THE CRITICAL SUCCESS FACTORS FOR PUBLIC-PRIVATE PARTNERSHIP HIGHWAY CONSTRUCTION PROJECT IN MALAYSIA

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ABSTRACT

The Public-Private Partnership (PPP) approach has been widely used in the development of major infrastructure and building projects all over the world and is considered as one of the effective ways to achieve value-for-money procurement for the public sector. PPP usually requires public authorities and private contractors to collaborate through long-term concession contract where the latter has the obligation to provide the public services desired for the public sector. PPP has recently being introduced in Malaysia as a revised approach towards improving its existing privatization approach in the procurement of public sector projects. Thus, it is essential to determine the critical success factor (CSF) for public sector projects in Malaysia. The Butterworth Outer Ring Road (BORR), which is one of the PPP-oriented infrastructure projects currently operating in Malaysia, has been used as a case study in order to achieve this aim. An extensive interview and structured questionnaires have been used as data acquisition means to elicit the perception of public sector clients in regards to the CSF for the BORR project. As a result, effective communication system, good project governance, responsibility and commitment of public and private sectors, competitive procurement process and ability to delegate authority have been identified as the top five CSF for the BORR expressway in Malaysia.

KEYWORDS*: Public-private partnership; critical success factors; Malaysia*

1.0 INTRODUCTION

PPP has been widely used as the procurement strategy recently as it is being considered as one of the most effective and efficient ways of achieving value for money deliveries for infrastructure and building project development (Li et. al., 2005; Ke et. al., 2010). This type of procurement strategy requires the principal and private sector to work on a collaborative basis, which involves risk-sharing and benefits from the procured construction project. By allowing

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each sector to do what it does best, the intended facilities and services for a PPP construction project are expected to be delivered in the most cost effective and efficient manner. Pierson (1996) describes PPP as an agreement where public sector bodies enter into a long-term contractual agreement with private sector entities for the construction or management of public sector infrastructure facilities by the private sector entity or the provision of services by the private sector entity to the community on behalf of a public sector entity.

The National Council for Public–Private Partnership defines this procurement approach as "contractual arrangement between a public sector agency and a for profit private sector developer, whereby resources and risks are shared for the purpose of delivery of a public service or development of public infrastructure" (Li et.al., 2005; United Nations Development Programme, 2005). The Canadian Council for Public–Private Partnerships (2004) sees PPP as "cooperative venture between the public and private sectors, built on the expertise of each partner, which best meets clearly defined public needs through the appropriate allocation of resources, risks and rewards". PPP is becoming a popular choice for most policymakers around the world that are facing with difficulties in terms of shortages in financial resources as well as acting as a countermeasure to overcome the inefficiency public sector deliveries (Terry 1996; Liu et. al., 2009). Among the prominent countries around the world that have been implementing PPP approach in most of their infrastructure and building project deliveries include the USA, the UK, Canada, Australia, South Africa, Japan, Finland, the World Bank, the European Investment Bank and the UN (Brook, 2001; Hamilton, 2001; Kouvarakis, 2001; The PFI Report, 2001). Malaysia is one of the latest countries that have recently adapted the PPP approach in the provision of buildings and infrastructures within a public sector development.

In the Malaysian context, PPP has been defined as "a process that transfers the responsibility of financing and managing capital investment and services in relation to the public sector assets to private sector (Economic Planning Unit, 2006). The decision of the Malaysian government to shift the procurement approach in the provision of public sector projects is mainly influenced by its expenditure policy and also financial constraints. The public-private

partnership programme in Malaysia started in 1993 through a privatization master plan, which marked a drastic shift of the government's procurement policy from public-sector oriented onto private-sector initiative. According to Netto (2006), the Malaysian government is reluctant to spend large sums of money on the development of public infrastructure projects due to insufficient public sector capital funding. With PPP procurement, the scope of the procurement is expanded to reflect a broader content with the focus being shifted to developing an integrated solution. project activities are generally broken down into smaller component parts and managed as separate units in a sequential manner due to budget limitations. As a result, the opportunity to develop an integrated solution that addresses a public sector need is often missed. Typically, most of the public projects have been plagued by delays and shoddy workmanship, which is inherently seen as a major problem to the government (Jayaseelan & Tan, 2006; Endut, 2008).

The objective of this research is to establish the critical success factors of PPP highway project in Malaysia. The identification of the critical success factors is not only useful as a measuring tool to assess the successful delivery of a procured project, but also can be used as the "key performance indicators" for the upcoming proposed building and infrastructure projects.

2.0 CRITICAL SUCCESS FACTORS FOR PPP PROJECTS

Generally a critical success factor is the term used to define the most important part for individual, institution or organisation that ought to be focused in order to achieve their objectives, missions and goals successfully. This concept was first introduced by Rockart (1982), which defined critical success factor as those few key areas of activity in which favourable result is absolutely necessary for a particular manager to achieve their goal (Jefferies et al., 2002; Hardcastle et al., 2005). Critical success elements are significantly important for firms and organizations to identify the key factors that they need to focus on in order to ensure success in the project involved (Rowlinson, 1999).

There are a number of significant findings related to the critical success factors of PPP projects around the world. Li et. al. (2005) has identified five critical success

factors towards effective and efficient deliveries of PPP construction projects in the UK, namely competitive and transparent procurement process, government guarantee, project implementability, favourable economic condition and the available financial market. An effective procurement process must demonstrate transparency and be competitive throughout the whole procurement process, which would subsequently enhance the project's value for money as a result. Among the key success factors identified towards competitive and transparent procurement process include good governance, well-organised and committed public agency, social support, shared authority between public and private sectors as well as realistic cost and benefit assessment. They identified that a guarantee from the government in terms of revenue assurance for long-term private investments and multi-benefit objectives of public and private sectors in PPP projects are protected.

As for the project implementability, Li et al. (2005) described components such as favourable legal framework, project technical feasibility, appropriate risk allocation and risk sharing as well as strong private consortium as among the key critical success factors for PPP projects in the UK. Sound economic policy and stable macroeconomic conditions such as lower risk market would provide a better opportunity to succeed for the latter as among the key success factors identified for favourable economic condition. Jefferies et al. (2002) and Zhang (2005) see project financing as one of the most essential key factors for the procurement of public infrastructure projects that require private investment. In most cases, the availability of an efficient and mature financial market with the benefits of low financing costs and diversified range of financial products would act as an incentive for private contractors to take up PPP projects. Therefore, Li et al. (2005) identified available financial market as one of the critical success factors for PPP projects in the UK. Table 1 summarises the critical success factors as determined by Li et al. (2005) for PPP projects in the United Kingdom (UK).

Table 1. Critical success factors for PPP projects in the UK

Success Factor Classification	Critical Success Factor
Competitive and Transparent Procurement Process	Good governance, well-organised and committed public agency, social support, shared authority between public and private sectors, realistic cost and benefit assessment
Government Guarantee	Revenue assurance, multi-benefit objectives protection
Project Implementability	Favourable legal framework, project technical feasibility, appropriate risk allocation and risk sharing, strong private consortium
Favourable Economic Condition	Sound economic policy and stable macroeconomics conditions
Available Financial Market	Available financial market

Chan et al. (2010) have classified critical success factors for PPP projects in China into seven key success elements, which are transparent and efficient procurement process, judicious government control, strong private consortium, equitable allocation of risks, adequate legal framework and stable political environment, project economic viability as well as the available financial market. Most of the CSFs for PPP project in China as identified by Chan et al. (2010) are similar to the one determined by Li et al. (2005) for PPP projects in the UK. For instance, equitable risk allocation, adequate legal framework and strong private consortium, which have been categorised under the key success classification for PPP projects in China, are part of the critical success factors classified under project implementability for PPP projects in the UK. Nevertheless, there are also a number of new critical success factors identified for the PPP projects in China. Amongst them include clear project brief, good partner's relationship and consultation with the end-user.

A clear project brief, which usually indicates the needs and wants of the clients, is critically important for a successful delivery of PPP projects to ensure that consultants and contractors are able to provide design and construction outcomes in accordance with the project aim. Consequently, a clear project brief would also reduce the possibility of project delay due to variation order (VO). According to Mohamad et al. (2010), among the causes of VO in construction

projects include changes in either scope, specifications, design and/or project schedule as well as errors and omissions in design. Rashid et al. (2006) have identified that a good relationship between partners is essential to develop a strong private consortium as they all bear relevant risks and benefits equally from the cooperation. Consultation with end-user has also been identified by Chan et al. (2010) as a critical factor towards successful deliveries of PPP project in China as it would provide a substantial customer satisfaction that could subsequently enhance the project viability. All the critical success factors identified by Chan et al. (2005) for PPP projects in China are indicated in Table 2.

Table 2. Critical success factors for PPP projects in China

Success Factor Classification	Critical Success Factor
Transparent and efficient procurement process	Competitive and transparent procurement process, clear project brief and client requirements
Equitable allocation of risks	Appropriate risk allocation and risk sharing
Strong private consortium	Good partners' relationship, technology transfer, effective management control
Judicious government control	Government guarantee, consultation with end-user, appropriate project identification
Adequate legal framework and stable political environment	strong government support, stable and transparent political/social situation
Project economic viability	Project economic viability, business diversification
Available Financial Market	Available financial market

3.0 METHODOLOGY

This research focuses on identifying the critical success factors for the Butterworth Outer Ring Road (BORR), which is one of the first highway projects that have been procured through the public-private partnership (PPP) programme in Malaysia. The recognition and identification of the critical success factor is not only useful as a measuring tool to assess the successful delivery of a procured project, but also can be used as the "key performance indicators" for the upcoming proposed building and infrastructure projects. The research methodology has been split into two sections.

3.1 Data Acquisition on Critical Success Factors

The first section entails the data acquisition on the critical success factors of highway projects in Malaysia from the perspective of public sector clients. In this respect, the MHA as statutory body responsible for regulating the development and management of toll highways in Malaysia has been chosen as the key respondents for interviews. There were ten personnel involved in the interview that include director of planning, project management and design management respectively as well as several senior engineers from the Infrastructure 2 (Highway) division. The views of these respondents on the criticality and importance of all twenty-three critical success factors identified by both Li et al. (2005) and Chan et al. (2010) have been generated. As a result, ten more critical success factors have been identified for highway projects in Malaysia. Amongst them include reasonable cost and revenue estimation, public resistance (willingness to pay), effective payment mechanism and also proportionate reward allocation for accepting risk. Table 3 indicates all the thirty-three critical success factors for highway projects in Malaysia in accordance with their respective key success elements.

3.2 Assessment of Critical Success Factor

The second section of research methodology involves the assessment of the criticality and importance of each critical success factor identified from the perspective of private sector operators/concessionaire through a real case study in which for this research is the Penang Bridge project. A total of twenty respondents, including site engineers, maintenance engineers and project managers from the Lingkaran Luar Butterworth (Penang) Sdn Bhd, which is the concessionaire of the project, were involved in the questionnaire-based interviews. The Analytical Hierarchy Process (AHP) approach, which supports any multi-criteria decision-making situations by breaking down problems into relevant hierarchical levels, has been used to achieve this purpose. Table 4 portrays the fundamental intensity scales developed by Saaty (1990) for AHP decision-making models. The fundamental concept of pairwise comparison in the AHP is to assess the importance of a particular criterion over another that leads to achieving a hierarchy objective. For example, if the criticality and importance of the criterion "A" is found to be essential or strong over "B" in pairwise comparison, then an intensity scale of 5 should be awarded

to the former. The intensity scale "1" usually represents two activities that have an equal importance to the objective when they are being evaluated in the pairwise comparison. The AHP originally developed as a decision tool for complex individual decision-making problems. The AHP is amendable to group decision making. The AHP is used to quantify relative's priorities for a given set of alternatives on a ratio scale, based on the judgement of the decision maker, and stresses the importance of the intuitive judgements of the decision maker as well as the consistency of the comparison of alternatives in the decision making process (Al Harbi, 2001). The use of the AHP technique enables the decision maker to structure a complex problem in the form of a simple hierarchy and to evaluate a large number of qualitative and quantitative factors in a systematic manner under multiple criteria (Cheung et al., 2010). Because AHP is not a statistically based methodology, a 'sample size' of 1 is enough to implement the AHP methodology. AHP was originally developed to enable a single decision maker to select an alternative among multiple alternative (Duke & Aull- Hyde, 2002). Based on that literature review, the AHP method had been used in this research.

Table 3. Critical Success Factors for PPP Highway/Infrastructure Projects in Malaysia

Key Success Elements	Critical Success Factor
Transparent and efficient procurement process	Good Governance
	Well-Committed Public Agency
	Clear Project Brief & Client Requirement
	Social Support
	Shared Authority Between Public-Private Sector
	Realistic Cost Benefit Assessment
	Reasonable Cost & Revenue Estimation*
	Mitigation & Flexibility In Managing Macro Risks*
	Innovative Output Specification*
	Objectives Of All Parties Are Agreed Prior To Contract Signing*
Judicious Government Control	Revenue Assurance
	Multi Benefit Objectives Protection
	Consultation With End User
	Appropriate Project Identification
	Strong Government Support
	Stable And Transparent Political & Social Situation

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Project Implementability	Favourable Legal Framework
	Project Technical Feasibility
	Appropriate Risk Allocation & Risk Sharing
	Strong Private Consortium
	Good Partners Relationship
	Technology Transfer
	Effective Management Control
	Public Resistance (Willingness To Pay)*
	Effective Payment Mechanism*
	Whole Life Asset Management*
	Good Communication Between All Project Parties*
	Proportionate Reward Allocation For Accepted Risk*
Favourable Economic Condition	Sound Economic Policy
	Stable Macroeconomic Condition
	Business Diversification
Available Financial Market	Available Financial Market
	Flexible Loan Repayment Scheme*

*Empirical data generated directly from interview

Table 4. The Intensity Scale for AHP Modelling

Intensity of Importance	**Definition**	**Explanation**
1	Equal Importance	Two activities contribute equally to the objective
3	Weak Importance of one over another	Experience and judgement strongly favour one activity over another
5	Essential or strong importance	Experience and judgement strongly favour one activity over another
7	Very strong importance	An activity is strongly favoured and its dominance demonstrated in practice
9	Absolute importance	The evidence favouring one activity over another is of the highest possible order or affirmation
2, 4, 6, 8	Intermediate values between the two adjacent judgements	When compromise is needed

3.3 Case Study

The Single Purpose Vehicle (SPV) for BORR is Lingkaran Luar Butterworth (Penang) Sdn Bhd or also known as LLB which was incorporated on 17th December 1996, is responsibility to privatize the BORR on a build-operate-transfer (BOT) basis. The main activity of this company in these projects is highway construction and toll collection. The Concession Agreement between the Company and the Government was signed on 28th April 1997. The concession period of BORR is thirty years. The BORR start operation and open to public commenced on 21st February 2007.

Figure 1. Aerial view of BORR Highway

BORR has 6 interchanges that promote smooth, faster and convenient for local traffic dispersal. The alignment of the highway covers a distance of 13.925 km which merge with existing 5.0 km of the Butterworth-Kulim Highway. BORR has three (3) two-way Toll Plazas - TP1 (Prai Toll Plaza), TP2 (Bagan Ajam Toll Plaza) and TP3 (Sg. Nyior Toll Plaza).

There is a kilometer marker on the median of BORR highway for easy reference during breakdown and emergency. BORR also provides a ring road around Butterworth town namely Deep Water Wharves and North Butterworth Container Terminal. The ring road functions as a separation between local town traffic and heavy commercial traffic. By separation between local town traffic and heavy commercial traffic its will catalyst the economic activity for future development of Butterworth town and transformation of Butterworth

landscape from backwaters of Penang into a modern vibrant city. Development of BORR, making Butterworth more accessible to nearby surrounding area to reach the townships, business and finance centers.

One of the biggest challenge faced during the construction stage is the delay in initiating the project due to recession period worldwide and currency depreciation, which was only started towards the end of year 2007. Despite that, the BORR highway have received several awards and recognition, including by the Institution of Structural Engineers UK, Sungai Perai Bridge winning award for Transportation Structures and prestigious Supreme for Engineering Excellence.

4.0 RESULTS AND DISCUSSION

4.1 AHP Pairwise

AHP approach, which supports any multi-criteria decision-making situations by breaking down problems into relevant hierarchical levels, has been used to achieve this purpose. AHP pairwise comparison is a process to make a decision-making base on scale for AHP modeling. It is also used to rank the factor based on priorities process or breaking down problems into relevant hierarchical levels. The fundamental concept of pairwise comparison in the AHP is to assess the importance of a particular criterion over another that leads to achieving a hierarchy objective. The entire factor that involve in the research went through pairwise comparison for ranking purposes. The value is acceptable if its inconsistency is below 0.1. There are twenty respondents including site engineers, maintenance engineers and project managers from the LLBS that were involved in the questionnaire-based interviews to determine the CSF ranking and identifying the key success element for the BORR project, as stated in Table 3. Not only all the thirty-three factors has been ranked but also a key success element was identified. Figure 2 shows the key success element for the BORR project.

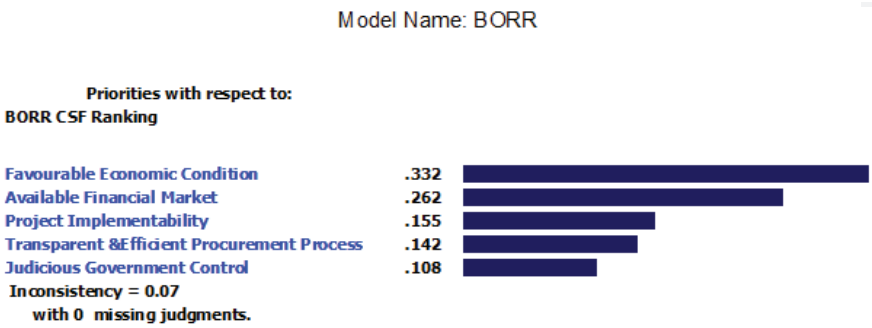

Figure 2. Key Success Element Ranking

Based on the results given in Figure 3, the most key element success factor that give an impact to the BORR Project is the favorable economic condition, available financial market and project implement ability. The favorable economic condition is the primary key success element that has been chosen. It is due to recession and currency depreciation during which the concession agreement was signed between LLB and Government of Malaysia in 1997. This situation have caused a ten-years delay in before the BORR Highway project have finally started.

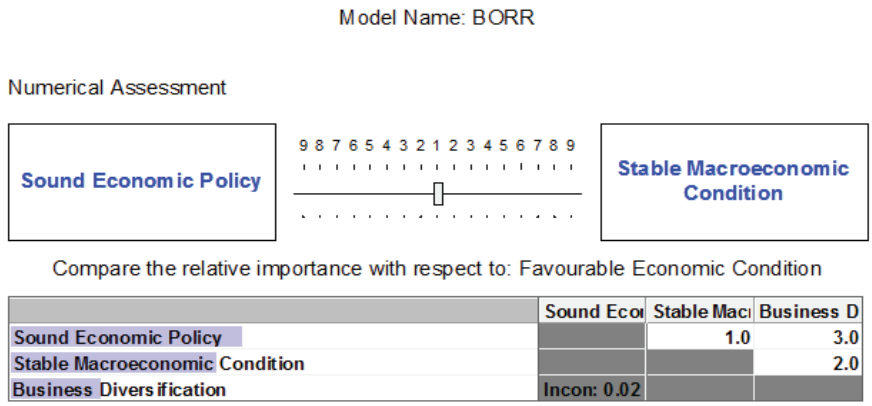

Figure 3. Pairwise comparison for subfactor under favourable economic condition

The second key success element is also found to be significantly affecting the progress of the BORR project. The concessionaire need to find a suitable investor and financier for the project. With a suitable investor and financier, the risk of failure and negligence of the project will be minimized. Through a good decision action in financial and economic aspect, the implementability

of the project will be successful to develop. The transparency and efficiency in procurement process is also important to ensure the project success. The clause must be clear, easy to understand and fair to each parties that are involved in the project. The good policy-maker that is enforced by the government is also helpful in succeeding the project where fair decision-making is established. Figure 3 is the pairwise sub-factor under favorable economic condition key element.

Based on the results, the economic policy and stable macroeconomic condition is equally important. The economic policy will affect the type of macroeconomic conducted in surrounding area. But to develop the economic policy, sources of existing economic activity is a main input for references and must be taken into account. During recession and currency depreciation, the economic strategy that was taken by the government is to stabilize the currency and in promoting growth of the existing microeconomics. The government have also tried to minimize the expenditure that will increase the debt and reduce foreign exchange that could jeopardize the Malaysian currency. Zahirawati Zakaria et al. (2010) noted that after the recession and currency depreciation, the government came out with a high growth policy based on a high ratio of investment to gross domestic product complemented with the promotion and support of certain mega projects, which have led to implicit assumptions by lenders that the government would not let those projects fail, which was helped by lending decisions by bankers based on not only a project's cash flow but also on collateral and implied government support. Other sub-factor under favorable economic condition is stable macroeconomic condition. Macroeconomic is the field of economics that studies the behavior of the aggregate economy such as changes in unemployment, national income, rate of growth, gross domestic product, inflation and price levels. A stable macroeconomic condition will help in the movement and trends of the economy as a whole. The activities that are related to macroeconomic surrounding BORR project are manufacturing factory, port and shipping, office and business center, and housing development.

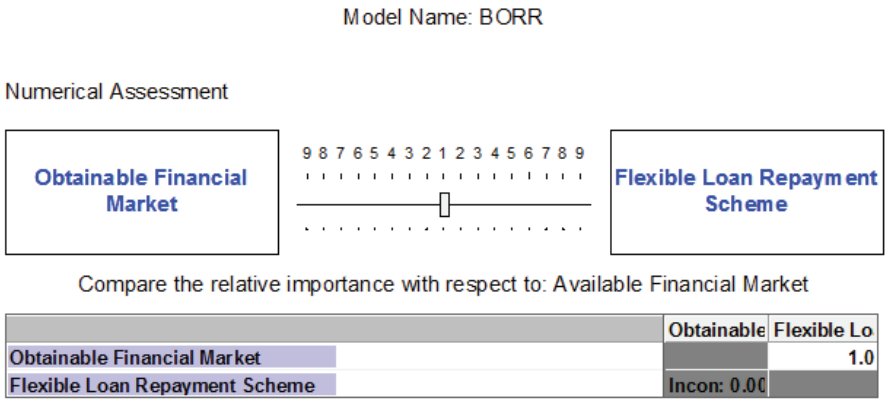

Figure 4. Pairwise of subfactor for available financial market

The business diversification from concentrating on Penang Island to mainland also gives impact to BORR project. There are many hypermarkets and business centers that have been developed nearby BORR alignment such as those in Perai, Perda and Seberang Jaya. All these areas become a catchment area for BORR highway to generate the revenues. The second main element of BORR project CSF is available financial market. The pairwise comparison for this element is obtainable financial market with flexible loan repayment scheme. The results of pairwise comparison is shown in Figure 4.

Both subfactors are equally important. In situation where our country have faced a recession and currency depreciation, the investor and financier became very thoroughly and particular in investment.There are limited number of investor and financier.The terms and condition for investment regulation was made more strict, making it very difficult for the concessionnaire to choose the best offer. Factors of consideration include currency for foreigner investor, the value of interest rate and duration for investment payback. Any lacking in the decision making for the financial aspect will result in more burden to the concessionaire. According to Zahirawati Zakaria et al. (2010), the currency mismatch has also occurred in Malaysia, with the exchange control regime requiring approvals for foreign currency borrowing. Several prominent corporations were allowed to raise foreign currency loans, although they only had Ringgit cash flows. Due to the sharp Ringgit depreciation, these corporations were faced with massive foreign exchange losses or insolvencies because of their currency mismatches and inabilities to hedge exposures.

Based on the results for the sub-factor under project implementability that give the impact to the BORR project , there are four items that can be considered as a priority factor such as efficiency of management control, good communication between all project parties, effective payment mechanism and project technical feasibility. The recession and currency depreciation in the early stage of BORR project require the management group of the concessionaire to reschedule all the planning work that has been agreed. To ensure the project is successful, an effective management control must be enforced, especially in the progress of the construction work, financial and expenditure of the project. Lack of decision making will result in the failure of the project. The key to success for all planning work on BORR project is good communication between all project parties. Through good communication between all project parties, the defect can be detected earlier and solve correctly. An effective payment mechanism for the parties involved in the project will impact the quality of work and time. With systematic work payment will enhance the output quality. This indirectly will make the progress of work fast and on schedule. The early obstacle and risk recognitions through project technical feasibility study can help with risk management of the on-going project. This will help in minimizing the impact of the risk to the project. The ranking of priority factor under project implementability is as shown in Figure 5.

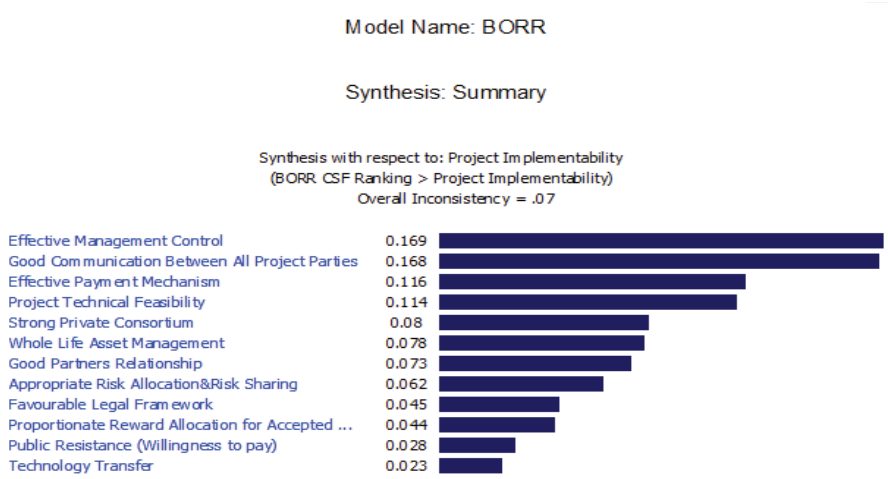

Figure 5. Priority factor for project implementability

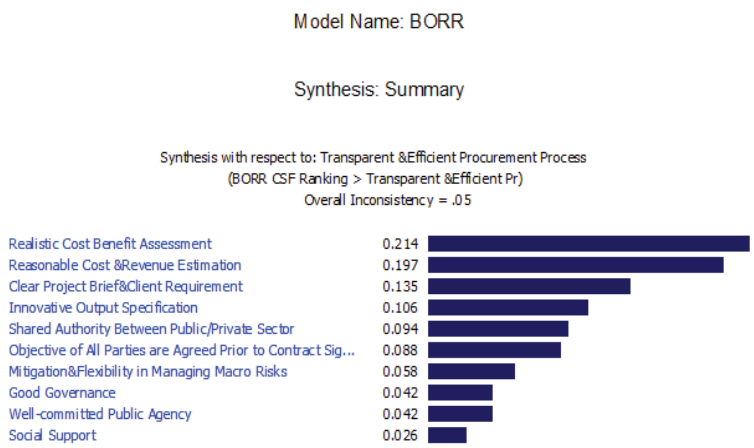

Figure 6. Ranking of the factor for transparent and efficient procurement process

There are ten sub-factors under transparent and efficient procurement process. From the entire sub-factors, four items have been chosen as a priority under the main element of transparent and efficient procurement process such as a realistic cost benefit, assessment, reasonable cost and revenue estimation, clear project brief and client requirement and innovative output specification. All the factors that have been chosen are related to financial aspect and detrimental to the quality of the output. A thorough cost benefit analysis will define the correct expenditure parallel to the profits gained. This will increase the degree of transparency and efficiency of the procurement process. Another factor that will increase the degree of transparency and efficient procurement process is the reasonable cost of work and correct revenue estimation. Through implementation of this aspect, the win-win situation can be achieved in the project. A clear project brief and understanding about client requirement will also make the procurement process become more transparent and efficient. All parties involved in the project know very clearly about the aim and goal of the project. Output specification is also important to ensure the procurement process is transparent and efficient. Output specification contains technical data and project design details. With complete and clear technical data will enhance the procurement process transparency and efficiency. The priority ranking of the sub-factor under transparent and efficient procurement process are stated in Figure 6.

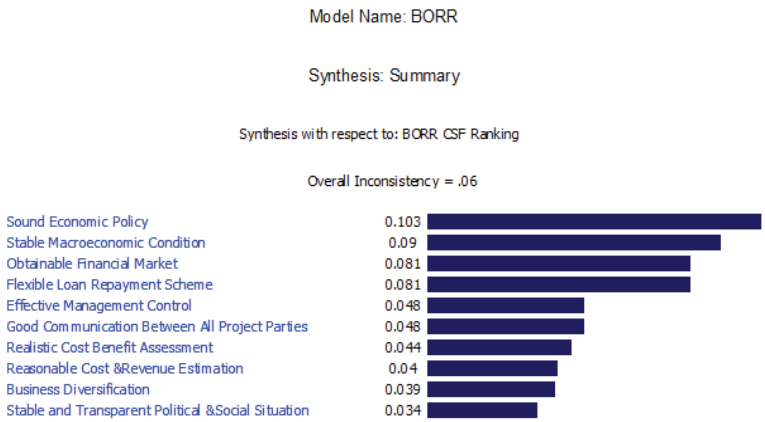

Figure 7. Top ten of critical success factor for the BORR project

The top ten of the thirty three of CSFs for the BORR project is shown in Figure 7. Based on the results, the highest CSF ranking is sound economic policy, stable macroeconomic condition, obtainable financial market and flexible loan repayment scheme.

5.0 CONCLUSION

This research aimed to identify the critical success factors (CSFs) and the use of key performance indicators involved in a PPP-highway project in Malaysia. There are altogether five most ranked out of the ten listed elements of the CSFs; these being (i) favourable economic condition, (ii) available financial market, (iii) project implementability, (iv) transparent and efficient procurement process and (v) judicious government control. In terms of the favourable economic condition, sound economic policy, stable macroeconomic condition and business diversification are identified as the three sub-factors under this CSF. Moreover, in the aspect of available financial market, obtainable financial market and flexible loan repayment scheme are found to be of high importance. It has also been observed that both project implementability, consisting of twelve elements and factors for transparent and efficient procurement process, with ten elements involved, greatly influence the PPP project progress. Lastly, all the ten identified CSFs for the BORR project have been ranked accordingly in a descending manner, from sound economic policy (ranked no.1) down to

stable and transparent political and social situation, with the lowest rank of all the ten CSFs identified from this research project.

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