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The Integration between Earned Value Management and Risk Management

Mohamed Kamal Asaad

Masters Student, Faculty of Engineering, Department of Structural Engineering,
Ain Shams University, Cairo, Egypt

Abstract:

The success criterion of a project is to achieve all project objectives and scope of work within the dedicated budget, targeted time and quality requirements. A lot of techniques have been developed to monitor, control and evaluate 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.

1. Introduction

Both EVM and RM inform the project stakeholders about the project past performance and the future performance, to allow project stakeholders to take the necessary corrective actions in the adequate time.

Using each of the EVM and RM techniques without a systematic integration and synchronization 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 raised specially in the current crucial worldwide economical circumstances.

Earned Value Management is used to monitor and control project performance and progress, accordingly makes predictions of the time and cost at completion. The Risk Management on the other side is forward looking and predicts the future threats and opportunities based on qualitative and quantitative analysis (Welch and Jonas, 2003).

For Earned Value Management, one of the main known weaknesses is its dependence on an assumption that future performance can be forecasted according to the data extracted from the past performance. Calculated performance indices are used to predict future cost and time trends. while there is no guarantee that these Earned Value Management assumptions will be correct and it is most likely that the future performance will deviate from that forecasted by simply concluded from past performance (Hillson, 2004).

(Bower and Finnegan, 2009) and also (Harbour, 2009) recommended that Earned Value Management should be merged with Risk Management to recover the weakness of the Earned Value Management tool. Integration of EVM with RM tools shall be an effective way to furnish more precise measurements of project estimates at completion and consequently enhancing the Earned Value Management measures (PMI, 2011a), integrating the data extracted from the EVM and RM processes in a systematic way shall result in a far extensive and more powerful way in running a project (Welch and Jonas 2003).

Since EVM and RM address the same issue, and both provide performance information to provide basis for decisions, actions and offer powerful insights into factors affecting project performance, hence, both techniques can and should be implemented in an integrated way along the project life cycle, and there has been a significant desire in the probability of creating an integrated approach to get synergetic benefits. EVM and RM currently operate as separate processes and lacks to an integration, although in practice, project management practitioners may unintentionally link the two techniques. Majority of the discussions on the integration between EVM and RM are still theoretical (Hillson, 2004).

2. Literature Review

The integration between EVM and RM techniques have been studied by scholars (Hillson, 2004; Pajares and Lopez, 2008; Lipke, 2011; APM, 2008; NDIA, 2008). those researchers and organizations did highlight and stressed on the importance and efficacy of the integration between both EVM and RM.

The qualities of EVM and RM have been all around described elsewhere, as their supporters look up to induce more extensive uptake and use. Every technique has minimum of one shortcoming aspect which shows a noteworthy danger to those depend on the output to support decision making (Hillson, 2004), according to (Pajares and Lopez, 2008), project Risk Management is crucial for project success. However, Earned Value Management does not take into account project risk. EVM and RM are two such project management tools those have demonstrated their value independently in supporting the project monitoring and control. However, there are areas where they are both complementary that if utilized could bring more benefits to both disciplines and therefore to project management (APM, 2008). The integration of risk analysis under the Earned Value Management framework represents an interesting step forward

in the development of the methodology. Earned Value Management variables and variances talk about what happened in the past, whereas Risk Management is concerned about the future, (Pajares et al, 2011) proposed to integrate both perspectives under the same framework, so that project managers could enjoy new tools for taking better decisions.

Both systems share a typical spotlight on project performance, and have the same target of creating powerful actions and decisions to correct or prevent unwelcome trends so as to improve the likelihood of effectively accomplishing project objectives. EVM does this by glancing back at past performance as an indication of the most likely future performance while RM looks ahead at possible events those might affect future project performance and patterns. (Hillson, 2004).

(Bower and Finnegan, 2009; Harbor, 2009) suggested that Earned Value Management ought to be coordinated with different procedures like Risk Management to adjust for this shortcoming of the Earned Value Management technique. Project leaders can see EVM and RM as corresponding project management strategies. Risk Management recognizes risks and the consequences for future project performance. In this manner combination of Earned Value Management with Risk Management techniques can be a helpful approach to give more precise measurements of project status at completion (PMI, 2011a).

(Pajares and Lopez, 2008) proposed to integrate risk analyses in project control. Earned Value Management focuses on the history of the project, whereas Risk Management procedures look forward. An integrated methodology could help to control the future performance of the project taking into account lessons learned from the past.

EVM and RM approaches are not in conflict or fundamentally unrelated. Indeed, their shared characteristics imply a power integration, that is accessible through combining the strong aspects of each technique and utilizing the information extracted from one to feed the application of the other (Hillson, 2004).

Any measurement baseline that does not take a consideration of risk is unlikely to be accomplished; the same for risk response actions that are not resourced and adequately monitored are most likely will not produce the aimed results (APM, 2008).

Potential benefits to be had from interfacing EVM and RM were listed by (APM, 2008) as the Performance Measurement Baseline incorporates the entire agreed scope of the project; the work is scheduled to meet the projects objectives, risks are identified and managed effectively into agreed scope as required, project level comparison of Risk Management based and Earned Value based forecasts will expose potential anomalies and inform better decision making at a strategic level and integrated management control processes are being maintained/implemented and developed where necessary, while (Teixeira, 2001) mentioned the benefits from the integration process as providing the right level of secure information to the right levels of management at the right time, improved communication and visibility within an organization and related organization regarding potential problems and who is doing what about them, improvement of the overall levels of management and control through better informed decision making and implementation of cost effective mitigating actions and controls and controlled risk increases the possibility of achieving the project requirements in accordance with the planned cost, time and performance target.

(APM, 2003) stated that "Risk Management and Earned Value Management share common frameworks. Earned Value Management requires a work breakdown structure, containing costs, timescales, budgets, and product definitions. When combined with an organization breakdown structure, one has a logical framework for identifying risks to program objectives, deciding ownership, and formulating and managing mitigation plans. Typically, the Earned Value Management system will be used to monitor progress to date and based on this and consideration of the forward plan, make predictions of actual spend and schedule completion. The Risk Management system on the other hand is forward looking and bases its predictions on potential risk and opportunity impacts and the anticipated affects of mitigation actions. Integration information provided by the Risk Management and Earned Value Management processes in a structured manner can lead to a far broader and more robust approach to running a program".

3. Methodology

Earned Value Management forecasts the future performance of the project in the light of the analysis applied to the past performance, the main disadvantage of using Earned Value Management solely is that it lacks a strategy for predicting future events.

The methodology of applying the integration between EVM and RM in practice shall be carried out through three main stages:

1. Allocating the project budget.
2. Budget change process.
3. Analysis and decision making.

3.1. Allocating the Project Budget

Creating of the scope of work is a high level state articulation of necessities, including deliverables for the project, that supports the item based work breakdown structure. This gives a structure to checking the project, creating detailed budgets and schedules, and recognizing risks.

After building up the scope of the works and the work breakdown structure, the top down budget is created. At this stage these outputs do exclude risk occasions, however they ought to incorporate evaluating uncertainty.

Next stage is to distinguish potential risks to the project objectives, the point is to set up a high-level perspective of the risks that may happen, and recognize procedures for how these ought to be confronted. Choices on which systems to execute will be vigorously affected by the association's risk appetite, arrangement of stakeholders' objectives and related project key arrangements.

Cost and schedule risk examination might be executed at this phase to comprehend the certainty of accomplishing the top down budget and top down schedule targets. This examination ought to incorporate both the uncertainty estimates and the effect of risk occasions. This procedure will help recognizing the touchiest regions of the schedule and budget, and the key risks to be overseen. Further examination ought to be embraced to decide the adequacy of executing management actions.

The advancement of suitable reactions to treat high-level risks will affect the top down budget and top down schedule that could bring about a change to the scope of work and the underlying work breakdown structure. The top down budget and top down schedule will be upgraded to mirror any adjustments, which ought to trigger a further review of the risk register and a rerun of the cost and schedule risk investigation. Now the budget estimates and schedule are still at a high level, and have not been created to the control account level.

To establish the initial project measurement baseline, further planning is currently embraced to the level of detail required to convey the project. This includes distribution of resources to activities and incorporation of approved risk response actions.

Establishment of the baseline schedule is an iterative procedure whereby legitimate interdependencies between activities inside control accounts are distinguished, and the detailed schedules are connected to make the coordinated project schedule. This is then contrasted with the top down schedule and any distinctions accommodated.

The project risk register is currently extended to incorporate noteworthy control account risks. Management ought to review this project risk register and approve any further risk response actions to minimize risks or improve opportunities. Approved actions ought to then be moved into control accounts, as indicated by the organization risk appetite, on the premise of suitable risk analysis and cost/benefits investigation data. The remaining evaluation of every risk ought to then be approved

The particular risk provision budget is presently ascertained on the premise of the post-mitigation position of the affirmed risks in the risk register. Risk response actions in the risk register don't form part of the particular risk provision amounts. At the point they are exchanged toward the PMB they will be incorporated into the PMB amounts, with the post-mitigation residual risk reflected in the particular risk provisions amounts.

An estimation of potential savings could be produced for the opportunities in the risk register. This value ought not be netted off against the particular risk provision. Any savings made by seizing opportunities may permit work and budget to be expelled from the PMB.

Predicted costs arising from delays to the project will be considered and provisioned for within the specific risk provision budget, e.g. cost escalation of raw materials due to delay in procurement, or additional costs of maintaining resources for a longer period. Temporary schedule reserve buffers may be included in the TD schedule in order to set realistic milestones.

The coordinated project schedule is currently settled and forms the premise of the approved project measurement baseline. Anything that has been recognized as potentially affecting the project yet is excluded in the project measurement baseline will be held in the risk register. The budget figured and concurred for these will be held in the management reserve. Management reserve is made out of specific risk provisions for known risks and non specific risk provision for unknown risks. Management will now estimate an amount for the non specific risk provision, to cover rising risks. This amount will be founded based on the management's view of the development of the data in the project risk register, the setting in which the project is being attempted, existing benchmark information and historical data on past comparative projects where suitable.

3.2. Budget Change Process

The project measurement baseline and management reserve changes relevant to the integration between Earned Value Management and Risk Management are results of the rolling wave planning which includes the work in planned in more details and that the control account owner re evaluating the identified or newly raised risks and applying risk response actions, the changes to the project budget is also a result of the approval of the risk response actions which includes the changes to the project scope of work that may influence the project measurement baseline.

A periodical review to the project risk register is carried out to recognize new risks, opportunities and to monitor or close existing risks, this does not necessarily affect the project measurement baseline, while there are newly identified risks, an amount from the non specific risk provision will be moved to the specific risk provision that will result into decreasing the non specific risk provision and increasing the specific risk provision, on the other hand if some identified risk are monitored and shall not be materialize and will be permanently closed, this risks provisions will be moved from the specific risk provision to the non specific risk provision which results in decreasing the specific risk provision and increasing the non specific risk provision.

A synchronization of funds is also expected to happen between the project measurement baseline and the management reserve (which consists of the non specific risk provision and the specific risk provision) when adding work to the baseline or removing work from the baseline when a risk response action is included in the baseline to mitigate a threat or exploit an opportunity or to recover from a threat that has materialized. The result is an increase in the project measurement baseline and a correspondent decrease in the specific risk provision, on the other hand, work may be removed from the baseline when a risk response action is discontinued or when an opportunity is realized, the result is a decrease in the project measurement baseline and an increase in either or both of the specific risk provision in case of a residual risk is introduced and the non specific risk provision.

3.3. Analysis and Decision Making

A periodical review to the estimate at completion of the project measurement baseline, the specific risk provision and the non specific risk provision is carried out to conclude and figure out the total project cost at completion in the light of the risk review, hence decision making process starts as where there is insufficient project baseline budget or schedule to cover approved changes, or more threats/fewer opportunities materialize than originally forecast, the project may go into over target baseline and/or over target schedule position.

4. Summary and Conclusion

The fruitful joining of EVM and RM will give more reasonable Earned Value evaluations and better estimates identified with the consummation of the project and a viable component for observing the individual performance of the risk moderating measures that have been executed. That mix gives driving pointers that expansion reaction time and likelihood of achievement.

EVM and RM forms share a typical plan to give project managers the best data accessible when setting goals and considering management techniques. In any case, they take contrasting methodologies, in that, EVM builds up project performance status, and extrapolates that data to pick up a comprehension of future patterns and the allotment of asset expected to effectively meet project developments. RM looks to the obscure future to recognize risks and prescribe early action to be taken to confine the impact or likelihood of danger event or amplify the misuse of opportunities.

Both EVM and RM are, in their own particular manner, accepting project standard estimates utilizing objective and subjective information: evaluating mistake can be lessened by correlation of information yields from both controls, giving a superior comprehension of project advance and anticipated future patterns.

The advantages of uniting the Risk Management and Earned Value Management orders are clear, compelling and an unquestionable requirement in both the pre-and post-contract grant stages.

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