

DEVELOPMENT OF COST DRIVEN WORK BREAKDOWN STRUCTURE FOR  
PROJECT MONITORING AND CONTROLLING

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*Specially Dedicated To*

*My Beloved Husband*

*Ahmad Marzuky Mohd Khiruddin*

*My sister*

*Fairozah Mohamad @ Harun*

*and*

*My family*

*Thank you so much for the support and understanding.*

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## ABSTRACT

One of the major issue in evaluating project work progress is due to the separation between the work item in Bill of Quantities (BoQ) and physical activities project schedule. This condition led to many problems such as the variances in project performance measurement from the physical schedule progress and the evaluation made by using cost elements in BoQ. Therefore, there is an urgent need to integrate cost in BoQ and work schedule to enable the application of the Earn Value Analysis (EVA) as the standard approach for the project performance appraisal. However the process of rationalising the cost element from BoQ to activities in project schedule is a very challenging task. Direct conversion of cost is virtually impossible. The methodologies adopted for this study were through literature review, interviews with expert panel, distribution of questionnaire survey form and validation of the proposed guideline developed with industry panels. From this study, it has been found that currently there is no specific guideline of rationalising the cost element from BoQ to project schedule. There is also no specific methodology on how to develop cost-driven WBS. This study has established that WBS can be used as an appropriate platform to convert BoQ cost to project schedule. Since WBS played a significant role in developing cost-driven schedule, this study has determine an appropriate guidelines that can be used to establish a suitable WBS. These guidelines have been validated by industry panel. Therefore, this study has been carried out with aim to resolve this issue by using Work Breakdown Structure (WBS) as a medium to rationalise the project cost elements for activities in project schedule. As conclusion, this study has determined that the use of WBS as a strategic approach toward establishing cost-driven schedule.

## ABSTRAK

Salah satu isu utama dalam menilai kemajuan kerja projek adalah disebabkan oleh pemisahan antara item kerja dalam Senarai Kuantiti (BoQ) dan aktiviti fizikal jadual projek. Keadaan ini membawa kepada banyak masalah seperti perbezaan dalam projek pengukuran prestasi dari kemajuan jadual fizikal dan penilaian yang dibuat dengan menggunakan unsur-unsur kos dalam BoQ. Oleh itu, terdapat keperluan segera untuk mengintegrasikan kos dalam BoQ dan jadual kerja untuk membolehkan penggunaan Analisis Nilai Perolehan (EVA) sebagai pendekatan standard untuk penilaian prestasi projek. Walau bagaimanapun proses merasionalisasi elemen kos daripada BoQ dengan aktiviti jadual projek adalah tugas yang sangat mencabar. Penukaran terus kos adalah mustahil. Metodologi yang digunakan dalam kajian ini adalah melalui kajian literatur, temu bual dengan panel pakar, pengedaran borang soal selidik dan pengesahan garis panduan yang dicadangkan yang telah dibuat dengan panel industri. Daripada kajian ini, telah didapati bahawa pada masa ini tidak ada garis panduan tertentu merasionalkan elemen kos daripada BoQ ke jadual projek. Tidak ada kaedah khusus mengenai bagaimana untuk membangunkan WBS kos yang dipacu. Kajian ini telah menetapkan bahawa WBS boleh digunakan sebagai platform yang sesuai untuk menukar kos BoQ kepada jadual projek. Sejak WBS memainkan peranan penting dalam membuat jadual kos, kajian ini telah menentukan satu garis panduan yang sesuai yang boleh digunakan untuk mewujudkan WBS yang sesuai. Garis panduan ini telah disahkan oleh panel industri. Oleh itu, kajian ini telah dijalankan dengan tujuan untuk menyelesaikan isu ini dengan menggunakan Struktur Pecahan Kerja (WBS) sebagai medium untuk merasionalkan unsur-unsur kos projek bagi aktiviti-aktiviti di dalam jadual projek. Kesimpulannya, kajian ini telah menetapkan bahawa penggunaan WBS sebagai pendekatan strategik ke arah mewujudkan jadual kos.

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## LIST OF ABBREVIATIONS

AC	-	Actual Cost
BAC	-	Budget at Completion
BoQ	-	Bill of Quantity
CA	-	Cost Account
CARD	-	Cost Analysis Requirements Description
CDC	-	Centers for Disease Control
CIDB	-	Construction Industry Development Board
DBMS	-	Database Management System
EV	-	Earned Value
EVA	-	Earned Value Analysis
JKR	-	Jabatan Kerja Raya (Public Work Department)
KPIs	-	Key Performance Index
LNEC	-	National Laboratory of Civil Engineering
PBS	-	Product Breakdown Structure
PMBOK	-	Project Management Body of Knowledge
PMI	-	Project Management Institute
PV	-	Planned Value
QS	-	Quantity Surveyor
RII	-	Relative Importance Index
SPSS	-	Statistical Packages for Social Science
WBS	-	Work Breakdown Structure

## **CHAPTER 1**

### **INTRODUCTION**

#### **1.1 Introduction**

A Work Breakdown Structure (WBS) is a foundation for developing a project schedule. In recent, many Project Managers discover the significance of creating the WBS as a commencement of project management. It is applied in monitoring and controlling the project and team. “The WBS provided an opportunity for all key functions on a project to view the project in the same manner, to speak a common project language for the first time” Fleming and Koppleman, (1996). It provides the information and project’s scope which the Project Manager and the team is able to measure progress.

The WBS established to provide framework for a work program in many aspects such as technical planning, cost estimating, resources allocation, measuring work performance, and status of a work for reporting. It is also a part of preparations for Cost Analysis Requirements Description (CARD). It is usually produced by a Programmer to initiate contract WBS. It relates to the specific tasks in a contract. “The intelligent structure of work breakdowns will produce an effective project management” as stated by Homer and Gun, (1995).In general, there is no proper

guidelines provided to develop an effective WBS for a practical project schedule. Since then, the identification of elements are based on self-experience and contract document with improper steps of developing the WBS contributed to the lack of information in a project scheduling. Therefore, the issues had been discussed in this study.

## **1.2 Problem Statement**

A work schedule is commonly prepared by the Programmer through relevant WBS. The effective work schedule is very useful for project team to monitor and control the project. Meanwhile, the issue of improper work schedule contributed to the failure of project success. Numerous complaints recognized significant deliverable-oriented Work Breakdown Structure for no specific methodology to apply this scope definition to other project processes, tools and tasks (Shelly et al, 2008).

The issue of work schedule occurs from the initial project stage. The lack of information in the work schedule is due to separate preparation of work schedule and Bill of Quantity (BoQ) at different phases. The Bill of Quantity (BoQ) is part of contract document and as an archive project information of a proposed development venture. According to Shelly et al, (2008), “the lack of helpful information about the processes used to apply deliverable-oriented Work Breakdown Structure (WBS) to project scheduling is seen as the primary obstacle project managers face when attempting to use deliverable-oriented Work Breakdown Structures as a basis for scope management and schedule development”.

The work schedule is prepared by the Programmer once the contract awarded though the BoQ is prepared by the Quantity Surveyor before the contract awarded (Tender Stage). Thus this leads problem in managing project schedule performance.



A cash flow deviation from current site progress is another problem occurred in project performance assessment that might leads to dispute in progress reporting. This is happened due to insufficient data collected and generated in the work schedule. In general, the work schedule produced at site is based on time-driven schedule. Status of work progress reported is based on time achievement or physical progress update. However, progress payment is based on Bill of Quantity (BoQ).

A work schedule is prepared by inexperience project personnel contributed to the inefficient work schedule. In addition, activities duration were determined based on experience of project manager. There is no specific format used to determine activity duration.

Therefore, this study intended to provide the integration cost and schedule for efficient project performance appraisal

### **1.3 Aim**

The aim of this study is to a develop guideline toward developing WBS that serve as a platform to rationalise project cost packages from project Bill of Quantity (BoQ).

## **1.4 Objectives**

To achieve the aim of this study, the following objectives have been established:-

1. To evaluate limitation of current practices in project performance appraisal process.
2. To propose guideline towards establishing practical WBS that incorporate project cost elements and time for project progress appraisal.
3. To demonstrate the application of cost-driven WBS in developing partial cost-driven work schedule.

## **1.5 Research Scope**

The scope of this study is focused on high rise building construction since it is rapidly develop in our country, Malaysia.

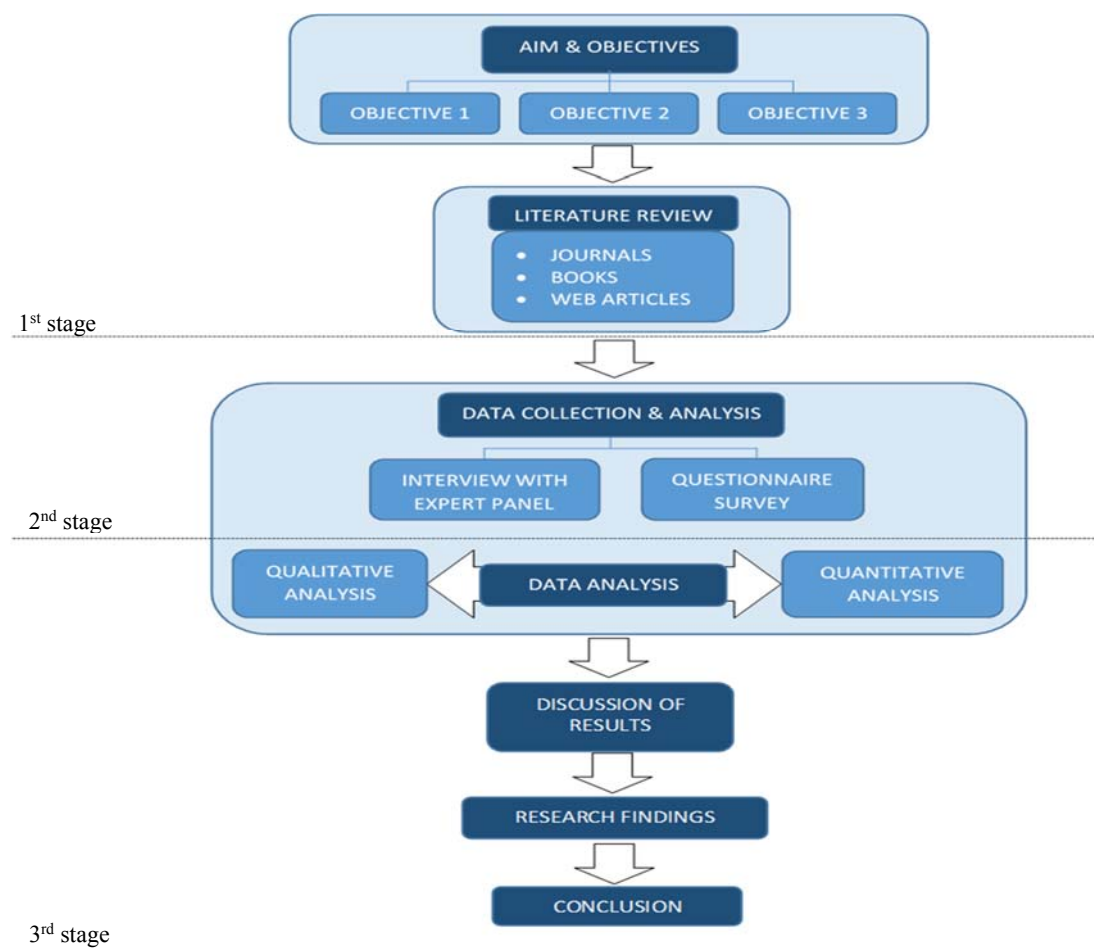
## **1.6 Research Limitation**

The following are limitations of this study:-

- i. The sample size is only 51 respondents.
- ii. It is only focused on high rise building construction.

- iii. Most of the planners preparing the work schedule in the industry have no proper training (incompetent) and not registered as certified planner.
- iv. The respondents are from various background in construction have a few knowledge in project scheduling.
- v. The validation for the proposed guideline is not forward to the Construction Industry Development Board (CIDB) and Public Work Department (JKR) for validation due to time constraint.

## 1.7 Brief Research Methodology



**Figure 1.1 :** Flow chart of brief research methodology

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