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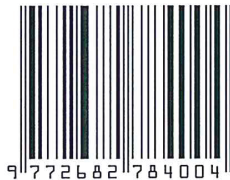
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THE IMPORTANCE OF INFORMATION IN THE PREPARATION OF FEASIBILITY STUDY FOR CONSTRUCTION DEVELOPMENT

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ABSTRACT

The planning of a project begins with envision of ideas, concepts and targets of the proposed construction development. Once set, all aspects of planning a development must be thoroughly evaluated during the preliminary stage of the Feasibility Study (FS). Matters that are related to technical, economic and financial aspects of the proposed development must be critically appraised in the FS. Without a well prepared FS, a development project can possibly fail due to issues such as inferior building quality, poor workmanship and cost overruns. For this reason, design consultants such as the architect, engineer and quantity Surveyor must always be aware so as to understand the importance of information needed in the preparation of FS. They should appreciate that the outcomes from an excellent FS could bring many good values for the construction project. The aim of this paper is to examine the importance of information required in the preparation of a FS and to explore the understanding amongst design consultants about its significance. Feedbacks obtained from the questionnaire surveys have shown that each consultant sets different priorities and purposes in identifying the crucial of data that they gathered during the FS. Though the main aim is to enhance the feasibility in terms of cost, quality and time demanded by the client, the research suggested that the views and suggestions made by consultants should not be ignored. In-depth investigations on economic, technical and financial analysis are the crucial factors to be considered so that at the final stage, the viability of a construction development would give good return on investment and other prospective values to the Client.

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1. Introduction

The construction projects entail many processes and different situations. Undeniably, the feasibility study (FS) is one of the most important stages in a project development. This is the stage that will eventually determine the viability of a project before it is implemented.

Most often, the lack of a proper, comprehensive and well designed strategic project planning at the inception stage is one of the factors contributing to the project failure (Tan, 2005). “The basic features in any feasibility study must be ensuring that we are working with accurate information, exact statement, and the latest financial records” (Mukherjee and Roy, 2017). From the construction and engineering perspectives, a FS can provide different options and outputs to ascertain the best way to adopt various phases of construction stages. Most importantly, it must be able to show that the income will exceed the costs in order to make the project financially attractive. Besides, a FS should help in determining the choice of projects to be undertaken, how it should be implemented, marketed and disposed of (Rahim, 2006). The purposes of a FS include the aim to achieve maximum profit from the project, to reduce construction costs according to the design criteria, quality and space, to maximise social benefits, to minimise risks and uncertainties, and to maximise safety, quality and public image (Ahmad, 2011). Hence, the FS helps to formulate the most viable business plan before the implementation of a construction project can be startoff.



Figure 2.1: Feasibility Stage in the Development Process
(Source: Nazari, 2007)

2. Feasibility Study

Many researchers believe that the economic analysis, financial analysis, technical analysis and the client’s requirement are the major factors to be considered in the FS (Mukherjee and Roy, 2017; Ahmad, 2011; Nazari, 2007; Rahim, 2006; Grubeberd and Weight, 1990).

The economic analysis is based on the market study of demand and supply analysis. The objective of economic analysis is to establish whether the goods and services provided by a new production is required by the community purposely in demand, and to estimate the volume which it required at the given (Nazari, 2007). The technical analysis is used to establish whether or not a project is technically realistic. It is an effort to determine how well the technical requirements of the project can be met, which location would be the most advantageous and what would be the optimum size of plants and machineries to be used. Financial analysis is made after taking into account all the

economic analysis and technical analysis. For example, a dollar in hand now is more valuable than the same dollar to be received at some time in a future (Benator and Thumann, 2003). For this reason, a time value must be placed in the cash-flow projections in the FS. Like in other mathematical statistics, a FS needs to show figures including the cost, benefit and income to the client. Whether the client has the expertise or not, his requirements on the time, costs and quality must be carefully considered by the design consultants during the FS.

The design consultants are the think-tankers hired by the client to conduct the FS. The architect has a main obligation to provide his clients informations pertaining to designs, principle of architecture and such. The style of design must incorporate factors such as commodity, function and practicality, firmness, construction and durability of materials with delighting appearance and attractiveness (Tornstall, 2006). For costing, the architect is assisted by a quantity surveyor to estimate the proper financial and economic variables based on the proposed design done by the architect. This has to be endorsed by the project engineer whose function is to ensure that the project is practicable, confirming its probable cost and to advise the client on the methods that should be adopted for the design and construction (Twort and Rees, 2004). Professional advice given by structural and mechanical engineers at the start of a project can enhance the efficiency of the proposed FS.

3. Feasibility Study Practices in Malaysian Construction Industry

Wong et al. (2000) conducted a study on the role in promoting best practice in project FS; a UK and Malaysia comparison study. They figured out that a project FS process can contribute to improve the construction processes. From the aspect of private and public sector, both sectors carry out the FS for different reasons. For the private sector, profit is the main interest on investment. Profit margins are likely to be between 15% and 25% of the project cost, with 20% often seen as the norm (Syms, 2002). Since 1994, the launching of privatisation programmes has led to implementation of many FS in construction development besides the government decided to utilise the Turnkey procurement system as they found that this is an effective action to improve construction performance (Wong et al., 2000). This is also applied in Australia, since their Public-Private Partnership (PPP) Contract acquires the feasibility study to be accomplished as the second task in procuring the building and infrastructure projects in their country (Liu et al., 2015).

A. Public Sector

In Malaysia, most of the FS for government projects are prepared by the Economic Planning Unit (EPU) and Implementation and Co-ordination Unit (ICU) under the Prime Minister's Department. Under the ICU organisation, all representatives from each ministry including Ministry of Public Works Malaysia (PWD) and Ministry of Finance sit together to discuss the preparation of Malaysian Plan. Here, all the representatives propose their future project plannings for each ministry. The EPU would then prepare a FS and allocate the most appropriate budget for each project. Next, it is the Ministry of Finance who endorses the proposal throughout various meetings with the Prime Minister Department (PMD). Finally, the sum of money or budget for the future projects is decided and ready to be gazetted in the latest Malaysian Plan. Endorsed proposals are submitted to the PWD for the implementation process.

For example, when the Ministry of Education plans to build more primary schools all over Malaysia, the proposal on design and costing parts have to be properly scrutinised. After approval, the proposal is directed to the PWD. The private sector too, it involved in the planning process through

its participation in the Private Sector Consultative Committee of the National Development Planning Committee (NDPC) under the supervision of EPU. In short, the PWD is not a planning agency of the public projects. It is acted as the implementation agency that supervises planning ideas to the end products. Most of the public projects are feasible because they bring benefits by providing services to the citizen not solely for profits. As long as the finance available, the services and products provided by the public sector will be viable, feasible and beneficial to the people.

B. Private Sector

The goal of private projects is more focusing on the aspect of financial value to the client (Sebestyen, 2017) and it is totally different from the public-based projects. Every single cent gives impact to the client's requirement and future profit. Any project found to be unfeasible from the initial stage to construction phase could incur losses to the client. Hence the design consultants must fully understand the requirements set by the local authority when preparing the FS. For technical analysis which describes sketch designs, the consultants must be familiar with the plot ratio stated by local authority. Sometimes, problems may arise in trying to suit the available land with the local authority's requirements. Consultants should conduct brainstorming sessions to find solutions and avoid difficulties at later stages. It is important that client or consultants must prepare comprehensive and well-defined FS.

4. Aim and Objectives

The aim of this paper is to examine the accurate informations needed by design consultants in preparing the Feasibility Study. The three main objectives outlined in this research are:-

- (i) To investigate the importance of reliable information in a FS by the design consultants.
- (ii) To identify the significant informations required in FS for a construction project.
- (iii) To determine the criteria for reliable informations that should be incorporated in the FS.

From the outcomes, the sourced informations will be recommended as proposals to improve the FS report for construction development in the future.

5. Research Methodology

The research was conducted by introducing a set of questionnaire survey, given to respondents which were the architects, quantity surveyors and engineers. Methods used to conduct the survey were from self-administered, by mail and through interview sessions. A random sampling method was used to identify the respondents. The studies focused on areas around the Klang Valley. An estimated two-thirds of practicing architects and other consultants work in this region. From 200 sets of questionnaire that were distributed, 70 questionnaires allocated to quantity surveyors and about 46% replied. About 33% of the 80 selected architects responded while about 21% of the 50 engineers returned to the questionnaires distributed. This gives a response rate of 26 % (N=52) as the total.

6. Results and Discussion

6.1 The Purpose of Information in Feasibility Study

Each consultant selected as the respondent, answered in the form of level agreement from 1 to 4. A weighting scale of 1 indicated evident agreement while the weighting scale of 4 showed the respondent had strongly disagreed. Based on the findings from the literature review, 10 important aspects of information were identified to be answered by the respondents (refer to Table 1).

From the architects' perspective, many of them wanted to improve the employment opportunities in the future because the proposed project is the most important factor in preparing FS. When the FS is completed, the appraisal would highlight the project's viability. Thus, it will directly enhance employment possibilities in many ways/terms and, in a way, the proposed project will generate other industries such as manufacturing, labour, materials and others.

The QS group probably highly chose to maximise the project's profit as they usually control the budget and cash flow of a development project. They have to serve the private client's interest, which is to achieve the maximum return of investment. For the future purposes, a FS can summarise the life cycle cost of a project. The FS set budget limits which can be used to monitor costs during construction. Upon completion, building owners or facilities managers can refer the FS to monitor running costs and maintenance by comparing the actual with expected figures.

Many engineers have focused on analysing problem areas, searching for a possible course of action as their main purpose of preparing the FS. They tend to believe that all possible problems can find the solutions during FS stage.

Table 1: The Purpose of Information in the FS

Importance and Purpose		Average Index			Rating Scale			Findings
		QS	Arch	Eng.	QS	Arch.	Eng	
1	To achieve maximum profit from the project	2.04	1.76	2.09	2	2	2	Agree
2	To reduce construction cost according to design criteria (i.e: space, quality, etc)	1.88	1.71	1.91	2	2	2	Agree
3	Helps to stimulate the business plan for the project implementation	1.88	1.82	2.18	2	2	2	Agree
4	Analyse problem area and search for a possible course of action	1.83	1.76	1.36	2	2	1	Agree
5	Development is required by the community purposely, and is in demand	1.96	1.76	2.00	2	2	2	Agree
6	To present cash flow statement by indicating the amount, timing and probability of future cash flows	1.63	1.82	2.45	2	2	2	Agree
7	To summarise the life cycle cost of project	1.88	1.94	2.45	2	2	2	Agree
8	To enhance the employment opportunities in future prospect	1.96	2.00	2.64	2	2	3	Agree
9	To ensure most of the client's requirements fulfilled	1.79	1.82	1.64	2	2	2	Agree
10	As guideline for facility manager during functional period of proposed project	2.04	1.94	2.18	2	2	2	Agree

6.2 Types of information required in the FS

There is so much information that can be found while preparing the FS. From the literature review, the information is divided into three main categories namely the economic analysis, technical analysis and financial analysis.

A) Economic Analysis

Based on the Figure 2, many in the the QS group perceive the market study report and post mortem analysis as the most required information (88%). As for the architects, 82% of them regard SWOT analysis as most important information required. Whereas, 82% of respondent (engineer) suggested the market study report as the most significant for them. The rationale of most building teams to choose the market study report is perhaps due to past market performance in certain areas related to the case studies. These can be referred as previous data to compute its potential, analysis trends and the analysis. However, the other information such as SWOT analysis, information of risk, post mortem, current issues, and client's requirement are still essential to support the economic analysis.

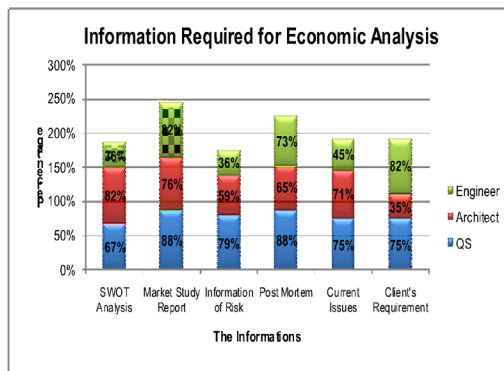


Figure 2: Information Required for Economic Analysis

B) Technical Analysis

For the technical analysis, 88% of QS respondents voted cost data as the foremost type of information required for technical analysis and the lowest percentage (42%) for design libraries. Perhaps for QS, the necessity to know the cost data is prevalent. However, they still have to refer design libraries for future reference as long as the scope of work are mostly cost-related. The QS could assist architects to do the costing as he is professionally trained in matters regarding finance and cost. In contrast, architect respondents chose design guideline and site investigation reports as the most relevant information required for technical analysis. Yet, only about 24% of the architect respondents have their own design libraries despite working as designers. Practically all the engineer respondents suggested site investigation reports as the most important information needed. This is probably because they specialise on structural, site and soil related matters. They prepare investigation reports together with the land surveyor.

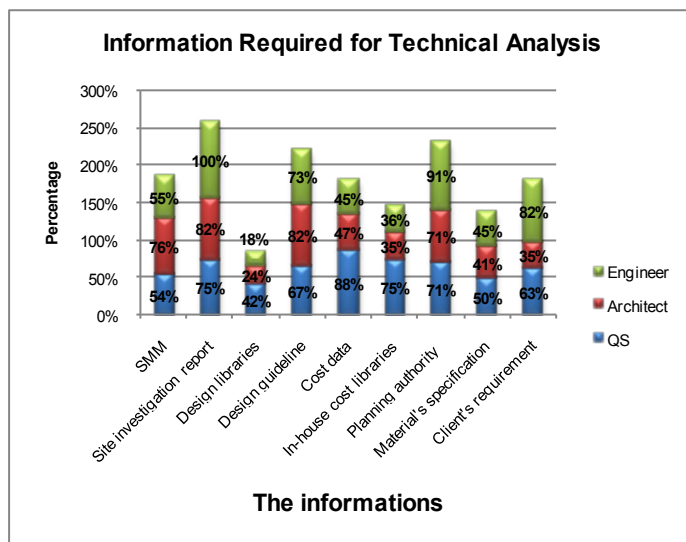


Figure 3: Information Required for Technical Analysis

C) Financial Analysis

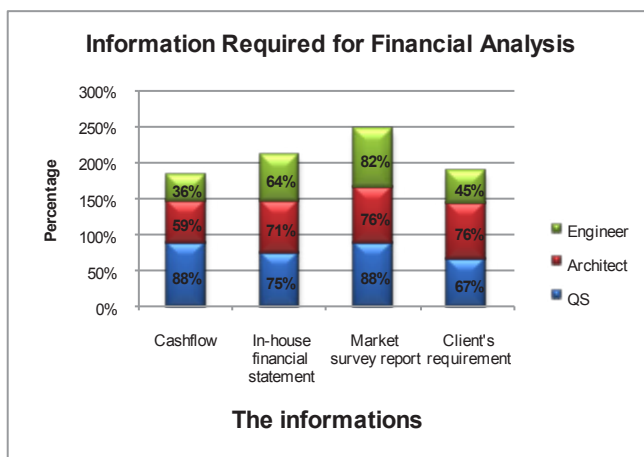


Figure 4: Information Required for Financial Analysis

Figure 4 in the financial analysis part, shows that QS respondents would choose cash flow and market survey report (88% voted) compared to the client's requirement (67%). This is possibly because the QS can read and understand the various kinds of information in the cash flow statement. Information extracted from the cash flow data show the amount of money to be spent, internal funding, interest rates, payback period and many more. About 76% of the architect respondents recommended that market survey reports and client's requirement as the main information required for financial

analysis. Perhaps, architect has always given the client priority to express their requirement, just as the same information required by architect.

Engineer respondent voted the lowest for cash flow (36%) and highest for market study report. Obviously, their opinion on the requirement of market survey report in preparing financial analysis is quite similar to QS respondent.

6.3 Criteria of reliable information required in the feasibility study

Based on the Table 2, most QS suggested that sources of information approved by authority provisions is the best criteria to classify reliable information required in FS. This is probably because quantity surveyors have lesser problems with lack of in-house data. Sometimes, certain data published by the private company are not approved by the local authority to be used as for reference.

Table 2 : Criteri of Reliable Information required in FS

Importance and Purpose		Average Index			Rating Scale			Findings
		QS	Arch.	Eng.	QS	Arc h.	Eng.	
1	Good accessibility of available data	1.79	1.65	1.80	2	2	2	Agree
2	In-house cost data or other information always been updated	1.67	1.94	1.90	2	2	2	Agree
3	Widespread the uses of guideline of standard quality among building teams	1.92	1.94	2.20	2	2	2	Agree
4	Expose the available guideline of standard quality to the building team	1.92	1.82	2.20	2	2	1	Agree
5	Source of information is approved by authority provisions	1.96	2.12	2.00	2	2	2	Agree

When the other consultants try to refer these sources, they are found to be unreliable and not to be considered as current costs. They believe that the available sources should be approved by local authority first. Most architects found the sources of information approved by authority provisions is the best criteria of reliable information required in FS, probably due to the same reason as quantity surveyors.

Occasionally, the architect's design is regarded private and confidential but in some cases the scheme design is published as a reference. Thus, they perceived the available sources should always be approved by the local authority. Others may refer their own design and treated it as a good criteria of reliable information that can be used legally by others.

Unlike the QS and architect respondents, the engineers suggested that the widespread usage on the standard guideline amongst building teams as the most crucial criteria. The reasons why

such issue scored the highest average index is probably not because the guideline of standard quality being available but due to incompetent implementation and exposure. So if the guideline used is widespread among the building team, the information would be useful as a reference.

7. Recommendations

Through the open ended questions, the respondents were asked to suggest recommendations to improve the preparation of FS. The followings, describe some of the findings:

The QS respondents, recommended the followings :

- (i) Increase involvement of all design team
- (ii) The more information gathered, it gives better results of FS
- (iii) Design teams preparing the FS should carry out more research on previous projects
- (iv) Closely and constantly follow the available guideline; A comprehensive study will discuss the benefits of the development and sensitivity analysis, informing owners or clients the alternative route of unpredictable events
- (v) All parties must work as a team to meet the design and cost concept
- (vi) All information available from government sources like PWD, JPS, local authorities and others as well as private organisations must be made available and kept as data.

This can be done by relevant bodies such as Board of QS, Board of Architect and Board of Engineer with the help of Construction Industry Development Board (CIDB). CIDB should assist to collect, coordinate and distribute these data on request, acting as a 'one-stop centre'.

The architect respondents, recommended the following :

- (i) Make available reports or database from relevant authorities, the information must be constantly updated
- (ii) More active participation of selected parties at the initial stage of construction project
- (iii) Supportive cooperation from the building team should be encouraged
- (iv) Make a compulsory requirement for all building team members involved to go on a site visit, they should not prepare FS based on previous similar project
- (v) Introduce standard guidelines on requirements to prepare a comprehensive FS
- (vi) Create a database, made accessible to all relevant parties consisting of clear cut guidelines for all projects

The engineer respondents, recommended the following :

- (i) Improve the coordination among project team members
- (ii) Promote knowledge sharing through articles, but avoid matters that developers would not want to share with their competitors

As a result, there were suggestions from the respondents to improve the manual (any form as being practiced in the industry) in the preparation of FS:

- (i) Market/economic information, technical information, and cost information (QS and architect)

- (ii) Reference centre or guide book to get the three information above (QS)
- (iii) Report by valuer and record of previous problems and solutions (QS and architect)
- (iv) Authority's requirements (QS)
- (v) Research on project feasibility (architect)
- (vi) Complete guideline and percentage of reliable feasibility project (architect)
- (vii) The format and type of information to be considered (engineer)
- (viii) The limitation or design brief (engineer)

8. Conclusions

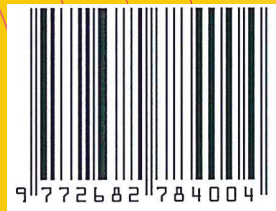
The outcomes from this research has developed through several phases to understand the important matters of collecting information in FS. This includes the type of information required and the criteria of reliable information for design consultants to prepare good FS. The recommendations from the respondents could help the building teams to improve the quality of FS for construction development in future.

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