Ain Shams University
Faculty of Engineering

THE INTEGRATION BETWEEN EARNED VALUE MANAGEMENT AND RISK MANAGEMENT IN CONSTRUCTION PROJECTS

A thesis submitted for partial fulfilment
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Declaration

I certify that all the material in this thesis that is not my own work has been identified and that no material is included for which a degree has previously been conferred on me.

The contents of this thesis reflect my own personal views and are not necessarily endorsed by the University.

(Signature)

(Date)

Abstract

The success criterion of a project is to achieve the project objectives and scope of work within the dedicated budget, targeted time and quality requirements. Various techniques have been developed to monitor, control and evaluates the project cost and time performance. One of these widespread techniques is the Earned Value Management technique which effectively measures the project performance to date in the terms of cost and time. On the other hand, the Risk Management technique is dedicated to address any future threats or opportunities.

Using each of the EVM and RM techniques without a systematic integration and synchonosization of the data extracted from both techniques may mislead the project parties in the terms of establishing the project measurement baseline, change management and the forecasting and decision making processes. Hence, the need for a systematic integration between EVM and RM was developed especially in the current crucial world wide economical circumstances.

The literature review was divided into Earned Value Management, Risk Management and the integration process between both techniques, the methodology proposed a systematic steps for the integration technique starting by establishing the project total budget, integrated baseline change management, forecasting and decision making.

A case study for an existing project which used only Earned Value Management technique as monitoring and control tool demonstrates the limitation of the Earned Value Management tool, subsequently the systematic integration between Earned Value Management and Risk Management was conducted resulting in improving the project performance.

A questionnaire was developed to understand the worldwide status of the application of the integration between the Earned Value Management and the Risk Management and also addressed the various benefits from the integration technique. The results of the questionnaire confirmed that there are many added values gained from the integration technique in terms of cost and time aspects.

In summary, the result of this research demonstrate that the integration between EVM and RM generally improves the project management throughout the project life cycle.

Keywords: Earned Value Management, Risk Management, Integration

Dedication

I dedicate this thesis to my family. A special feeling of gratitude to my lovely and kind parents whose affection, love, encouragement and prays of day and night made me able to get such success and honour in addition to their moral support, their words of encouragement and push for tenacity were always ringing in my ears.

This thesis is also dedicated to friends and coworkers who have supported me throughout the process. I will always appreciate all they have done through advices and sharing of experiences.

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Chapter One: Introduction

1.1 Background

Cost monitoring and controlling of a project is very important and crucial factor for project success, as one of the main objectives of project management is to finish the project at a point that is not far away from the allocated budget, after establishing the project budget and the commencement date of the project starts, normally deviations start to appear between the allocated budget and the actual incurred costs, these deviations may be above the allocated budget (overrun), and may be under the allocated budget (under-run), the probability of the overrun is usually higher than the probability of the under-run, prices of the construction materials raise due to economical inflation and many other risks occur that affect the project cost performance, project stakeholders start to investigate the reasons of the cost overrun, highlight and monitor those reasons, to figure out whether these new impacts will continue affecting the cost performance till end of the project or not.

Forecasting of the project cost at completion is a challenging issue, as the project may go into overrun, under-run and according to the allocated budget, but the issue is whether the current cost performance trend will remain the same, enhanced or worsen for the remaining life cycle of the project. There are two major parts at any time of the project progress, the first is the works executed to date (work done), and the future remaining works which will be carried on to achieve the project, the cost performance till a certain time of a project life cycle can be easily determined and monitored because it is a fact, the challenging part is to know what is coming on - the uncertainty.

Various techniques are used to figure out the cost performance to date, one of these techniques is the Earned Value Management that can be effectively used to monitor and control the project actual costs to date by simply comparing the budgeted cost of work performed against the actual cost of work performed, reasons of the cost performance can be then figured out. On the other hand there is nothing else but the Risk Management can be used to predict the future issues whether threats or opportunities, Earned Value Management system is only fed by the data extrapolated from the past performance and hardly any way to use the Earned Value Management to predict the future, the Risk Management on the other hand is the specialized tool in this regard.

Many organisations use both techniques actually, but the issue is that The Earned Value Management and Risk Management can and should be implemented in an integrated way, not only during the project execution phase, but also from the project initiation phase till project completion.

The integration will be started by establishing the project budget (measurement baseline) which shall be monitored and controlled by the Earned Value Management and establishing the project management reserve which shall be monitored and controlled by the Risk Management.

The integration process will be then pass by the project execution phase, which is the major part of the integration technique, at this stage the project will encounter changes in the cost performance trends, deviation will start to appear, and the management reserve can be used to recover these deviations when materialised. The management reserve will cover the cost deviation which has happened due to risk factors (whether threats and opportunities), and shall not be used to cover for any scope changes or any other related cost impacts.

A synchronisation system will to be conducted between the project measurement baseline and the management reserve, management reserve estimated could be then measured and evaluated when embedded in the project measurement baseline using the Earned Value Management tool.

The Earned Value Management and Risk Management approaches share a mutual interest of providing the project stakeholders with the adequate available information while setting targets and considering management strategies. However, they take differing approaches, Earned Value Management measures the project performance to date and uses these information to gain an understanding of future performance and the required resources to effectively reach these objectives. Risk Management looks forward to the obscure future to recognize and analyze risks and suggest actions to be applied to minimize or avoid the influence and the likelihood of a threat incidence or increase the utilization of the opportunities (APM, 2008).

The Earned Value Management concept has been deeply studied by (Besner and Hobbs, 2006; Bower and Finnegan, 2009; Butler and Richardson, 2011; Fleming and Koppelmann, 2008; Garrett and Roberts, 2008; Hillson, 2004 and 2011; Leu and Lin, 2008; Liu and Tu, 2010; Shepherd, 2010; Song, 2010). they highlighted the benefits of the Earned Value Management in forecasting the project cost and time at completion based on a variety of measurable and estimable costs and time of a project based on past performance. In spite of their extensive studies, project management practitioners faced several problems and challenges related to the Earned Value Management technique, for example, Earned Value Management uses the past performance of current projects to expect future trends and performance, that can usually limit its dependability because Earned Value Management solely cannot forecast strategies to foresee future events that are not dependent on past performance (PMI, 2011a).