e-PSC: Progress ScoreCard Application in the Construction Industry

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Abstract — The construction industry is dynamic and very progressive in nature. The success of a particular project is almost the ultimate goal for every project and it was considered to be tied to performance measures. At the project level, success was measured by the project duration, monetary cost and project performance. However, construction industry lags behind other industries in its acquisition and use of modern technology to measure project performance. Therefore, the aim of this paper is to study the usage of Information Technology (IT) in enhancing and measuring the success of construction projects through the use of IT system that was developed. The detail development of the IT system known as e-PSC is also described. The validity of the system developed is tested by the case study in the construction industry. Finally, the limitations of the system developed are discussed and this paper also provides significant insights into developing a general and comprehensive base for further research.

INTRODUCTION

Most industries are dynamic in nature and the construction industry is no exception. Its environment has become more dynamic due to the increasing uncertainties in technology, budgets and development processes. A building project is completed as a result of a combination of many events and interactions, planned or unplanned, over the life of a facility, with changing participants and processes in a constantly changing environment [1]. Project success was considered to be tied to performance measures, which in turn were tied to project objectives. At the project level, success was measured by the project duration, monetary cost and project performance [3].

However, construction industry lags behind other industries in its acquisition and use of modern technology. It was observed (and the literature review confirmed) that the modern construction industry does not encourage workers to use contemporary technologies (like computers) on site [4]. Moreover, none of the researched companies identified computer skills as a requirement of employment for construction workers. Without this job requirement, the role of computer skills, and technology adaptability would not surface as a need of the workers

RESEARCH METHOD

In conducting this study, the researchers followed three major steps such as follows:
1. literature review was conducted to investigate the previous research and body of knowledge related to information technologies, its applications, and implementation issues in the construction environment.
2. Questionnaire surveys were conducted with con-struction managers and technology providers.
3. A system knowns as e_PSC was developed to measure the progress of the project management in construction industry.

SOFTWARE DEVELOPMENT

This e-PSC was developed according to Rapid System Development Life Cycle (RSDLC) technology. RSDLC is a strategic, fast and practical approach of developing application in e-management environment. It is the modification of SDLC (Standard System Development Life Cycle). Though this is a new model in System Development Discipline, but through experiment it in several organizations, it is proven that this technology is the best and the most practical for a dynamic organizations. The key of RSDLC are fast, parallel and integrated. RSDLC also has its own culture to ensure the effectiveness. The main objectives of RSDLC are:

1. Fast and integrated design.
The design must be done by the business and technical experts. Business expert will ensure the world class business process and the technical experts will ensure the system integration is done properly. The keyword in RSDLC is fast and integrated.

2. Fast and efficient coding
Coding must be done in a very efficient manner. It must avoid database problem or resource problem such as memory problem or server problem.

The coding must be done by the expert developer to ensure the fast and efficient coding. The coding must be zero-error.

3. Fast and efficient Deployment
Another objective of RSDLC is to ensure fast and efficient deployment. A lot of fail projects are due to delay in deployment. In RSDLC, the development and deployment will be done in parallel. RSDLC is a user-centric approach which focuses more on the user needs, urgency and priority.

4. Fast and efficient Maintenance

Another objective of RSDLC is to ensure fast and efficient maintenance. Maintenance must be done as soon as possible. It must be zero-delay. Late maintenance will cause user's frustration and they will give less support in the future for the next implementation.

5. Fast and efficient Enhancement

RSDLC also stress on fast and efficient enhancement. This means that enhancement must be done as soon as possible. Any problem rectified must come with the enhancement plan or proposal for a comprehensive solution to the integrated system. All modification and enhancement of the application must be done in a short period of time, tested and immediately deployed.

Fig. 1. Database/ System Development Process

From the database development, three mains modules were developed;
1. Project Management
    i. List of Projects
    ii. List of clients
    iii. List of Consultant
    iv. Location plan

2. Progress Works
    i. Entry progress
    ii. Lists of entry progress
3. Performance Index
   i. View Performance Index.
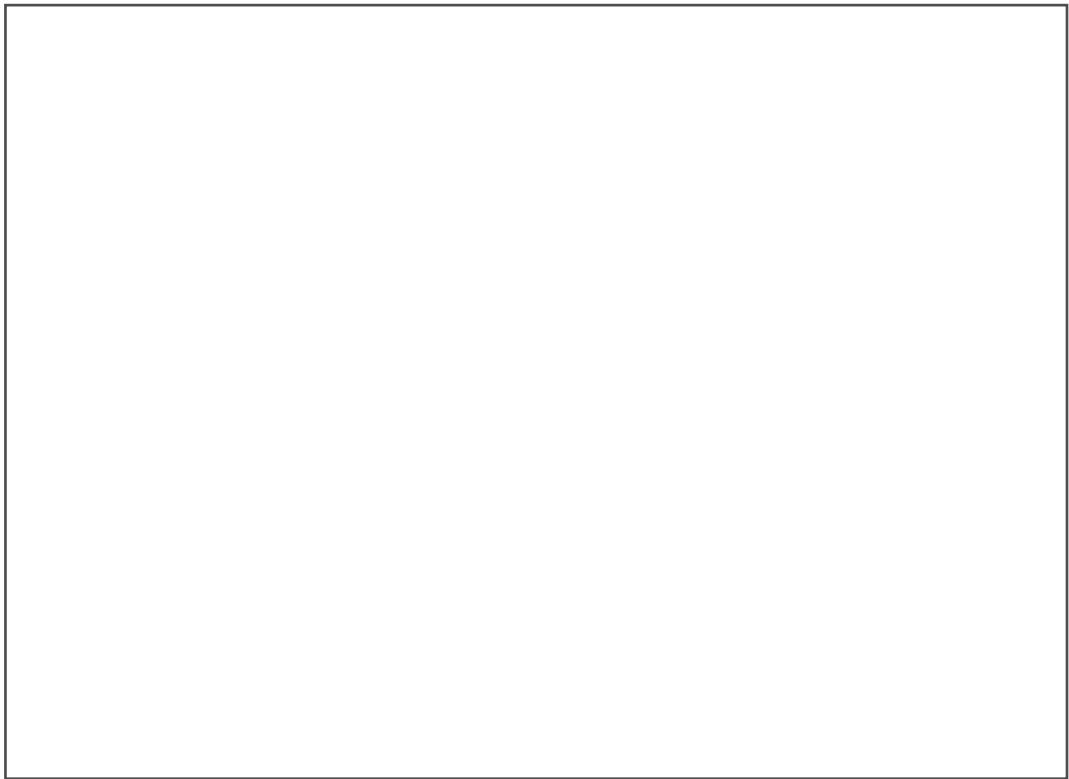
Fig. 2. Layout of the e-PSC frontpage

RESEARCH FINDING

Case Study

Table 1 shows the data of the progress report from the project management of Pembinaan Institut Kemahiran Tenun in Pekan, Pahang . These data were simulated were in the modules of e-PSC system. Graf of Performance Index can be observed through the system as shown in Fig.3. The *S curve* of actual work progress is compared to *S curve* of the scheduled progress. From the grafs of the S curve, it clearly showed thar *S curve* of actual work done follows the *S curve* of the scheduled work done iondicating that the physical developmen of the project is right on schadule. The graph in Figure 3 shows the performance index of project Pembinaan Institut Kemahiran Tekun , Pahang.

Limitations

i. The KPI(s) measured in this study based on progress in physical development of the projects.
ii. Certain project information, especially those related to monetary values, are sensitive and confidential and so the stakeholders may not be willing to disclose for analysis.
iii. Limitation relates to the measurement of health and safety
iv. The calculation of the projects' value and profit also poses some problems. The data are difficult to obtain because of its confidential nature
v. The last limitation is on the measurement of environmental friendliness
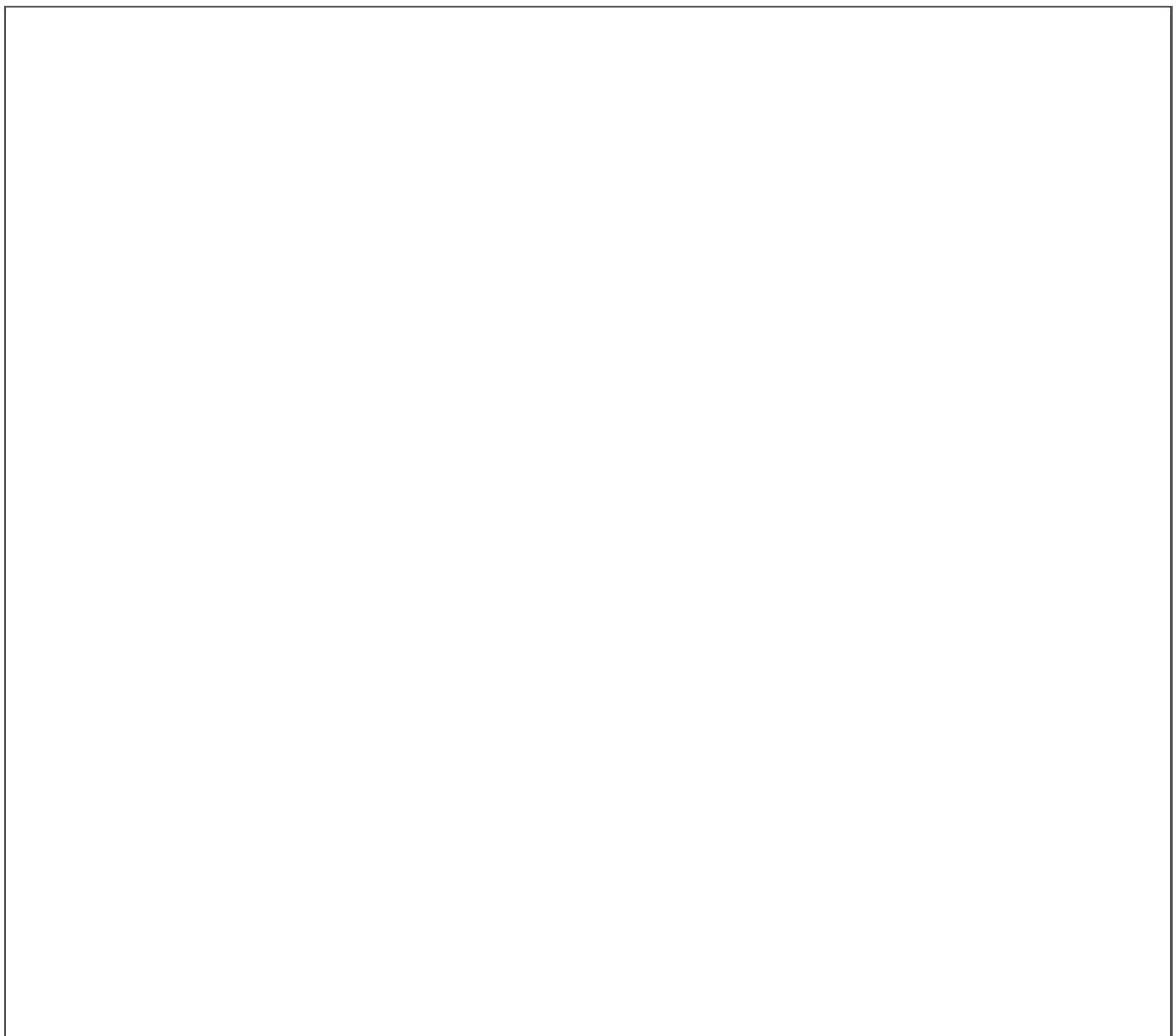
Fig. 3. Performance Index of Project Pembinaan Institut Kenahiran Tenun, Pahang

SIGNIFICANCE OF THE STUDY

Success is always a debatable topic. In the construction industry, time, cost and quality have long been defined as the basic criteria of measuring success. However, different ideas have emerged in the last decade. Therefore, a comprehensive review of KPIs is essential. The current study also helps set a benchmark for measuring the performance index of the physical development of a project. It develops a general and comprehensive base for future research, especially in the determination of success factors. This paper provides an overview of success measures through using IT system which is called e-PSC.

CONCLUSION

Project success has been a recurring topic in the construction management field for many decades. The review of journals on project success reveals that cost, time and quality are the three basic and most important performance indicators in construction projects. Other measures, such as safety, functionality and satisfaction, etc., are attracting increasing attention. A set of KPIs, measured both quantitatively and qualitatively, are developed as a result of this comprehensive review. To verify the practicality and usefulness of these KPIs, case studies on three infrastructure projects (jambatan Sungai Gau, Temerloh, Majlis Bukit Setongkol and Pembinaan Institut Kemahiran Tenun) in the state of Pahang.were examined. It was shown that the identified KPIs are in general good indicators of the performance of construction projects. The syatem provide a useful tools of framework for measuring and comparing project performance for future studies. They also furnish project managers, clients and other project stakeholders useful information to implement a project successfully.

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Table 1: Data of actual works vs schadule works