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Dynamic modelling of the relation between bidding strategy and construction project performance

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Abstract

Strategy is required in order to win the competition. Bidding strategy in construction is defined as a management skill of using all available resources, both physical and financial, to offer a comprehensive and competitive bidding, with an aim to win the competition, and provide maximum project performance. There are many factors that influence construction bidding strategy, and many indicators of project performance have to be considered. Therefore, the relation between bidding strategy and project performance is very complex. Contractors have to consider this very carefully, and they have to evaluate their bidding strategies to ensure that the company goals have been achieved. Dynamic system is a method for develop a management simulation using computer, and helps the study of dynamic complexity; understand the source of policy resistance and helps the design of more effective policies. Furthermore, dynamic system is explained as a tool simulation system that is able to solve the problem of system complexity and also can present behaviour of real world. The study aims to develop a dynamic model and the simulation of bidding strategy and project performance. Case study was carried out in the major contractor in Denpasar, and the analysis used is *System Dynamics*. The model demonstrated that bidding strategy had a direct impact to project performance. The model simulation found that the enhancement of bidding strategy by 13.67% improved the project performance significantly, by 10.55%, from bid price.

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1. Introductions

Strategy is how the company achieves a goal. Park (1979) in [1] outlines many definitions of strategy such as skilful of company management of their financial and physical resources, to reach the company goals that have been established; meeting the science and art of the management under the most advantageous condition possible; handling plans or methods carefully; management of ideas related to the firm's objectives, and how to realize these company goals and the reason to achieve them. In the simplest terms strategy means a plan for company success. However, bidding strategy in construction is not only aiming to win the competition, but also intended to achieve project success and make a profit. Therefore, the ideal outcome is that the contractor wins a project and a good performance is achieved, through the profit that has been planned. Strategy is necessary in this process because the contractor is faced with uncertainty. In addition, many factors influence the bid/no bid and mark up decisions.

2. Literature references

2.1. Bidding strategy in construction

Bidding is a proposal based on the requirements or specifications which have been specified to do something, submitted from one party to the other. Bidding strategy in construction comprises of two important decisions, including whether to bid or not bid; and the mark up level to be adopted. When contractors are faced with competition, two extremely unpleasant options present themselves. First a low bid proposal with high possibility of winning the competition, but an excellent chance of making no profit, and second a high bid with no chance at all of winning the competition or making a high profit. These are two extreme options, therefore a contractor must consider other alternatives, which allows the obtaining of a reasonable profit. A contractor's decision is influenced by many factors. Based on [2], [3], and construction practitioner interviews, there were three groups of related variables, identified as external, internal and environment factors. The internal factor consists of the client characteristics, project characteristics, and contract. External factor consists of business benefit, project financing, company characteristics, and company experience. The environment factor includes bidding situation, economic condition and the competition. Through bidding strategy contractors intend to not only win the competition but also implement the project in accordance with specifications, so the project can generate maximum performance.

2.2. Project performance

The project success has to be evaluated through many criteria. Key performance indicators (KPI) is one of the frequently-used criteria [2]. But multidimensional performance criteria from other authors also propose to construct, based on empirical research [4], proposed that projects are carried out in order to generate business advantage. Thus a project is a strategic tool to produce economic value and competitive advantage while the project manager is a strategic leader who is responsible for producing expected business results. Hence the efficiency of the project, the effect on the customer, and expectation of future business, factor in the project success consideration. According to [5] project performance variable consist of six sub variables such as cost, time, quality, productivity, safety and project environment.

2.3. System dynamics

According to [6], the dynamic system is a method to improve learning in complex systems. Learning about complex dynamic systems require the relevant technical basis to create a mathematical model. The model is an abstraction or simplification of the real world, which is able to describe the structure and interaction of elements and overall behaviour in accordance with the view point and the desired goal. Furthermore, valuation of models is how far the model was useless***, so the usefulness of the model as a predictive tool, on the accuracy and precision of the prediction.

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