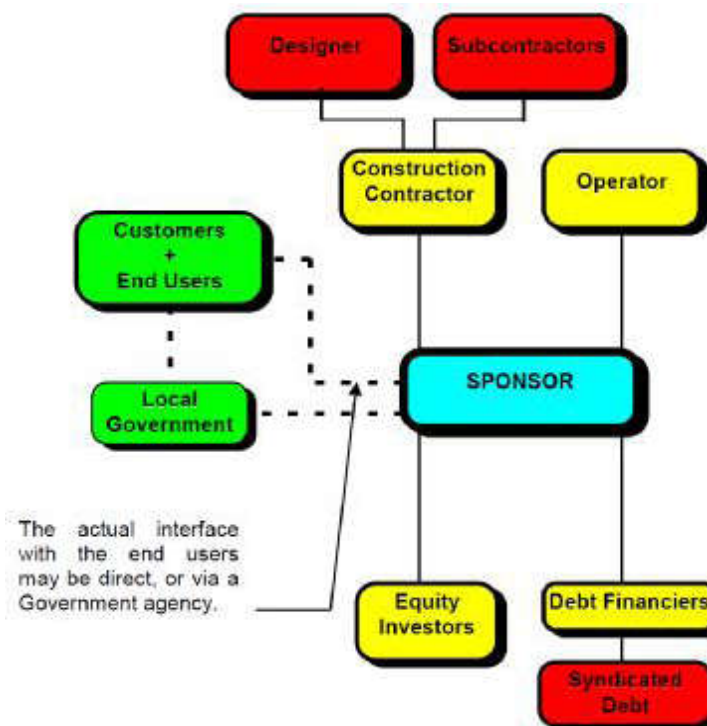


Figure 2: typical BOOT consortium [8]



Risk Distribution, To face risk related to “nonrecourse” funding in this model lender would treat the cash flows of the project as the only source from which loans would be repaid and the project assets as the only available collateral. In South-Asia region and South-east Asia region technical, financial, and political risks (more crucial respectively) were experienced in BOOT projects conducted [9].

Practical Implications, As the infrastructure projects need large investment and long time period, the risks for investor is also comparatively more. Thus investor always requires government support including perfect law and regulations system, guarantees, develop strong domestic capital, ensure easy and speedy processing of the project, fair sharing of risks between both parties, and provide realistic incentives, adequate returns and protection of the investment [10, 11].

Advantages, This method of founding includes could be beneficial for public and private sectors such as: strong financial incentives for the BOOT operator, transferring construction and long-term operating risks onto the BOOT provider, risk mitigation through the involvement of multiple participants, increase the project certainty and early interest recovering through involving a BOOT operator, encouraging maximum innovation allowing to have the most efficient designs, high accountability for the asset design, construction and service delivery due to recover the expenditures and, enhancing BOOT operators and project’s management knowledge through experience, minimal costs of company structuring matters.

Disadvantages, Moreover the defects of this model are described as: higher cost for the end user due to the BOOT provider accountability of 100 percent financing and on-going maintenance, negative reaction of community to private sector involvement, not realizable full benefits of economic development a sole sourced BOOT provider, time consuming and resource hungry management and monitoring of the operating contract with the BOOT operators, requirement of a rigorous selection process in selecting a BOOT partner [10].

Public Private Partnership

The P3 procurement model is unique in that the private sector assumes a major share of the responsibility for the delivery and the performance of the infrastructure – from designing the concept, architectural and structural planning to its long-term maintenance. When applied effectively, the P3 model can provide additional value to taxpayers by leveraging the right capabilities to complete the job on time and on budget, allowing for greater integration of project planning and design and eliminating major shortfalls around building, construction and maintenance.

Background, Pressure to change the standard model of Public Procurement arose initially from concerns about the level of public debt, which grew rapidly during the macroeconomic dislocation of the 1970s and 1980s. In 1992, however, the Conservative government of John Major in the United Kingdom introduced the private finance initiative (PFI), the first systematic program aimed at encouraging public-private partnerships. In the 1992 program, the main focus was on reducing the Public Sector Borrowing Requirement, although, as already noted, the effect on the public accounts was largely illusory. The Labor Party (UK) government of Tony Blair elected in 1997, persisted with the PFI sought to shift the emphasis to the achievement of “value for money” mainly through an appropriate allocation of risk. [12].

Definition, P3 is a service contract between a public authority and a private sector concessionaire, where the public authority pays the concessionaire to deliver infrastructure and related services, Typically, the concessionaire, who builds the infrastructure asset, is financially responsible for its



condition and performance throughout the asset lifetime, or the duration of the agreement [13], or it describes a government service or private business venture which is funded and operated through a partnership of government and one or more private sector companies. These schemes are sometimes referred to as PPP, P3 or P3 [12]. Stages of P3 are indicated in the Figure 3.

Figure 3: Stages of P3 method

Advantages, P3 main features and benefits are, Delivers value for money, Engages in a competitive process to achieve the best project for the best cost, Transfers appropriate risks, Establishes performance standards and payment mechanisms, Maintains government involvement to oversee public interest, improve project delivery, better project discipline, reduce scope creep, faster procurement [14].

Disadvantages, Having disproportionately high costs associated with their implementation, both for the sponsoring government entity and for the private sector entities, improving the quality and clarity of tender documents, particularly with respect to the output specifications is required, Sometimes, there are not sufficient numbers of experienced private contractors to create the competitive tension required to achieve the best value for money, PPPs carry an implicit government guarantee and therefore should be priced as government risk This appears to be a philosophical objection about the line between what is privately provided and what the state should provide [12]. Moreover, non-complete contracts and uncertainty over a long horizon are other P3 challenges.

Risk distribution in P3, Risk transfer in P3 is deemed in the Table 2 and responsibilities of each sector are indicated in Figure 4.

Table 2: risk distribution in P3

Public Sector	Shared or Deal Specific	Private Sector
4. Legislative Change 5. First Nations 6. Land Acquisition 7. Force Majeure 8. Site Geotech	1. Environmental 2. Demand Growth 3. Energy Costs 4. Schedule	1. Design 2. Construction Costs 3. Industrial Relations 4. Maintenance 5. Permitting 6. Commissioning



Figure 4: public and private sector responsibilities

Analytical comparison

The greatest advantage of BOT for the government is the subcontracting of the majority of the risks to the private sector, with the latter willing to finance and assume risks in the development of a public facility. At the end of the concession period, the government will inherit a well-operated project without investing public funds and with little risks. A consequence of not investing its own money is that the project can take place even if the government's budget is limited. The finance is obtained by private organizations and the execution of the project is independent of the financial planning of the government.

Furthermore, because the design, development, and construction are all the responsibilities of a single party, the concessionaire, the facility should be more effective and efficient [6].

BOOT versus BOT, The definition of BOOT and BOT is very close together and the only difference is the ownership of facilities in BOOT and because of this, quality of the work is vital to private. BOOT is more efficient because the ownership of facilities prepare a better environment for management. The BOOT contracts have the tendency to work well when the purpose of the project is to offer a service, but if the aim is to improve a service or make more efficient a system, this modality is not recommended. These methodologies increment the complexity of the financial study.

P3 versus BOT & BOOT, In PPP, private sector has a role as engineer or constructor. Ownership, operation and financing are the public role. On the other hand a pure private is responsible for all matter. In BOOT final owner is public, but concession for a long period of time (25-30 year) is regarded to private.

The ownership shifts from public to private as we move from PPP to BOOT.

Also private sector accepts more risk and preparing capital investment in BOOT/BOT.



Clear law and regulation and Stable political and economical environment is an important factor that effect BOOT/BOT project more than PPP, The degree of involvement in BOOT/BOT is restricted. The advantage of this, is releasing from project jobs and disadvantage is low control of government on project. Britain vs. turkey is a good example. Crises in political relation of two countries caused the British party leave project dam building in turkey and because Turkish government was not involved with project document, they were unable to continue the project.

Comparison between these three project delivery system based on some important criteria and aspects is briefed in Table 3.

Table 3: brief comparison between methods

Comparison aspects							
Method	Risk	Public support	Duration period	involvement	investment	Cost for end user	efficiency
BOT	90% by private sector	vital	Long term project (20-30)	Less public involvement	70-100% by private sector	Higher cost for end user	Medium-high
BOOT	90% by private sector	vital	Long term project (30+)	Less public involvement	70-100% by private sector	Higher cost for end user	high
P3	90% by public sector	Not more important	Short term project	More public involvement	Lower by private sector	lower cost for end user	high

The spectrum of fully government venture to complete private sector initiative is indicated in the next figure which distinguishes each of P3 models position in respect of its closeness to each of private or government sector. Moreover, in the following table risks versus rewards of all of them is compared.

Figure 5: PPP Models, Traditional Investment Responsibility



Table 4: Risks versus Rewards

Type of PPP Model	Design and Build	Contract License	BOT	Lease Agreements	Joint Venture	BOOT	BOO
Degree of Risk	X	X	XX	XX	XXX	XXXX	XXXXX
Degree of Reward	✓	✓✓	✓✓	✓✓	✓✓✓	✓✓✓✓	✓✓✓✓ ✓

Conclusion and recommendations

There is a wide range of contractual forms for PPP based on risk allocation. Risk to private sector increases in BOT and BOOT.

Previous experiences show that there is significant potential in attracting investment from the private sector, but successful PPP profoundly depends on planning actions prior to implementation. PPP should be carefully planned and presented based upon simple, transparent and strategic principles. The role of a legal and regulatory framework for PPPs is vital to its success. PPP policies are important as a starting point for the PPP process. Consequently, governments need to be the driving force behind the creation and implementations of PPP policies. Trust alone is not sufficient for the success of PPPs. Governments have an important role in assuming leadership, promoting transparency and enforcing laws. Successful PPPs are those that clearly delineate the responsibilities of each party, while also allocating risks to the party best able to manage them. Thus they require carefully designed, well-written contracts, and close monitoring or regulation. Governments contemplating PPPs should consider the technical, financial, economic, and legal feasibility of a project while seeking to match government goals with investor interest. PPP relationships are difficult to design, implement and operate. Finally, it is worth pointing out that the risk of remaining locked-in an inefficiently designed contractual arrangement is high.

Recommendations:

- Governmental sector should develop tools and methods that could accurately analyse the complex reality of PPP projects.
- There is a need for capacity-building and education within governmental institutions on the benefits of PPP
- It is better that government sectors provide incentives to the private sector by compensating private firms for proposals. Private firms need to be reassured that their novel ideas and proposals will not be exploited and that they will have a chance to provide a return on their creativity
- The role of the private sector in creating and implementing PPPs needs to be clearly defined
- If there is not a complete feasibility study, please do not use PPP.



- Co-operation between the public and private sectors can be a powerful incentive for improving the quality and efficiency of public services, and a mean of public infrastructure financing.
- Governments set up a specialized unit to define and implement the country-specific BOT/PPP policy, with a global approach designed to ensure horizontal co-ordination between the various governmental departments and public bodies involved.
- The quantity and quality of general information to all bidders of BOT/PPP projects be improved in order to minimize the necessity of bidders making their own costly technical investigations.
- Governments carefully select the payment mechanism and – where necessary – guarantee sufficient financing and / or modest subsidy in order to make feasible projects.
- Risks of BOT/PPP projects should be borne by the party which is in the best position to assess and influence the probability and financial impact of its occurrence as well as to manage and bear the consequences of its materialization.
- Value for money and the evaluation of overall expected efficiency should be determined when choosing a PPP approach and when deciding which of the available models is best suited for the case at hand.
- The agencies in BOT/PPP projects review and extend their political risk cover program in terms of scope and volume in order to adapt their products to the specific requirements for such projects.
- Evaluation criteria should be made clear in the tender documents of BOT/PPP contracts beforehand.
- Governments should take adequate steps to reduce currency risks to facilitate implementation of BOT/PPP projects.
- Since the private sector is guided by profit motives, PPP's may not be suitable for sectors where public safety is a major concern, operating is expensive, marketability of services is low. Accordingly, the most optimal and commonly observed areas for private sector participation are water and waste, roads, bridges and tunnels, telecommunications.

After examining three project delivery systems, what emerges from the observation of currently adopted schemes is that each PPP arrangement should be designed and adapted to the specific characteristics of the asset at stake, as well as to the peculiar abilities of all partners involved in the project. Each of these arrangements offers various and wide range of services to the involved parties. Therefore, in order to guarantee value for money, the relative strengths and weaknesses of each PPP scheme should be considered. Depending on the sector of application, some models are better suited than others in delivering targeted outputs and in ensuring accurate risk management. Choosing the wrong model or inaccurately evaluating the risk management capacities of each party may have extremely costly consequences and a negative impact on public accounts.

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