

EFFECTIVE METHODS IN COLLABORATIVE PROCUREMENT SYSTEM FOR ENERGYSECTOR PROJECTS IN SRI LANKA

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Abstract: All governments are bound to provide better infrastructure services for their citizens. Due to numerous financial difficulties governments move towards Collaborative procurement methods to secure infrastructure projects with participation of private sector. Sri Lanka is still lagging in implementing proper collaborative partnerships in infrastructure developments. Sri Lankan energy sector highly depends on hydro and expensive diesel power plants. Because of that, in dry season Sri Lanka is facing huge generation gap in meeting demand. To overcome these challenges Sri Lanka urgently needs to implement new power plants with more economical power sources. Therefore, the aim of the study is set to identify suitable collaborative procurement methods and develop the framework for processing those new projects. Barriers to implement collaborative energy sector projects were identified through literature review and expert interviews. Explored barriers were categorized into Social, Economic, Political and Regulatory discipline and key measures were proposed to overcome such. The suitable procurement routes for each energy project were brought to the new knowledge considering power generation capacity of power plants and prevailing regulations. Finally, the framework was developed to adopt proper implementation of identified procurement methods in Sri Lankan energy sector.

Keywords: Collaborative Procurement, Public-Private Partnerships, Energy Sector, Sri Lanka.

1. Introduction

Infrastructure development is very crucial in the process of achieving the development goals of a country. Governments are under pressure to provide access to better infrastructure facilities on par with the global trends despite the financial limitations. Accessibility to reliable and efficient public utilities is vital in curbing the poverty in developing countries. Sri Lanka is facing numerous financial difficulties and struggling to get out of the income trap, thereby financing the infrastructure deployments is becoming increasingly difficult. In fact, to overcome the matters, governments around the world have adopted different types of solutions. Among all, collaborative procurement approach is becoming increasingly popular often due to its successfulness in overcoming the drawbacks of conventional procurement methods in acquiring infrastructure developments (Tang, Shen and Cheng, 2009; Ahadzi and Bowles, 2001; Dabarera, Perera and Rodrigo, 2019). Compared to other countries, Sri Lanka adopts collaborative approach in their infrastructure development much slower. Sri Lanka invested 4.6% of share from its GDP for infrastructure development in 2016 which 3.6% for economic infrastructure and 1% for social infrastructure (Dabarera, Perera & Rodrigo, 2019). According to the World Bank Public Private Partnership database and USAID report (2017), Sri Lanka implemented 73 Public Private Partnership (PPP) projects in total accounting for investments worth over 6 billion US dollars. But majority of these investments were confined to the Telecommunication and IT sectors. Sri Lanka is still lagging in strong collaborative environment and struggles to implement collaborative projects in critical sectors like energy, roads, water & waste and social services. In past two decades, Sri Lankan government showed more tendency towards foreign debt to finance their infrastructure projects rather than collaborative methods and Foreign Direct Investments (FDI). According to the Central Bank statistics in 2020, due to this excessive foreign debt borrowing national external debt increased up to 56 billion US dollars and public debt up to 86% of GDP and it further increased up to 104% in 2021. Lack of Return of Investment (ROI) in infrastructure projects funded through foreign borrowings hindered the government's ability to repay for foreign debts. With the covid-19 pandemic Sri Lankan economic situation has become much worsen with lack of foreign remittances, decrease of the production and productivity and collapse of tourism industry. Thereby, Sri Lanka further restricted on its ability to finance the infrastructure projects while also lowering its ability of foreign borrowings due to high debt to GDP ratio (Tharmakulasingham and Pasindu, 2021).

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On the other hand, Sri Lankan energy sector is facing a crisis due to the lack of ability of Ceylon Electricity Board (CEB) in power generation resulting in a shortfall of electricity supply that lead to the regular power cuts. Sri Lanka's annual electricity demand growth is range 4% to 6% (CEB annual report, 2019). The increasing demand for electricity Sri Lanka urges the initiatives for new power generation projects. As Sri Lanka faces a significant financial crisis, government finds it is challenging to finance and implement new energy generation projects. Collaborative procurement approaches can play vital role in Sri Lankan energy sector. According to the CEB forecast, Sri Lanka will need USD 14,568 million in capital investment for the next two decades to initiate new power generation projects in different sources of generations like solar, hydro, liquid natural gas (LNG) and wind. (CEB report for 2018-2037, 2017). To attract those capital investments, Sri Lanka requires investment friendly environment and proper framework for regulation of those projects. Fernando (2019) contended that, lack of state credibility, unreliable policies and regulation towards PPP projects, lack of public awareness and support are some of the reasons which prevents Sri Lanka to achieve better PPP projects in the energy sector. It is noteworthy to mention that, past literatures have identified barriers in the implementation of energy sector projects in Sri Lanka, but none have provided the suitable procuring mechanism to acquire such. Hence, this study is attempted to propose sustainable collaborative approaches in delivering energy infrastructure projects in Sri Lanka. This is achieved through,

1. Identification of available collaborative methods in energy sector projects
2. Identification of the barriers in existing procurement methods in energy sector projects in Sri Lanka
3. Evaluating the applicability and appropriateness of collaborative procurement methods for Sri Lankan energy sector projects
4. Develop the framework for implementing collaborative energy projects in Sri Lanka

2. Literature Review

Collaborative procurement plays a key role in infrastructure development in all around the world. There are different types of collaborative approaches followed by governments with private sector to jointly develop their infrastructure projects. World Economic Forum (2012) stated that countries are unlikely to achieve sustainable, efficient and effective outcomes from its infrastructure unless those infrastructures are aligned with economic, environmental and social priorities of that particular country. Thus, it is important for nations to identify the true priorities of infrastructure before implementation of such projects.

2.1. COLLABORATIVE PROCUREMENT SYSTEM

Service contracts, Concession contracts, PPP, can be identified as strategic (long term) collaborative approaches while those will predominantly be the Private Finance Initiatives (PFI). PPP methods under collaborative approach have highly adopted by many countries to develop their infrastructure projects (Li and Akintoye, 2003). Primary aim of PPP method is to encourage private sector to invest their capital on the country's infrastructure which will allow the government to reallocate the financial capital in other prominent areas such as health, welfare, social developments by avoiding burden of infrastructure implantation expenditures (Ahadzi & Bowels, 2001). Parvu and Olteanu (2009) mentioned that risk sharing in PPP is a trump card for the host government when acquiring projects involving high risks. According to the Li & Akintoye (2003), because of the participation of private sector in infrastructure projects, profitable commercial disciplines and good management skills can be achieved. Furthermore, the risk of cost overruns, frauds and project delays have been considerably reduced while providing adequate life cycle cost insights in the projects and ensuring value for money (Li and Akintoye, 2003).

Many different collaborative procurement avenues are available in practice based on different project criteria. Those collaborative avenues are designed to achieve various aspects of the agreement's parties based on ownership, responsibilities of the parties, risk allocations of the parties and timeframe of the agreements. According to the Asian Development Bank (ADB) report (2016), they categorized collaborative models based on level of ownership in public and private sector, level of risk and responsibilities for the partners and time duration of the agreements. As contended by Nathan (2017), there are several issues that should be considered in selecting the suitable collaborative model to a specific project. They are time and size of the project, required investment to implement the project, projected revenue generation from the project, fair for risk allocation and government capacity to implement the project to name few. Procurement methods are mainly categorized as short-term procurement methods and long-term procurement methods. Under short-term procurement method unsolicited proposals, Swiss challenge and cost reimbursement contracts can be identified and following long-term procurement methods also been identified in past literature; Service contracts, operation and management contracts, concession contracts, PFI and PPP (Tang, Shen and Cheng, 2009; Dabarera, Perera and Rodrigo, 2019; ADB PPP Handbook, n.d.). These long-term procurement methods differ to each other based on the contract duration and level of private sector involvement. Under PPP; Built-Operate- Transfer (BOT), Built-Own-Operate-Transfer (BOOT), Design-Built-Operate (DBO), Built-Own-Operate (BOO) and other specialized concession contracts where private firms invest their own money on development of infrastructure project etc. Responsibilities of the private sector can be varied depending on the approach and those responsibilities are in terms of finance, design, construction, ownership, and operation of the infrastructure facility.

2.2. COLLABORATIVE PROCUREMENT METHODS FOR ENERGY SECTOR PROJECTS

Until 1980s energy and electricity utilities remain under the state monopoly but with the rising population, governments around the world found it is difficult to face the challenge of catering the fast-growing energy demand. However, in order to meet the demand requirements, governments have moved towards collaborative arrangement with private consortium to provide public services for a specified duration to allow the recovery of investment (Umara et al., 2016). Aitken (2014) identified, Politics, Regulation, Financial Assistance and Technical Assistance as the four main factors that may affect the success of PPPs. Aitken (2014) further illustrated that having clear strategy and vision in public authorities enable the private party to invest with confidence, while emphasizing the regulatory measures, proper fiscal framework, transparency and incentives. Furthermore, adequate financing partners, technical assistance, appropriate preliminary and feasibility studies, cost effective construction surroundings, proper assessment of social, economic and environmental impacts, management and system maintenance were identified as the factors that are vital for successful collaborative energy projects delivery. Over 100 countries which are having collaborative energy/electricity infrastructure projects, established the regulatory body to regulate the private partnering activities (Umara et al., 2016). These regulatory bodies are entrusted with various duties such as; providing policy advice to government, setting performance standards, provide feasibility studies, monitoring the performance of parties, dispute resolution etc. The regulatory bodies shall consist of highly qualified professionals from various disciplines (Umara et al., 2016). Developing countries have used project guarantees for attracting private investments. Public sector can offer demand side guarantee to private investors to ensure commercial viability of the project. This will provide fewer uncertainty and predictable revenues in energy sector projects (Rashed, Faisal and Shikha, n.d.). Collaborative methods are quite popular in implementing new energy sector projects with the global trend for renewable energy. In 2020 South Asia region received 10.2 billion US dollars' worth private investments in infrastructure developments. From that 65% of investment commitments were made in energy sector. Sri Lanka also implemented collaborative projects in AES Kelanitissa 163 MW, Heladhanavi Puttalam 100 MW projects and plan to execute development of 350 MW natural gas fired combined cycle power plant with dual fuel capability on PPP basis at Kerawalapitiya (CEB Long term generation plan 2022-2041, 2021). Countries use different types of methods to enhance the capital funding ability in energy projects like public funds, private funds, joint ventures and PPPs. Usually, countries rather go with PPP and public fund method in high-capacity energy development because of the neediness of high capital and strategic importance of those kinds of facilities.

2.3. IDENTIFICATION OF BARRIERS IN IMPLEMENTING COLLABORATIVE PROJECTS IN SRI LANKAN ENERGY SECTOR

Collaborative projects in infrastructure sector always deal with number of risks because of barriers in project implementations. Along with other developing countries, Sri Lanka also experiencing lack of proper collaborative implementation mechanisms which prevents its adoption. Barriers to implement collaborative procurement in infrastructure can be identified under different segments like social, legal, economic, environmental, political and technological (Zhang, 2005). Under social factors; lack of understanding about collaborative procurement methods in general public leads to public resistance to such kinds of projects. In Sri Lanka public awareness of Collaborative method is limited and sometimes it misinterprets as privatization of state assets. Also, the prejudice that the PPP infrastructure may lead higher tariffs for end users which can be seen as a common misnomer that led to the public opposition for PFIs (Weththasinghe, Gajendran and Brewer, 2016). As an example, the 900 MW of coal fired power plant in Kalpitiya had been suspended more than two decades due to protest by public. Lack of proper collaborative procurement guide and outdated regulation like 1998 PPP guidelines, absence of strong government policy and legal framework can be identified as main legal barriers in Sri Lankan context. When it comes to the economic factors, countries high debt to GDP ratio, the uncertainty of ROI to private sector and unfavorable economic and commercial conditions have been identified as common constraints to execute collaborative projects. As an island nation, Sri Lanka having limited land area with high population density. Therefore, land acquisition will be difficult and time consuming. Since, Sri Lanka is having high biodiversity led to stringent environmental constraints imposed by the regulations. Thus, in implementing high scale infrastructure projects like expressways, reservoirs and power plants, it is needed to deal with various restrictions, laws and guidelines.

Under political barriers, lack of political stability, constantly changing government policies toward collaborative approaches and governments losing political willingness to execute and encourage such procurement mechanism can be identified as the limiting factors. Collaborative large scale infrastructure projects usually require a lot of technological and management skills throughout its life cycle of the project. Lack of suitable skills and experience, inadequate public sector professionals and resources to manage the collaborative procurement of large-scale infrastructure projects and technological complexity of such kind of project can be identified as technological barriers that experiencing in Sri Lankan context (Weththasinghe, Gajendran and Brewer, 2016; Zhang, 2005; Tharmakulasingham and Pasindu, 2021; USAID report, 2017). Lack of proper Energy sector infrastructure development plan has been a vital concern in Sri Lanka for several decades. Sri Lankan government holding monopoly of Energy/Electricity sectors under Ceylon Electricity Board (CEB) over five decades being a state-owned enterprise. CEB projected capital requirement for power generation infrastructure is around USD 14,568 million for years 2018-2037. CEB has borrowed short-term and long-term funds to implement energy infrastructure from various financial institutions as in mainly from local government banks and international finance agencies like ADB. Excessive foreign borrowings, lack of production, limitations in economic activities during the pandemic have dragged country's economy toward a crisis. Thereby no longer hold the ability to fund mega infrastructure projects through public

funds. Full private sector contribution in Sri Lankan energy sector projects hindered by strict guidelines and laws. The cancellation of 500 MW coal power plant in Trincomalee in 2015 set a good example for political instability and lack of state credibility that peg the implementation of PPP energy projects in Sri Lanka. Absence of implementation above projects on time has been led to a power shortage within the country and it caused a huge backlash for the country’s economy (Fernando, 2019; Appuhami and Perera, 2016; Fernando and Nanayakkara, 2020; USAID report, 2017).

3. Research Methodology

In this research qualitative method was selected with inductive theory as the research approach. The aim of the study would be drawn from observing and analyzing the objective data. Since the professionals’ perceptions and meanings were used to develop the framework, the believed research philosophy was interpretivism. The strategy of inquiry is phenomenology. Narangoda and Khathibi (2014) have similar research approach to identify the applicability of PPP in healthcare sector in Sri Lanka. Both the first and second objectives of this study, were achieved through comprehensive literature synthesis. Thereby, the theoretical background of collaborative procurement system, its variants and barriers in the implementation of collaborative procurement approach in Sri Lankan energy sector are established. Dabarera, Perera and Rodrigo (2019) have been conducted expert interviews to identify the suitable PPP methods to Sri Lankan Road sector after providing their appropriateness. Accordingly, to identify the appropriate collaborative methods for energy sector projects in Sri Lanka, industry experts were interviewed. Purposive sampling was done, and selected sample of professionals were from both public and private sectors who have experience in either government procurement or have been involved in collaborative project implementations in Sri Lanka. The participants' sample consisted of 8 experts in Project Management, Civil Engineering, Electrical Engineering and Quantity Surveying. The semi-structured interview method selected as the data collection technique for this research. Gathered data from expert interview were analyzed through content analysis using NVivo the following section presents the summary of the data analysis.

4. Data Analysis and Discussion

From this section the data analysis findings are discussed. As following the research ethics respondent details remain anonymous. Thus, each respondent was denoted as P1, P2, P3, P4, P5, P6 and P7. Table 1 provides the basic profile of interview participants.

Table 1: Profile of the Interview Participants

Respondent	Position	Experience
P1	Senior Procurement Engineer	28 Years
P2	Procurement Engineer	23 Years
P3	Senior Quantity Surveyor	20 Years
P4	Senior Electrical Engineer	18 Years
P5	Quantity Surveyor	12 Years
P6	Quantity Surveyor	10 Years
P7	Electrical Engineer	6 Years

4.1. APPLICABILITY OF COLLABORATIVE PROCUREMENT APPROACH FOR INFRASTRUCTURE PROJECTS IN SRI LANKA

Almost all the participants expressed their awareness about collaborative procurement system and all of them had sound knowledge in different methods available under collaborative procurement system. Every participant strongly supported to adhere the collaborative procurement approach for infrastructure developments in Sri Lanka and they mentioned that the current practice of collaborative procurement methods in infrastructure developments in Sri Lanka are in poor progress. P3 stated that sectors like Transport, Energy, Water have good potential in implementing through collaborative procurement systems. P2 added that collaborative procurement approach is a good solution to overcome financial barrier that large scale infrastructure projects always face. Further P2 added, with the financial crisis that Sri Lankan government facing currently, government is not in a position to fund large scale infrastructure development projects through government capital or foreign borrowings. Similar to P4, P2 expressed that ‘government financing or borrowing foreign debt for large scale infrastructure development is no longer an option with the current economic downfall of our country’. Having said that, there is a lack of practicing in collaborative procurement approaches when implementing energy sector projects in Sri Lanka. This was confirmed by the P5 stating that, Sri Lanka can carry out studies on successful implementation of energy projects procured through collaborative approaches used in other regional counterparts like India, Bangladesh and Malaysia. Overall, all participants suggested that the collaborative approach as the most appropriate procurement method to implement infrastructure energy sector projects. Because it consists of good alternative funding arrangements and risk sharing techniques between private and public parties. P1 added, having professional and skillful persons to implement, regulate and operate advanced project is an advantage for Sri Lanka. Successful factors that would cause in

implementing proper collaborative energy sector projects that have been identified in literature review and interviews can be listed as, political, regulatory, social, economic assistance and technical assistance.

4.2. SIGNIFICANT OF ENERGY SECTOR PROJECTS AND SUITABLE ENERGY SOURCES FOR FUTURE ENERGY SECTOR PROJECTS IN SRI LANKA

According to the finding of literature review Energy sector developments directly effect to the national economy growth. With the growing population and industrial growth demand for electricity and other energy sources continuously increasing annually. In the semi structured interview, all participants stated the significance of energy sector developments and how it contributes to national development of Sri Lanka. P1 argued that ‘almost all performances in Sri Lanka depend on energy sector’. P2 argued that current electricity generation system in Sri Lanka is not sustainable and further P2 argued that Sri Lanka needs to move towards more economical and sustainable energy solutions and lack of these types of energy projects leads the country to an energy crisis. Apart from that, P3 mentioned ‘constant electricity supply is very important to any country and its economy’ and further mentioned that Sri Lanka needs to move more towards renewable energy sources whereas the country has good potential in these sources because of the geographical conditions within the country. Corresponding to that, P4 stated that country’s electricity generation strategy needs to be shifted from thermal power to more economical electricity generation methods. P5 and P6 added to that, existing electricity generation system still depends on thermal powerplants where the energy generation inputs are scarce and have higher unit costs. Therefore, they suggested, implementing electricity projects with lesser unit costs will also be beneficial to the local economy. Further P6 and P7 highlighted that Sri Lanka is currently experiencing an energy crisis due to lack of power generation outputs. Hence, fast track implementation of new energy infrastructure projects is vital to avoid future catastrophes of energy supply.

Selecting suitable energy sources to power generation is very crucial strategic decision of the country. CEB already developed their strategic plan and represented it as a ‘Long-term Generation Expansion Plan 2022- 2041’ (LTGEP). It contains CEB’s potential Electricity development plan for next 20 years. According to LTGEP 2022-2041, CEB has vision to achieve 50% renewable energy share from the total energy supply by 2030. All the participants who interviewed strongly supported to renewable energy infrastructure development in the country. As a country, Sri Lanka is highly depends on hydroelectricity generation. P7 pointed out that all possible large scale hydropower plants have been already developed in Sri Lanka. According to statistics of CEB, full capacity of hydropower plants could contribute up to 70% of total electricity demand of the country. Therefore, as a country Sri Lanka gets a huge advantage from hydropower to electricity generation. But P1 mentioned, during the dry season electricity generation hydropower sometime can fall into a significantly low level and that could lead to a power shortage within the grid. All participants backed the plan to develop wind and solar power generations. According to CEB, to achieve 50% renewable energy share large scale wind and solar power generation projects are much needed. CEB mentioned in LTGEP 2022- 2041 (2021) “Though the large hydro resources played a major role in renewable energy share in the past, variable forms renewable resources such as wind and solar are becoming dominant contributors in the future”. But P5 point out that, the development of large-scale solar plants will not be sustainable with the limited availability of lands in Sri Lanka. In P5’s opinion Roof-top solar development is more sustainable method for Sri Lanka. Other than renewable energy, interviewed experts suggested different thermal energy sources that they think are suitable for Sri Lanka. P1, P4, P5, P6 and P7 suggested coal power plants suitable for Sri Lanka because it is more economical than other thermal power sources. P1 further explained that coal power plants have more environmental impact than other power generation sources. P5 and P7 suggested LNG power plants are more economical and environmentally friendly than diesel power plants and CEB already plan to decommission their diesel power plants in near future (LTGEP, 2021). Therefore, LNG plants are a good replacement for diesel power plants. Environmental friendliness is the main factor to be considered when selecting power sources for new energy sector projects. Even though hydropower is renewable power source, development of large-scale hydro plants has a massive impact on environment conservation.

4.3. COLLABORATIVE PROCUREMENT FOR ENERGY SECTOR DEVELOPMENT IN SRI LANKA

According to the literature review findings regarding, collaborative procurement methods, participants were given a list of distinct types of collaborative procurement. Those procurement methods are categorized under two sections which are long-term and short-term procurement methods. All of participants strongly backed the PPP as the most suitable procurement route for energy sector infrastructure development in Sri Lanka. P1 stated that, PPP methods are the best way to ensure the proper performance of energy projects. Further, P1 argued concession contracts are also a suitable procurement method similar to BOT method. According to the literature review there are different types of PPPs like BOT, BOOT, BOO etc. P3 mentioned BOT method under PPP more suitable for Sri Lankan context and has already been practiced in few projects. Further P3 stated, “This method is one of the solutions to overcome financial barriers that cause when implementing big infrastructure projects”. According to P3, public sector can develop their infrastructure without spending their capital money using private sector investments. P2 mentioned some more advantages of BOT/BOOT methods as the ability to jointly share the ownership and management of the project, the risk balance between public and private sector partnering and the ability to have proper management and efficiency of private sector. P5 also suggested BOT/BOOT variant as a suitable collaborative procurement systems for future energy development projects. Further P5 argued that, if there is a technically advanced power project like a nuclear plant or LNG plant, those types of projects can be procured through DBO. P5 mentioned that, from this type of procurement arrangement public sector can collaborate with a single experienced private sector investor who has

design, building and operating capabilities. He further explained, technology transfer is a very crucial part of these kinds of projects and stated, “These procurement methods can facilitate that kind of technology and knowledge transfers to our country”. In Sri Lanka mainly privately owned independent power plants are limited to the mini hydro projects and solar plants. P6 explained, the attraction of more investments for the privately owned independent power plant is one of good resolution to overcome the power generation gap in electricity grid. After reviewing the literature review and experts’ opinions following collaborative procurement approaches are identified in figure 1 as suitable for Sri Lankan energy sector developments.

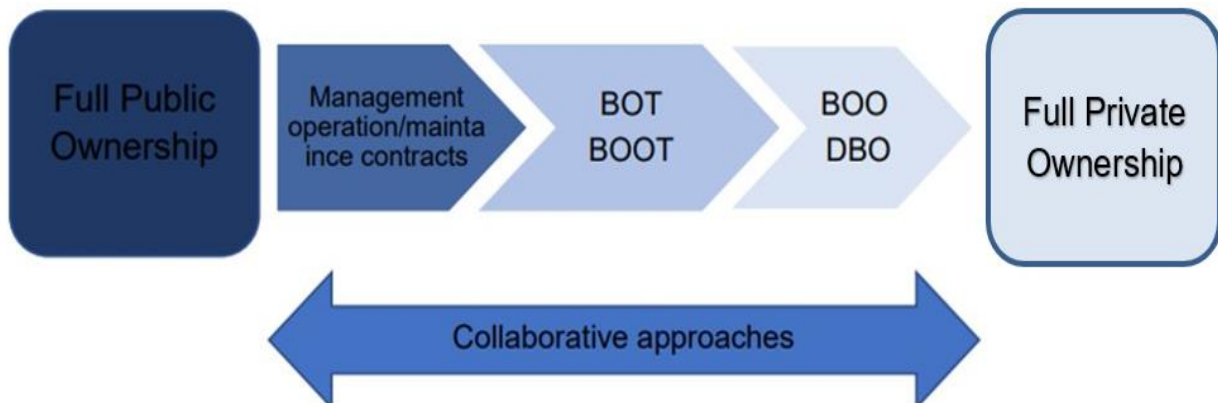


Figure 1- collaborative approaches

4.4. POSSIBLE STRATEGIES ON OVERCOMING THE BARRIERS EFFECTING IMPLEMENTATION OF COL- LABORATIVE ENERGY PROJECTS

In expert interview process, participants were asked about their opinion regarding the possible measures for proper implementation of collaborative energy sector developments in Sri Lanka. Every participant introduced various proposals to ensure successful project delivery in collaborative energy projects. P1 pointed out, the establishment of proper implementing and monitoring process is vital to this kind of projects. In accordance that, P2 suggested maintaining competitiveness, fairness and transparency are very crucial factors to energy sector projects and it is required to maintain them throughout the process of implementation. Further explained that negotiation process of these kind of projects is very important to achieve the properly defined financial proposals, risk allocations, tariffs and supply of energy source of the proposed projects. P7 added to that “public sector has to appoint skillful professionals to evaluate and then negotiate with private sector on financial and technical proposals and establish proper risk allocation between parties to reach win-win situation for both parties”. P5, P6 and P7 explained that government need to facilitate more investment friendly environment by providing incentives to both local and international investors who are interesting to invest in Sri Lanka. Further P4, P5, P6 told that, providing tax incentives, less complicated negotiation and quick approval process will attract more private investors. P6 highlighted, complicated and long delaying approval process hindered the private sector's willingness to invest in energy sector. Hence P6 and P7 proposed to establish an independent regulatory body specially for energy sector projects to undertake the responsibility of evaluation, negotiation and granting approval for investment proposals. Further P6 added that the regulatory body can monitor the performance while private sector carries out the operation part and set out the tariff or unit cost of the power generation to ensure proper service outcomes to the general public. This independent regulatory committee can be appointed as same as other projects committee in line public procurement procedure under procurement guidelines. However, it is proposed that, this regulatory body should be kept alone specifically for energy sector projects implementations. This independent regulatory body should consist with all line ministries’ representatives who responsible for project approval process. This kind of “one-counter” project approval process could support time saving and a less complicated approval process. Main responsibilities of this proposed regulatory body range to regulate and approval granting, coordination between line ministries, setting out standards, regulating tariff and power purchasing agreements and performance monitoring.

P1 argued that projects guarantees play very important role in attracting private investment. In PPP infrastructure projects, private sector gets their ROI through tariff for providing the services. For example, in PPPs in toll roads, investors get their ROI in a fee from its end users. Unlike in toll road, energy sector projects can get their ROI through signing power purchasing agreements with authoritative bodies who are responsible to distribute electricity. In Sri Lanka electricity distribution, monopoly is under CEB the public sector. Therefore, CEB can enter power purchasing agreement with the service provider. P1 added that, continuous increasing demand for electricity and the current power generation gap cause promptly requirement of new energy projects in Sri Lanka. Therefore, Sri Lankan government can ensure reliable project guarantees for private parties for their ROIs. Unlike other infrastructure developments, in energy sector, private sector can acquire better project guarantees through power purchasing agreements due to continuously increasing electricity demand. This factor is already supported by literature findings where, the highest share of private investment in the last decade is committed to energy sector development and in 2020 65% of South Asia’s PPPs recorded the commitments towards energy sector (world bank PPI annual report, 2020).

4.5. BARRIERS AND SOLUTIONS FOR IMPLEMENTING ENERGY SECTOR PROJECTS THROUGH COLLABORATIVE PROCUREMENT APPROACH

Barriers to collaborative energy sector projects are identified in both literature and semi-structured interviews. In expert interviews, participants proposed various measures to overcome those barriers. Following table 2 presents the identified barriers and possible measures to overcome those.

Table 2: Identified collaborative procurement implementation barriers in literature review and interviews along with the solutions.

Category	Barriers identified in Literature review	Barriers identified in interviews	Proposed solutions
Social	Public opposition and lack of understanding of PPP Misinterpretation of PPP as privatization Less experience in community towards collaborative projects	Public thinking private sector involvement may lead higher tariff	Public awareness Maintain transparency in competitive bidding when selecting proposals
Economical	Lack of government funds and capacity Lesser domestic investors with proper capacity Less competitiveness in unsolicited proposals Lack of project guarantee for private sector	Expensive thermal power sources Lack of foreign remittance to import thermal power sources	Attract more foreign investments Providing incentives to investors Shifting to more economical power sources Ensure ROI for investors
Political	Lack of support for collaborative procurement approach Socialist political thinking Government monopoly over electricity	Lack of strong public strategy towards collaborative infrastructure development	Establish strong public policy towards collaborative approach
Regulatory	Absence of legal framework towards PPP Complicated approval process Unfair risk allocation Inefficiency in procurement process	Time consuming approval process	Establish independent regulatory body consisting of all line ministries Ensure ROI for investors through proper regulation

4.6. SUITABLE COLLABORATIVE METHODS FOR ENERGY SECTOR

After reviewing the literature review and semi structured interviews, it is identified that Sri Lanka is facing a lack of infrastructure developments. Energy sector as one of the most significant infrastructures in Sri Lanka leads to a major power crisis and face longer power cuts owing its fewer power generation projects. Lack of collaborative energy sector projects and lack of renewable and more economical thermal power plants were identified as main causes for the energy crisis. Depending on power generation capacity, suitable collaborative methods can be varied because of the prevailing regulations and Acts. According to the electricity act, power stations with a capacity up to 25MW can only be privatized and power plants with capacity of more than 25MW government should hold 51% ownership. Due to this legislation barrier implementation of proper collaborative procurement methods has been limited in Sri Lanka. With a proper amendment to the mentioned clause in the existing regulation, it is possible to adopt quality PFI mechanism to finance projects with 100% private financing. However, with the effect of very recent amendment to the Act, the limitation was repealed. Along with that below, table 3 suggests suitable collaborative procurement methods for the implementation of power generation projects into 3 groups, 1) capacity up to 25MW, 2) capacity between 25 – 100 MW, 3) capacity more than 100 MW. Collaborative methods for each category are proposed based on the findings of both literature review and participant’s opinions.

Table 3: Proposed collaborated methods for energy sector project implementations

Capacity up to 25 MW (Small scale)	Capacity between 25-100 MW (Medium scale)	Capacity more than 100 MW (Large scale)
Privatized power plants DBO	Concessions Management & Operation contracts BOO BOT	BOOT BOT DBOT Joint ventures

4.7. FRAMEWORK FOR COLLABORATIVE PROCUREMENT IN SRI LANKAN ENERGY SECTOR

Following figure 2 framework was developed to ensure proper implementation of Collaborative procurement approach in energy sector projects in Sri Lanka. It is developed based on the findings upon achieving the objectives of the research. In this framework, exit gates were based on the formation, implementation, operation and transfer

phases. The applicability is tested for the three different slabs based on the capacity. This framework proposes an independent and regulatory body to undertake the responsibilities discussed in section 4.4. All solicited and unsolicited projects proposal in energy sector development are reviewed and implemented through this body. The main feature of this proposed method is to implement much-needed energy sector projects in a fast-track process where it is would base on “one-counter” concept to provide relaxed project approval. After the contract award, energy sector projects with different collaborative approaches can exit through 3 gates. Fully privatized power plants can exit through gate 1 after the construction phase with short-term collaboration. Exit gate 2 is for projects with long-term strategic collaborations between public and private parties like BOO. Long-term strategic collaborations like BOOT and BOT which are having transferring phase after ROI period can exit through gate 3 with the proper transfer of either technology or ownership.

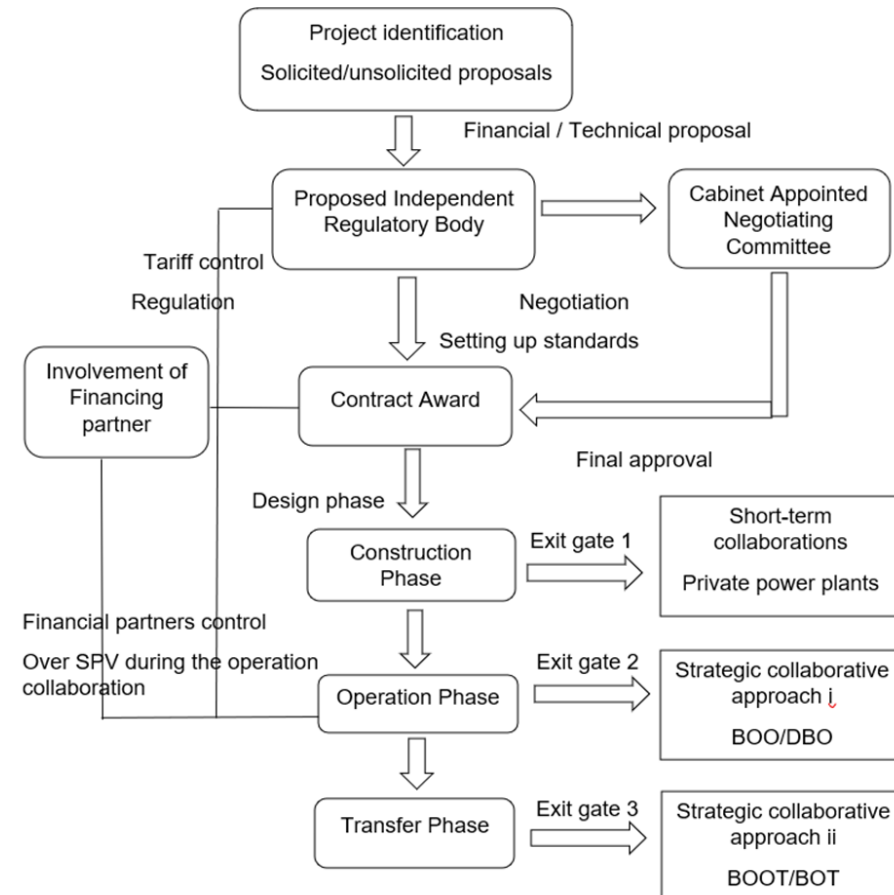


Figure 2 - Framework for collaborative projects implementation

5. Conclusion and Recommendations

With the effect of prevailing energy crisis in Sri Lanka, implementation of energy sector projects is indeeded. Hence, this research was conducted to fulfil the existing knowledge gap on appropriate collaborative procurement approaches for the implementation of Sri Lankan energy sector projects. Through the conducted literature review barriers, and different collaborative procurement variants are found. Next, the pertinent adoption of the different collaborative variants, methods of adoption and strategies for overcoming barriers were further illustrated by the experts in the arena via semi-structured interviews. As for expert explanations and opinions privatization, concession contracts, PPPs and several other short term strategic collaborative approaches were identified as the most suitable approaches for different scenarios in Sri Lankan context. Further PPP methods like BOT, BOOT and DBO methods were identified to overcome financial burdens for implementing energy projects by developing projects with private sector investments. BOOT and BOT methods are identified as most suitable collaborative approaches for large-scale (over 100MW) energy development projects because of the private sector's ability on financing, designing and constructing the facility. Moreover, private sector may operate the facility until recovering the investment. After the ROI period, public sector can retain the ownership. Nevertheless, Sri Lanka can attract new electricity generation technologies like nuclear power plants through foreign investors and then enable new technology transfers to Sri Lankan energy sector. The sustainable amendments are recommended to the Electricity Act 2009 to attract large-scale investors through BOOT/BOT procurement routes as government's poor financial capability to fund these projects with the prevailing economic crisis. For the medium-scale projects concession contracts, BOO and DBO collaborative methods are proposed to facilitate more private sector contributors. Finally, the developed framework is given to follow a quality implementation process for future Sri Lankan energy sector projects while overcoming existing barriers.

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