A CONCEPTUAL FRAMEWORK OF PERFORMANCE ASSESSMENT FOR PRIVATE FINANCE INITIATIVE PROJECTS IN MALAYSIA

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Abstract
Private Finance Initiative (PFI) is one of the procurement methods that has been applied widely in the global construction market including Malaysia. PFI is an alternative procurement which is viewed as restructuring the previous privatisation concept in delivering value for money (VFM) for Malaysian public infrastructure. Among the restructuring efforts in the privatisation is specifying the standard assessment of private concessionaires' performance through the execution of key performance indicators (KPIs). The assessment is practically benchmarked against the government's standard. However, in Malaysia, lack of an effective KPIs is identified as one of the core criticisms for measuring the PFI projects performance. Therefore, two objectives are established which are; to investigate the implementation of various PFI performance measurement models across the globe to measure the performance and how these models can be adopted within the PFI in Malaysians. Finally, a conceptual framework is proposed for measuring performance of PFI projects in Malaysia. The outcomes of this paper can serve as a theoretical base for the development of an effective performance measurement tool for monitoring and measuring PFI projects performance in Malaysia.

Keywords:
Key Performance Indicators, Performance, Performance Measurement Tool, Private Finance Initiative

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BACKGROUND OF STUDY

In recent years, governments worldwide have adopted Public Private Partnership (PPP) more extensively for the reason of achieving value for money (VFM). The government in the United Kingdom (UK) had originally adopted this procurement method since 1992. It involved the transformation from a conventional contract of delivery (design and construction) of providing public service projects to the privately financed (finance, design, construct, manage and operate) public facilities. This approach is called Private Finance Initiative (PFI), which is under umbrella of PPP. Carrillo et al. (2006; 2008) in their research defined the PFI as the involvement of the private sector in financing, management skill, and capabilities of implementing the public sector projects (constructed facilities and services) within the stipulated concession period, typically 20–30 years (NAO, 2003; El-Haram & Agapiou, 2002).

Furthermore, PFI is a contractual arrangement between public and private sectors, where the private sectors need to deliver good services and successful performances within stipulated concession period. Meanwhile, public sector is accountable to monitoring and measuring the performance of private sector in delivering good services and facilities. Simultaneously, PFI also emphasizes the concept of VFM and innovation based on harmonious partnership (Yuan et al., 2008). According to Robinson & Scott (2009), VFM in a PFI project crucially depends on the performance of the projects.

Fundamentally, the PFI projects are designed to fund long-term public infrastructures and services provided for the whole life cycle of PFI projects. During this cycle, PFI performances could be affected by a number of factors, which might cause the inefficiency and ineffectiveness of the projects. For instance; defects occurrence (Isa et al., 2016; Universiti Teknologi MARA, 2016); complaints from users on poor facilities and services provided; low level of users' satisfaction (Universiti Teknologi MARA, 2015; 2016); and conflict between payment and measuring performance (Oyedele, 2013; Yescombe, 2008). These factors can contribute to the PFI poor project performance and consequently will affect the payment process. Payment deduction will be imposed to the low level of performance standard achieved by the concessionaire (Oyedele, 2013). It is supported by the report from NAO (2010), that service failure and poor performance in maintenance works for non-

compliance with output specification are frequently reported within PFI projects in the UK and Australia. This result will affect the success of a PFI project implementation and consequently failed to achieve VFM. Thus, factors that influence this performance should be measured before any deductions and determination level of performance is imposed. Therefore, to measure the level of PFI projects performances, the establishment and selection of an effective performance measurement tools is a necessity.

In PFI projects implementation, Key Performance Indicators (KPIs) is used as a measuring tool in determining the level of performance and overall success of the PFI projects. However, in Malaysia, the lack of an effective performance measurement tools is identified as one of the core criticisms towards the implementation of measuring PFI projects performance (Ismail, 2012; Khaderi & Aziz, 2010). This situation was similarly happens to the other countries during measuring performance of the PFI projects. In addition, it has been proven by many researchers that the lack of an effective performance measurement in PFI will be reflected from the depreciation of standards below optimum service quality of infrastructures and will contribute to the deliveries failure of PFI projects (Yuan et al., 2009; Liu et al. 2013; Regan et al. 2011; Hodge, 2004; Yong, 2010; VAGO, 2002; House of Commons, 2003; Mladenovic, 2013). Therefore, establishment of KPIs as a performance measurement tool is vital to make PFI projects functioned effectively and efficiently.

Even though a lot of studies on KPIs have been conducted with the aim to improve the performances, nonetheless, KPIs are still continuously debated. For instance; lack of clarity and understanding of KPIs for PFI projects (Lawther & Martin, 2014; Javed et al., 2013a; David & Steve, 2012) and insufficient effective performance indicators for measuring quality of the service delivery (Toor & Ogunlana, 2010; Oyedele, 2013; Javed et al., 2013b). The agreeing level of performance is what determines the payments or deductions from the public sector to the private sector. Consequently, if the quality of service does not achieve the minimum standards stipulated in the output specification, a payment deduction or penalties can be triggered in the form of a performance failure payment deduction (Yescombe, 2008). Therefore, the development of an effective KPIs is crucial in determining the level of service quality and facilities delivered by concessionaire, so that it can be monitored and measured effectively and efficiently.

This study presents an early research purely based on literature review and preliminary survey on the understanding of performance measurement in PFI projects. It takes into account the soft and hard issues of PFI projects performance, concept and various types of performance measurement tools which can be adapted in PFI projects in Malaysia. Within this context, this research presents two objectives which are; to investigate the implementation of various PFI performance measurement models across the globe and how these models can be adapted within the context of PFI in Malaysia. Finally, a conceptual framework is proposed for measuring performance of PFI projects in Malaysia.

LITERATURE REVIEW

Overview of PFI

PFI was initiated in 1992 under United Kingdom (U.K.) government and has transformed its approach from traditional delivery of providing a range of public service projects, such as hospitals, schools, prisons, roads, etc., to privately finance, design, construct, manage, and operate these facilities. PFI is a unique procurement approach nominated by the governments all over the world. It is unique in terms of the nature of the projects and smart partnership adopted in the contract, even though they involved lengthy period of contracting throughout the whole life cycle. As such, Kamara (2012) defined PFI as a form of public private partnership, where a single organization (private sector) provides the financing, design, construction and operation of facility over a 25-30 years period of concession.

In addition, PFI is a procurement method that has been successfully implemented by many countries worldwide such as United Kingdom, Australia, USA, China, Hong Kong, France, Germany, Japan as well as Malaysia. The main guiding principle is the usage of private sector in the provision of constructed facilities by using a whole life approach (delivering and maintaining it) within the whole life of concession period. The approach includes the operational and maintenance phases of the projects throughout the entire concession period. (El-Haram & Agapiou, 2002; NAO, 2003).

PFI in Malaysia

Private sectors' participation in providing facilities and public services is not a new thing in Malaysia where it has been implemented since the 1980s. The adverse impact of the world economic recession prompted the government to seek assistance from the private sector for the development and economic activities of the country (Ismail & Rashid, 2007). Currently, most of the public projects have been plagued by delays and shoddy workmanship, which are inherently seen as a major problem to the government (Jayaseelan & Tan, 2006; Endut, 2008). As a result, the maintenance repair costs are increased, causing the Malaysian Government to be reluctant to spend huge amounts of money on the development of public infrastructure projects as public sector capital fund is insufficient (Netto, 2006). Therefore, to bridge these issues, the Malaysian Government is turning to alternative ways such as PFI for transforming the public projects. PFI evolution in Malaysia started from the 4th Malaysian Plan with the agenda of privatisation incorporation. The evolvement of privatisation continued to the 6th Malaysian Plan with the introduction of Privatisation Master Plan. Then, the concept of PPP is introduced in the 8th Malaysian Plan and the ownership structure named PPP is re-branded as PFI in the 9th Malaysian Plan. Following these plans, the 10th Malaysian Plan continued to incorporate PFI in developing Malaysia. This agenda is sustained in the 11th Malaysian Plan so as to promote the involvement of the private sectors in investing in the Malaysian development. The rationale of utilising the PFI procurement in Malaysia is to provide better and more efficient public services by sharing resources between public and the private sectors (Takim et al., 2008).

Referring to that, PFI in Malaysia is originally initiated by the Malaysian Government through the Ninth Malaysia-Plan (2006-2010) under the National Privatization Plan (Economic Planning Unit, 2006) and is officially implemented in 2009. The Malaysian version of PFI will be financed by the Employees Provident Fund (EPF) loans in which the amount is published in the Ninth Malaysian Plan. In order to facilitate the implementation of PFIs, the Ministry of Finance Malaysia has acquired a substantial amount of funds to facilitate the first wave of PFI implementation in Malaysia (Jayaseelan & Tan, 2006). In Ninth Malaysian Plan, RM20 billions are allocated for these PFI projects. Nevertheless, there is a view that the government could still bear the risk to a certain extent, in particular if any of the PFI projects becomes unsuccessful.

PFI procurement scheme in Malaysia is still at an infant stage and the concept of PFI is lagging behind compared to other experienced countries such as UK and Australia. One of the issues experienced by the Malaysian government is on the assessment of PFI projects performance. Therefore, the establishment of a framework is paramount in order to provide a better understanding of the execution of the complex scheme of financing, as well as the establishment of the KPIs for assessing overall projects' performances is a necessity. Despite the tremendous growth of PFI implementation in Malaysia, the PFI arrangements have been constantly reviewed and revised by the Malaysian government to improve the present practice of PFI implementation to ensure the achievement of its ultimate goal and objectives.

Currently, there are 28 projects listed under Unit Kerjasama Awam Swasta (UKAS) and 71% of the projects are for social infrastructure, which is on educational sector and health sector. Another 29% is allocated for economics infrastructure such as bridge and highway. Most of the PFI projects in Malaysia are currently operated under operational and maintenance (O&M) phase. However, poor performance (defects occurrence) and low level of end users' satisfaction (complaints) in PFI projects in Malaysia very disappointing. In real fact, the government has paid a full amount of payment (availability payment) to the concessionaire but truly they have not met the level of performance standard set by the government. The standard set by the government is mainly refer to the KPIs as agreed by both parties where indicated that the minimum level of successful project performance is 95% achievement. If the level of performance achievement below than 95%, it will affect the payment process to the concessionaire where payment deduction will be imposed (Universiti Teknologi MARA, 2015; 2016; Isa et al., 2016). This situation occurs because of the insufficient of effective performance measurement tool to measure the performance of PFI projects especially after entering O&M phase. Therefore, performance needs to be monitored and measured (the relationship between performance and payment) in order to achieve VFM.

Previous Study on Performance Measurement System

Performance measurement is an important process in relation to the success of PFI projects. However, it has received limited attention under the life-cycle perspective. Performance measurement is defined by the Lebas (1995) as a process of quantifying and reporting the effectiveness and efficiency of the action performed towards influencing organisational objectives. While, Performance

measurement system (PMS) can be defined as the process of defining goals, selecting strategies to achieve those goals, allocating decision rights, and measuring and rewarding performance (Heinrich, 2002; Ittner & Larcker, 2001). This contradicts with Bassioni et al. (2005), where he states that PMS is the system implemented by construction organisations for the purpose of internal management of the firm, not the evaluation by clients and stakeholders. In addition, performance measures are classified as key result indicators, result indicators, performance indicators, or key performance indicators. There are several frameworks presented in the literature for constructing PMS for an organisation over the last decade. Most of developed PMS are used in the business and construction industry with their purpose and benefit to the organisations or projects.

According to Yong (2010), the process of measuring performance is usually determined by the metric of a number of indicators, which include both financial and non-financial indicators. The use of performance measurement is to judge their project performances, both in term of the financial and non-financial aspects and to compare and contrast the performance with others, in order to improve programme efficiency and effectiveness in their organisations or projects. Research on performance measurement particularly in construction industry had been initiated since 1989. Table 1 shows the types of PMS used to measure the performance specifically in the construction industry.

Table 1: Types of Existing Performance Measurement System (PMS) used in Construction Industry

Types of Performance Measurement	*Purpose*	*Level of Measurement*	*Authors*
Balance Score Card (BSC)	BSC is a tool used to describing, implementing and managing strategy at all levels in the organisation. It also identify area of improvement.	Organizational Projects	Alsulamy et al., (2012); Bassioni et al., (2004) Kaplan & Norton (1992)
European Foundation Quality Management (EFQM)	The EFQM Excellence model proposed to help organisation to assess their progress to excellence and continuous improvement, and is based on their eight fundamental concepts of excellence.	Organizational Projects	Alsulamy et al., (2012) Bassioni et al., (2004) Watson & Seng, (2001) EFQM (2003)
The Performance PRISM	The performance prism described a comprehensive measurement system that address the key business issues to which a wide variety of organisation, profit and not for-profit, will be able to relate.	Organizational Stakeholders	Neely et al.(2001) Neely et al. (2002) Striteska & Spickova, (2012)
Key Performance Indicators (KPIs)	KPI function as all-in-one tool in improving the on-going process performance of the entire organisation and project. KPIs not only score the performance, detect changed conditions, perceive potential problems and designate a change from preliminary strategy of particular project or organisational. KPIs are useful tools in achieving VFM	Organizational Projects Stakeholders	Alsulamy et al., (2012) Haponava & Al-jibouri (2012) Eagan (1998)
Malcolm Baldridge For Performance Excellence (MBNQA)	To improve organisational competitiveness. It focuses on the outcomes of customer satisfaction and organisation performance.	Organizational Projects	(Alsulamy et al., 2012)

There are several types of performance measurement model that have been used to measure performance. However, there are only five regular models implemented in the construction industry namely; the Balance Scorecard (BSC), the European Foundation Quality Management (EFQM), the Performance PRISM, the Key Performance Indicators (KPIs) and the Malcolm Baldridge for Performance Excellence (MBNQA). In construction, performance measurement was initially conducted at project level. Nevertheless, the research focus has been shifted from project level to the organisational level (Bassioni, 2005). Phusavat et al. (2009) was suggested that performance measurement at organisational level as adopted in BSC, EFQM, KPIs, The Performance PRISM and MBNQA must answer three key questions: ‘how well is an organisation performing? Is the

organisation achieving its objectives? How much has the organisation improved from the last period?" in order for measuring the performance. Even though the main purpose of all performance measurement models discussed above is to assess the performance of the organisation and the projects, nonetheless, each model has their uniqueness in terms of strength and weakness to be selected as a useful and effective tool.

Among the models, KPIs by Eagan (1998) appears to be more applicable and effective to be adopted and used in construction industry especially involving several types of contract. It is due to fact that, KPIs have a strength to be one of the useful tools that can be applied for achieving VFM. It can also function in monitoring the performance particularly at different projects phases and most importantly is, KPIs can be applied to identify the strength and weakness in projects partnership in achieving best value for money (Alsulamy et al., 2012; Haponava & Al-jibouri, 2012; Eagan,1998).

Therefore, KPIs in this study offer an effective approach towards completing successful project at different levels and phases particularly for performance monitoring and evaluation. Echoing to this statement, KPIs are revealed as the most practicable tool to be applied in construction industry especially for PFI projects since the goals of PFI is to achieve VFM.

Performance Measurement System in PFI Projects

The key principle of PFI is the link between performance and incentive payments to the private sector based on successful delivery of services to the public sector. However, the service delivery aspects of PFI projects cannot be examined until the projects become operational (Yuan et al, 2009). Yet, during the operational phase, services delivery can be frequently measured to determine its compliance with the output specification and payment deductions for the performance failures in accordance with the payment mechanism (Akbiyikli, 2013). In PFI projects, KPIs are a useful tool to measure the performance of PFI projects at different levels and stages of the project. The U.K NAO (2003) acknowledged that most PFI contracts use KPIs as a benchmarking tool for contractors' evaluation with regards to service delivery. In order to measure performance or calculate the effects of any given change on the process of PPP projects, one must determine the appropriate KPIs to focus on and measure the impact (Yuan et al., 2009). The used of KPIs in PPP projects can be used to identify the strengths and weaknesses of PPP projects and are useful tools for effective PPP project performance management (Mladenovic et al., 2013).

Performance measurement is an important process in relation to the success and performance of PFI projects. However, it has received limited attention under the life-cycle perspective (Liu et al. 2015). Neely et al. (2005), defines performance assessment as a process or a set of metrics used to quantify and report the effectiveness and efficiency of the action performed towards organisations' objectives. While, Ong'olo (2006) in his study describes that, performance measurement refers to the selection and the use of quantitative measures (item that can be quantified based on the measurement units) and qualitative measures (item that can be quantified based on satisfaction level). The assessment is regarding project capacities, processes and outcomes to inform the public or designated public agency about critical aspects of a project. Thus, the assessment of PFI projects become more difficult compared to traditional projects as it involves a lot of stages (e.g. documentation, financing, taxation, technical details, and sub-agreements) and risks (e.g. market risks and project risks) that arise from the complexity of long-term contractual arrangement, which can change dynamically over the projects' lifecycle (Grimsey & Lewis, 2002). Theoretically, an ideal performance measurement system in PFI can contribute especially to an effective assessment of PFI projects performance and beneficial to the multiple stakeholders.

RESEARCH METHODOLOGY

An in-depth and comprehensive literature review is conducted in this study. It reviews theoretically on the types of performance measurement model established in construction industry. It also reviews the developed performance measurement model for specific PFI projects in United Kingdom (UK), China, Australia, and Malaysia. Based on various developed models of performance measurement, the proposed conceptual framework for Malaysian approached is established. This conceptual framework is developed based on the gaps identified and uniqueness from previous practices that can be adopted for the Malaysia context. Further study is planned to be conducted by comprehensive empirical research using a combination of qualitative and quantitative research design in the form of interviews (semi-structured interview) and questionnaires survey followed by the development and validation of performance measurement tools based on KPIs method using Analytical Hierarchy Process (AHP) multi-criteria decision making (to determine prioritised KPIs with relative weightage).

THE PRELIMINARY REVIEW OF PERFORMANCE ASSESSMENT MODELS INTERNATIONALLY

Table 2 shows the performance assessment model of PFI projects adapted by the UK, Australia, China and Malaysia. These models are chosen in this study due to their experience and establishment in implementing PFI and good track records in terms of performances. Among all, UK is a pioneer and originator of PFI approach in terms of contract procurement as well as performance assessment in the PFI projects. There are six variables that have been reviewed to compare the performance measurement models globally. The variables are; types of performance measurement tool, criteria in selecting good performance indicators, categories of KPIs, KPIs measures, implementation stage, and gap/limitation of each model. Most of the model are using key performance indicators (KPIs) as a base method in assessing performance of PFI projects except for the model from Australia, which is by using performance prism. There is no different concept between Australia models with other models where indicators are still applicable.

Table 2: List of PFI Performance Assessment Model Developed Internationally

Models / ***Variables***	***UK Performance Assessment Model (Zhou et al. 2013)***	***Australian Performance Assessment Model (Liu et al. 2015)***	***China Performance Assessment Model (Yuan et al. 2009; 2012)***	***Malaysia Performance Assessment Model (Ismail, 2009)***
Performance Measurement Tools	• Key Performance Indicators	• Performance Prism	• Key Performance Indicators	• Key Performance Indicators
Criteria of selection performance Indicators	• Complex • Defined • Measurable • Simple & Understandable	• Measurable • Specific	• Defined • Specific • Complex • Measurable	• Presented via metric • Measurable • Closely monitor performance • Understandable • Link with reward and penalty
Categories of key performance Indicators	• Social • Economic • Environmental • Technical	• Stakeholders satisfaction • Stakeholders contribution • Strategies • Process • Capabilities	• Physical characteristic of the project • Financing and Marketing • Innovation and Learning • Stakeholders • Projects Process	• Functional • Professional • Operational
Measures	• Quantitative measure • Qualitative measure	• Objective measure • Subjective measure	• Quantitative measure • Qualitative measure	• Quantitative measure • Qualitative measure
Implementation (Project Phases)	• Operation & Maintenance	• Design • Building • Finance • Operation & maintenance	• Planning • Design • Procurement • Construction • Operation and Maintenance	• Planning • Design • Procurement • Construction • Operation and Maintenance

Gap/Limitation	• Lack of experience consultant for sustainability • Lack in depth analysis of individual projects	• No specific itemized indicators (Objective and subjective) • No detailed measures (weightage system)	• Lack of stakeholders contribution • No specific itemized indicators (qualitative and quantitative) • Complex KPIs • No detailed measures (weightage system)	• Only focused on Functional categories • No specific itemized indicators (qualitative and quantitative) • No detailed measures (weightage system)

The UK performance assessment model of PFI project by Zhou et al. (2013) outlines a process starting by looking into performance measurement tools used in the PFI projects. This model is designed to use KPIs as a tool in assessing PFI projects performance. The development of KPIs by UK model depends on certain criteria which are complex, defined, measurable, simple and understandable. The UK model has divided the KPIs into four categories of dimensions which are social,
economic, environmental and technical. These cover most of the critical sustainability issues through the wider PFI project environment. Consequently, this model fails to show the relative weightage and method on how these indicators would be used to measure the performance.

In the context of Australia, the performance measurement tools applied in the model is performance prism. The performance prism by Liu et al. (2013) has a similar concept with KPIs but differs in terms of the involvement of multiple stakeholder integration and it provides assistance in directing and guiding the design of performance measurement for long-term success. The performance prism comprises of five interrelated facets designed for measurement such as stakeholder's satisfaction, strategies, processes, capabilities and stakeholder's contribution. The views of stakeholders that are incorporated in the Performance Prism means that it gives the ability to overcome the hurdle triggered by multiple stakeholders (shareholders, customers, suppliers, alliance partners, and even intermediaries) in PFI evaluation. The development of performance prism takes into consideration both measurable and specific criteria for each dimension.

The China performance measurement model by Yuan et al. (2009, 2012) uses KPIs as a tool in measuring performance of PFI projects. It differs from the UK model where the KPIs are comprehensively used in assessing sustainability of PFI projects performance. KPIs developed in China performance measurement model are basically based on the main criteria which are identical to the UK model, which are defined, complex and measurable. KPIs must be specific, clear and focused to avoid misinterpretation or ambiguity. This model has categorized the dimensions into five categories which are physical characteristic, financing and marketing, innovation and learning, stakeholders and projects process.

For the Malaysian context, KPIs approach is used to measure performance of the PFI projects. A study by Ismail (2009) divides the KPIs into three categories, namely functional, professional and operational. The formation of KPIs is fundamentally based on the criteria such as presented via metric, measurable, closely monitored performance, understandable and KPIs must link with reward and penalty. All listed criteria are vital to be considered when choosing and constructing the KPIs.

As a conclusion, all the models highlight the criteria needed for the selection of a good performance indicator. Zhou et al. (2013) reveals that complex, defined, measurable, simple and understandable are among the criteria needed for the selection of indicators for the PFI projects. It is almost similar with the model from China (Yuan et al., 2009; 2012), where the identified criteria are defined, complex, measurable and specific. Meanwhile, Liu et al. (2015) highlights measurable and specific as the main criteria needed. It differs with the Malaysia model, where every single indicators must be presented via metric, measurable, closely monitored performance, understandable and linked with reward and penalty. It can be seen that, specific and measurable are among the important criteria to be considered. The categorization of the KPIs amongst the models differ according to the nature of the projects but similar in terms of item measures, which are emphasized on qualitative and quantitative measures. The application and implementation of the KPIs are mostly for the whole life cycle projects. There is a single model that is stressed on the specific critical phases (operational & maintenance), which are the model from United Kingdom (Zhou et al., 2013).

Although KPI is developed by recognized countries, there are some limitations and gaps

identified. No specific itemized indicators (objective and subjective measures) and no detailed measures (relative weightage system) are among the crucial aspects that need improvements. The data collected from different countries will be used as an improvement on monitoring and measuring performance (KPIs development) for other countries.

A PROPOSED CONCEPTUAL FRAMEWORK OF PERFORMANCE ASSESSMENT FOR PFI PROJECTS IN MALAYSIA.

The proposed conceptual framework for PFI performance assessment in Malaysia is developed as demonstrated in Figure 1. The initial step in establishing framework for developing a new performance measurement tool is to select the appropriate phase that should be incorporated. In this framework, performance measurement is designed to embrace the specific phases of the PFI projects, which is focused on the critical phases throughout the project life cycle. It is due to the fact that every project's phases has its own objectives and goals that need to be achieved. Operational and Maintenance (O&M) phase has been seen as the critical phase since they are involved in a lengthy period of concession. This appropriate phase are determine from the result of preliminary survey. Most critically, the payment to the concessionaire begins at this phase. Thus, the performance level of the PFI projects need to be monitored and measured in order to achieve VFM. Next is to determine the performance indicators that associated for measuring the performance of the selected phase. Lastly is to determine the relative weightage for each performance indicators in assessing the performance of PFI projects.

The implementation of performance measurement via KPIs approach is necessary to achieve performance standards set by the government and simultaneously can provide good quality of services and achieve VFM. Therefore, KPIs reflect as one of the effective performance measurement tools used to assess the performance of the PFI projects, specifically in Malaysia. There are several indicators identified and further grouped into six (6) main KPIs. These selected KPIs are aimed to measure performance at O&M phase, i.e. innovation and learning, process, strategies, capabilities, stakeholders' satisfaction and stakeholders' contribution. Further, these KPIs were classified into two categories, which are measurable and non-measurable indicators. The construct indicators are relatively compiled and characterized from previous established PFI performance assessment models from different countries such as model from UK, Australia, China and Malaysia and also previous research by Liu et al. (2015); Zhou et al. (2013); Miguel & Lima (2013); Ogunsanami (2013); Yuan et al. (2009; 2012); and Ismail (2009) on the assessing performance of PFI project. Next is prioritising and assigning of weightage for each indicators using Analytical Hierarchy Process (AHP) approach as it is involved with a multi-criteria decision making (Saaty, 2008). Afterwards, the prioritised KPIs will be correlated with the criteria in selecting good indicators. The criteria are gathered from the theory of goal setting and task performance and some are compiled from previous studies. There are fifteen identified criteria which are specific, measurable, attainable, realistic, time limit, closely monitored, understandable, consistency, linked with reward and penalty, comparability, reliable, relevance, generalized, defined and complex notion. The dimension of KPIs in Figure 1 have generally covered the characteristic of O&M phase that mainly concerns on the performance and its impact towards the payment mechanism.

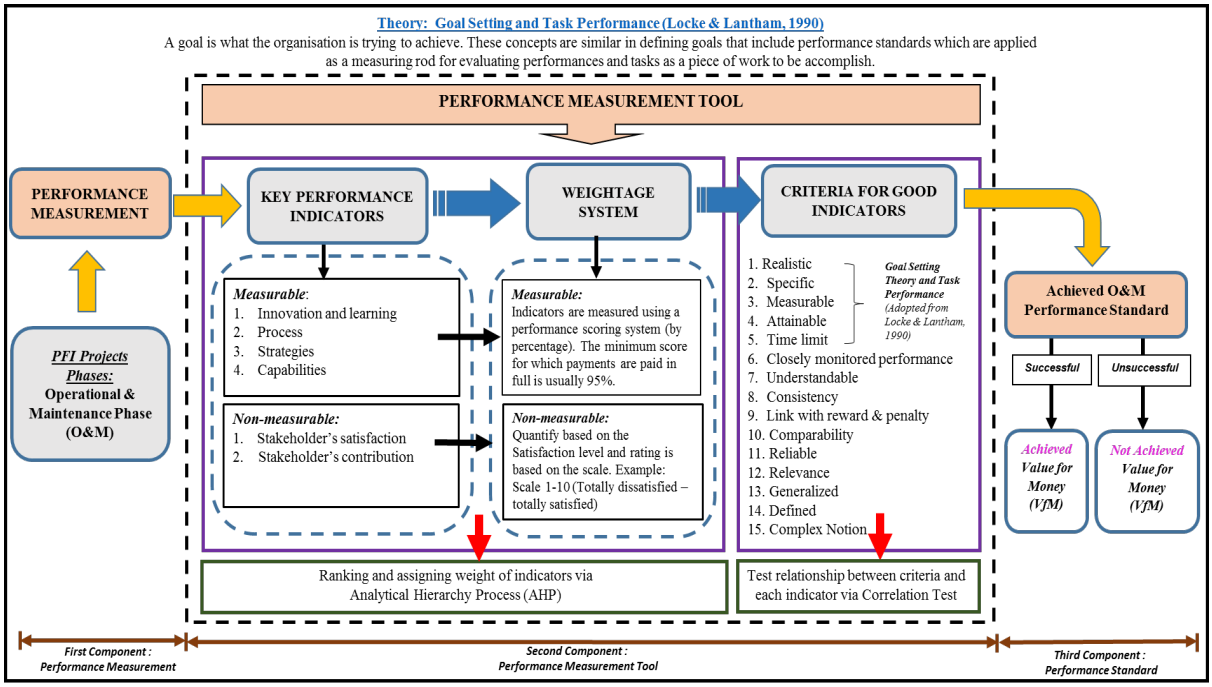

Figure 1: A Conceptual Framework of Performance Assessment for PFI Project in Malaysia

The development of this conceptual framework comprises of 3 major components, which are performance measurement, performance measurement tool, and performance standard. The first component is to measure the performance of O&M phase as it is a critical phase among others. The performance level of O&M phase needs to be measured before any payment or deduction can be made to the concessionaire. Hence, to measure the performance, effective performance measurement tool are needed and this is reflected in the second component this framework.

This research will be focuses on the second component, which is on the development of performance measurement tool. This component is divided into 3 sub-components namely KPIs, weightage system and criteria for selection of a good indicators. Essentially, there are interrelationship between KPIs and weightage system in measuring the performance. For instance; measurable indicators (each indicator) is quantified and measured based on scoring system. Practically, the minimum score for which payment is paid in full to the concessionaire is 95% (NAO, 2010). For non-measurable indicators, it is quantified based on the satisfaction level and the rating is based on the scale. The prioritisation of KPIs and their relative weightage can be identified through Analytical Hierarchy Process (AHP). AHP was also used to indicate the weightage rating or index for each indicator. AHP is a mathematical decision-making technique, developed by Dr. Thomas L. Saaty in 1980, that provides an effective means to deal with complex decision-making. AHP allows consideration of both qualitative and quantitative aspects of decisions; it can reduce complex decisions to a series of one-on-one comparisons by assisting with identifying and weighting selection indicators, analysing the data collected for the indicators and expediting the decision-making process. Computer software Expert Choice 11 was used for analysing the data gathered from AHP process. Therefore, the determination of performance indicators with their relative weightage is important for the development of performance measurement tool. The third component in this framework is on the performance standard. The result derived from second component will determine the performance level and will indicate whether the projects meets the performance standard or not and simultaneously shows whether the project achieves its VFM or vice versa.

CONCLUSIONS

This paper anticipates to review, synthesize and develop a conceptual framework of performance measurement based on KPI method for PFI projects in Malaysia. The development of this conceptual framework is mostly based on the reviewed models of performance measurement from different countries i.e. UK, China, Australia, as well as Malaysia. It also intends to identify the direction and

usefulness of performance measurement tools (KPIs based method) to be practiced for PFI projects in Malaysia. Most of the existing PFI projects are applying KPIs model as a tool to measure the project performance across projects' phases. However, the development of this model is lack on the determination of weighting system for each indicators in measuring performance of PFI projects.

This paper also has presented a performance assessment process where a conceptual framework shows the integration between the indicators, weightage system and selection criteria for good indicators. This framework of performance assessment is designed based on the Key Performance Indicators (KPIs) but with the addition of the 'multiple stakeholders' perspectives. The uniqueness of this framework as compare to existing model is on the identification and separation of measurable and non-measurable indicators, which can be tailored to fulfil the unique measurement needs of a specific operational level. Furthermore, it illustrates the relationship of the measures to strategy, providing indicators for effective performance management.

As a result, gaps are identified in this study through the listed limitations. Therefore, it is vital for the Malaysian Government to develop a performance measurement tool (KPIs based method) for assessing PFI projects' performance especially for the critical phase of operational and maintenance (O&M), which involves a lengthy concession period (25-30 years) and has a direct relationship with the payment mechanism.

The research presented in this paper is initially and a part of an ongoing PhD research at the Faculty of Architecture, Planning and Surveying, UiTM to develop a performance measurement tool for PFI projects implementation in Malaysia. The result of the study would provide an insight into the Malaysian construction projects' development and form the basis of a valuable guideline, especially to public and private sectors in Malaysia.

References

Akbıyıklı, R. (2013). Performance Assessment of a Private Finance Initiative Road Project. *Transport.* 28 (February 2015): 11–24.

Alsulamy, S., Wamuziri, S., & Taylor, M. (2012). Evaluation of Key Metrics for Measurement of Project Performance, (September), 1101–1110.

Bassioni, H. A., Asce, S. M., Price, A D F, Hassan, T. M., & Asce, M. (2004). Performance Measurement in Construction. *Journal of Management in Engineering*. 42–50.

Bassioni, H.A., Price, A.D.F. and Hassan, T.M. (2005). Building a conceptual framework for measuring business performance in construction: an empirical evaluation. *Construction Management and Economics.* Vol. 23 (No. 5): 495-507.

Carrillo, P. M., Robinson, H. S., Anumba, C. J., & Bouchlaghem, N. M. (2006). A Knowledge Transfer Framework: the PFI context. *Construction Management and Economics*. Vol. 24 (758063447): 1045–1056.

Carrillo, P., Robinson, H., Foale, P., Anumba, C., & Bouchlaghem, D. (2008). Participation, Barriers, and Opportunities in PFI: The United Kingdom Experience. *Journal of Management in Engineering*, Vol. 24 (3): 138–145.

David, & Steve. (2012). The top ten risks that auditors should be aware of when reviewing the operational phase of PFI schemes. *HM Treasury*.

Eagan, Sir J. (1998). Rethinking construction: the report of the construction Task Force, Dept. of Environment. *Transport and Regions (DETR)*. London.

Economic Planning Unit (EPU). (2006). Streamlining Privatization. *Ninth Malaysia Plan 2006-2010.* 223–233.

Economic Planning Unit (EPU). (2010). *The Tenth Malaysian Plan, 2011-2015.* Putrajaya: Prime Minister's Department.

Edge, T. (2006). Untested Model for Malaysian Companies. *The Edge Malaysia*. 75.

EFQM. (2003). Introducing Excellence Brussels: *European Foundation for Quality Management*.

El-Haram, M. A., & Agapiou, A. (2002). The Role of the Facility Manager in New Procurement Routes. *Journal of Quality in Maintenance Engineering.* Vol 8 (2): 124–134.

Endut, I.R. (2008). *Framework For Minimizing Time Overruns of Malaysia Construction Projects*. A PhD Thesis, Glasgow Caledonian University.

Goldratt, E. M. (1990). What Is This Thing Called the Theory of Constraint? North River.

Grimsey, D., & Lewis, M. (2002). Evaluating the risks of public private partnerships for infrastructure projects. *International Journal of Project Management*.

Haponava, T., & Al-jibouri, S. (2012). Proposed System for Measuring Project Performance Using Process-Based Key Performance Indicators. *Journal of Management in Engineering*. 140–149.

Heinrich, C. (2002). Outcomes-based performance management in the public sector: implications for government accountability and effectiveness. *Public Administration Review.* Vol 62: 712-725.

Hodge, G. (2004). The Risky Business of Public-Private Partnerships. *Symposium.* Vol. 63 (December): 37-49.

House of Commons. (2003). *The Operational Performance of PFI Prisons: Forty-ninth Report of Session 2002-2003*.

Isa, M.H., Ismail, K., Halmi, Z., Othman, M.F. (2016). Tracking Architectural Defects in University Building in Malaysia. *4th International Building Control Conference.* 7 – 8 March 2016. Kuala Lumpur Malaysia. MATEC Web of Conference.

Ismail, K. *A*. (2012). *Value for Money Assessment Framework for Public Private Partnership Approach*. PhD, Thesis. Malaysia.

Ismail, S., & Rashid, K. A. (2007). Private Finance Initiative (PFI) In Malaysia: The Need for and Issues Related to the Public Sector Comparator (PSC).

Ismail, S. (2009). *Key performance indicator for private finance initiative in Malaysia*. PhD Thesis. Malaysia.

Ittner, C.D., & Larcker, D.F. (2001). Assessing empirical research in managerial accounting: A value-based management perspective. *Journal of Accounting and Economics.* Vol 32: 349-410.

Javed, A. A., Lam, P. T. I., & Chan, A. P. C. (2013a). A model framework of output specifications for hospital PPP/PFI projects. *Journal of Facilities Management*. Vol 31(13): 610–633.
Javed, A. A., Lam, P. T. I., & Zou, P. X. W. (2013b). Output-based specifications for PPP projects: lessons for facilities management from Australia. *Journal of Facilities Management*. 11(1): 5–30.
Jayaseelan, R., & Tan, M. (2006). PFI-cure for All Ills. *The Edge Malaysia.* 72-74.
Kamara, J. M. (2012). Integration in the project development process of a Private Finance Initiative (PFI) project. *Architectural Engineering and Design Management*. Vol 8(February 2015): 228–245.
Kanji, G. K. (2002). Performance Measurement System, *in Total Quality Management*. Vol 13 (No.5): 715-728.
Kaplan, R. S. and Norton, D. P. (1992). The Balanced Scorecard-Measures That Drive Performance. *Harvard Business Review*. Vol 70: 71-79.
Keegan, D. P., Eiler, R. G., and Jones, C. R. (1989). Are your performance obsolete?. *Management Accounting (US)*. Vol 70 (No. 12): 45-50.
Khaderi, S. S., & Aziz, A. R. A. (2010). Adoption of Private Finance Initiative (PFI) in Malaysian Public Works Projects: Are We Ready ?. *CIB TG72 World Building Congress.* 105–120.
Lawther, W. C., & Martin, L. (2014). Availability Payments and Key Performance Indicators: Challenges for Effective Implementation of Performance Management Systems in Transportation Public-Private Partnerships. *Public Works Management & Policy*. Vol *19* (5): 219–234.
Lebas, M. J. (1995). Performance measurement and performance management. *International Journal of Production Economics*. Vol 41(1–3): 23–35.
Liu, J., Love, P. E. D. D., Smith, J., Regan, M., & Palaneeswaran, E. (2015). Review of Performance Measurement: Implications for Public–Private Partnerships. *Built Environment Project and Asset Management. Vol* 5 (1): 35–51.
Liu, J., Love, P. E. D., Davis, P. R., Smith, J., & Regan, M. (2013). *Performance Measurement Framework in PPP Projects*.
Lynch, R. L, and Cross, K. F. (1991). *Measure Up! Yardsticks for Continuous Improvement*. 2nd ed. Cambridge. *Blackwell Publishers Incorporation*. 250
Miguel, B., & Lima, R. (2013). *Definition of Indicators for Monitoring of Concessions*. Master Dissertation.
Mladenovic, G., Vajdic, N., & Wu, B. (2013). *Use of Key Performance Indicators for PPP Transport Projects to Meet Stakeholders' Performance Objectives*.
NAO. (2003). *The Operational Performance of PFI Prisons*. June. 55.
NAO. (2010). *The Performance and Management of Hospital PFI Contracts.* 68.
Neely, A., Adams, C. & Crowe, P. (2001). The Performance Prism in Practice. *Measuring Business Excellence.* Vol 5 (2): 6-12.
Neely, A., Adams, C. & Crowe, P. (2002). *The Performance Prism: The Scorecard for measuring and managing Business Success.* London. Prentice.
Neely, A., Gregory, M. and Platts, K., (2005). *Performance Measurement System Design: A Literature Review and Research Agenda*. *International Journal of Operations and Production Management*. Vol. 25 (No. 12): 1228-1263.
Netto, A. (2006). *Malaysia's New Fangled Privatization Fudge*. EPU.
Ogunsanmi, O. E. (2013). Stakeholders' Perception of Key Performance Indicators (KPIs) of Public Private Partnership (PPP) Projects. *International Journal of Construction Supply Chain Management.* Vol 3 (2): 27–38.
Ong'olo, D.O. (2006). Public Private Partnerships (PPP): Practice and Regulatory Policy in Kenya. Paper prepared for the Institute of Economic Affairs (IEA) on July 7th 2006, Kenya.
Oyedele, L. O. (2013). Avoiding Performance Failure Payment Deductions in PFI/PPP Projects: A Model of Critical Success Factors. *Journal of Performance of Constructed Facilities*. June. 259.
PEMANDU. (2011). *Annual Report: Economic Transformation Programme (ETP).* Kuala Lumpur: PEMANDU.
Phusavat, K., Anussornnitisarn, P., Helo, P., and Dwight, R. (2009). Performance Measurement: Roles and Challenges. *Industrial Management and Data Systems.* Vol 109 (5): 646-664.
Prime Minister Department. (2009). *Public Private Partnership (PPP) Guideline*. 1–12.
Regan, M., Smith, J., & Love, P. E. D. (2011). Impact of the Capital Market Collapse on Public Private Partnership Infrastructure Projects. *Journal of Construction Engineering and Management.* Vol 137(1): 6–16.
Robinson, H. S. H., & Scott, J. (2009). Service Delivery and Performance Monitoring in PFI/PPP Projects. *Construction Management and Economics.* Vol 27(2): 181–197.
Saaty, T. L. (2008). Decision making with the analytic hierarchy process. *International Journal of Services Sciences.* Vol 1 (1): 83.
Striteska, M., & Spickova, M. (2012). Review and Comparison of Performance Measurement Systems. *Journal of Organisational Management Studies*. Vol. 2012 (2012).
Takim, R., R, A. R., Ismail, K., & C.O, E. (2008). The Acceptability of Private Finance Initiative (PFI) Scheme in Malaysia. *Asian Social Science*. *Vol* 4 (12): 71–82.
Toor, S.R., & Ogunlana, S. O. (2010). Beyond the "Iron Triangle": Stakeholder Perception of Key Performance Indicators (KPIs) for Large-Scale Public Sector Development Projects. *International Journal of Project Management*. Vol *28* (3): 228–236.
Universiti Teknologi MARA (2015). *Laporan Audit Fasiliti & Perkhidmatan.* Perak. Universiti Teknologi Mara, Cawangan Perak.
Universiti Teknologi MARA (2016). *Laporan Prestasi Konsesi.* Selangor. Bahagian Dasar Operasi PFI, Pejabat Pembangunan Infrastruktur.
VAGO. (2002). *Report of the Auditor-General on the Finances of the State of Victoria.* 2001-2002.
Watson, P. and Seng, L. T. (2001). Implementing the European Foundation for Quality Management Model in construction. *Construction Information Quarterly, Construction paper 130.* Chartered Institute of Building, Ascot. U.K.
Yescombe, E. R. (2008). The Social Sector : PFI Schools projects in the U.K . November. 1–18.
Yong, H K. (2010). *Public-Private Partnerships Policy and Practice*, London: C. Secretariat.
Yuan, J., Skibniewski, M. J., & Li, Q. (2008). Managing the Performance of Public Private Partnership Projects to Achieve Value for Money : Key Performance Indicators Selection. *In International Conference on Multi-National Construction Projects.* 1–16.
Yuan, J., Zeng, A. Y., Skibniewski, M. J., & Li, Q. (2009). Selection of Performance Objectives and Key Performance Indicators in Public–Private Partnership Projects to Achieve Value for Money. *Construction Management and Economics*. Vol 27: 253-270.

Yuan, J., Wang, C., Skibniewski, M. J., & Li, Q. (2012). Developing Key Performance Indicators for Public-Private Partnership Projects: Questionnaire Survey and Analysis. *Journal of Management in Engineering*. Vol *28* (3): 252–264.

Yusoff, W. Z. W., & Xuen, J. W. M. (2013). Private Finance Initiative (PFI) / Public Private Partnership (PPP) in Malaysia Context. *International Journal of Information Technology and Business Management*. Vol 17 (1): 29-42.

Zhou, L., Keivani, R., & Kurul, E. (2013). Sustainability performance measurement framework for PFI projects in the UK. *Journal of Financial Management of Property and Construction.* Vol 18 (3): 232-250.