

## A RESEARCH ON PROJECT PERFORMANCE MEASUREMENT BY THE METHOD OF EARNED VALUE ANALYSIS\*

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### ABSTRACT

**Purpose** - The purpose of this paper is to examine EVA method and to reveal the perspectives of the managers in project-based sectors regarding project management issues and EVA method.

**Methodology** - Primary data were used in this study. Data was collected through an online survey from 456 participants who manage projects in the business world.

**Findings**- A significant difference was found between two groups as those who use EVA and those who do not, in terms of the performance criteria of reaching the milestones of the projects on time and completing the projects on time.

**Conclusion**- In this study, it was seen that EVA offers significant opportunities for project-oriented businesses. However, the fact that the EVA method does not consider the risks and uncertainties is the most serious problem. Studies should be done to solve this problem, and the EVA should be made a more effective method.

**Keywords:** Earned value analysis, project management, project performance metrics, project management trends

**JEL Codes:** M10, M11, C49

### 1. INTRODUCTION

Projects are those that consist of a sequence of activities made to achieve a goal, which have a complex start-up and finish dates, and which require efficient use of resources. This requires that projects be managed based on budget, time, and scope constraints.

The most important activity of the project management process is the measurement and evaluation of the performance of the project. The performance of a project demonstrates how well the project has progressed towards its objectives. For this reason, it is possible to measure the performance of a project with the project plans being implemented. If performance is the first measure of correct measurement, plan the project in line with realistic goals (Navon & Sacks, 2007).

Project performance gives important clues about the success of the project carried out by project stakeholders. Measuring the performance of a project in this direction is a prerequisite for running the project. However, the performance of each project must be measured in the direction of the project's specific goals and objectives.

Due to the complexity of the project both from project performance measurement and from planning mistakes, the actual success of the project can never be determined due to the method used. But with good measurements, it is possible to obtain the closest results (Kerzner, 2006)

\* This article is adapted from the master's thesis called Earned value analysis as a project performance measurement system and a research.

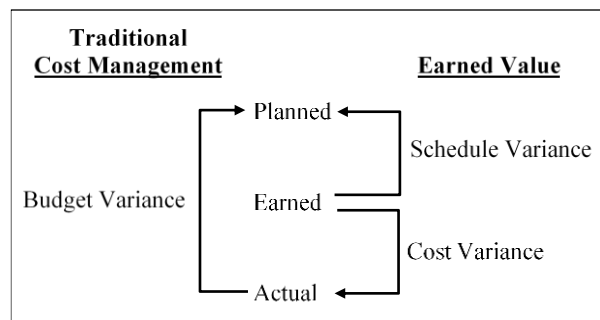
\*\* Corresponding author

EVA is a methodology used to measure and communicate the real physical progress of a project and to integrate the three critical elements of project management (scope, time, and cost management) (Vandevoorde & Vanhoucke, 2006). This is a proactive project performance measurement tool. It also produces variance and performance indices for project costs and schedules, and thus predicts project costs and schedules at completion, providing early indications of expected project performance results (Chen, Chen, & Lin, 2016). By evaluating the methodology, cost, and schedule measure together, a project provides integrated information about both budget performance and schedule performance.

Traditional cost management uses a bivariate approach to measure project success - real cost and planned cost. For this reason, the actual cost calculated based on the initial assumption, which is used at the planning stage of the project performance to be calculated at any stage, will not be an accurate reflection of actual success.

Therefore, a third variable called “earned value” is needed to measure actual accomplishment. Figure 1 depicts the variance comparison. The earned value system reduces subjectivity and provides a more objective performance measurement. The basic concept of establishing and maintaining a plan against which to measure actual accomplishment is one of the most fundamental management principles. Earned value is a practical tool to apply such a principle (Chen, 2008: 3).

**Figure 1: Traditional Cost Management vs. Earned Value**



Source: Chen (2008, p.3)

This research was conducted to examine the project managers' perspectives on project success factors, the success levels of the projects they carried out, and their perspectives on EVA. In this context it consists of 4 parts: literature review, data and methodological approach, findings and discussions, and conclusion.

Within the scope of the research, the attached questionnaire was applied to the project managers and the current situation regarding the project methods and project successes that are widely used was tried to be revealed. In addition, the prevalence of EVA, which is a project performance management system based on project budget and schedule, and its effects on project success were examined. It is thought that the findings will provide significant benefits to researchers and project managers.

**2. LITERATURE REVIEW**

EVM is an objective management technique that is useful to measure the performance of a project and its progress. At the same time, it can be called Variance Analysis (Zhong & Wang, 2011). It is a strong project performance technique because it can measure the time and cost performance of a project at the same time.

This method measures deviations of the plan comparing the data of current costs and time with estimated project indexes. These deviations show how suitable the project is to the plan. This way the method, allows the calculation of the performance of the project and at the same time allows correcting the performance (Anbari, 2003).

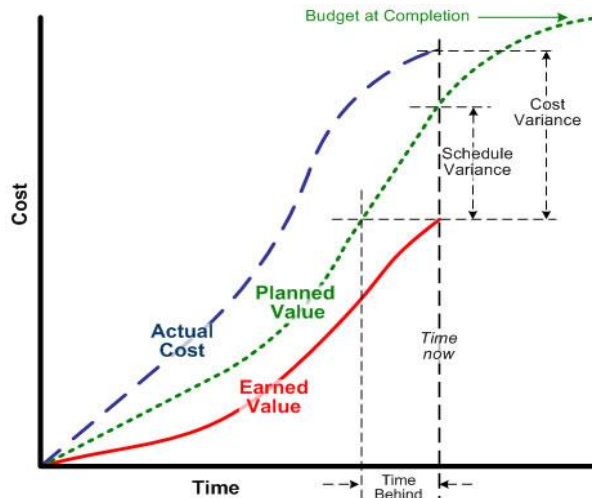
The foundation of EVM is based on U.S.A. air force studies to guide project contractors in the 1960s. Ever since this time this method has been used by several countries' ministries especially by the U.S.A for diverse big projects which had been bought (Taylor, 2006). Nowadays it is being used as an internal audit for management functions of projects with a complicated structure.

This method is calculating the costs and time performance indexes of projects. This way this method measures the planned performances of the project completion costs and the length of the project comparing to the actual values. Thus, the method can measure the most important elements: cost, timing, and the content performance of a project at the same time integrating project performance and productivity management.

Considering all these aspects one can think that this method has a pro-active methodology structure. This pro-active structure allows the project managers to compensate for project deviations from the project performance expectations in each time.

This method uses the planned value, earned value, and actual cost parameters to evaluate the project performance. Using these parameters, this method is doing the performance measurement and with the outcomes, it blends the foreseen plans and creates the completion projection of the project (Bhosekar & Vyas, 2012). The basic parameters of EVA are given in Figure 2, and it is briefly explained in the following paragraphs.

**Figure 2: Basic Parameters of Earned Value Analysis**



Source: <https://www.projectemplates.com/earned-value-analysis-template/> Access date: September 04, 2020

**Planned Value (PV):** It refers to the planned total cost of the works to be performed within a certain time. In other words, it is the budgeted cost of the work planned for a given time (Gupta, 2014).

Since the planned value will serve as a reference for the performance of the project, it is extremely important to accurately measure the performance of the project since it contains realistic data. Therefore, a very detailed planned value list should be created during the planning phase. Thus, the data will have a realistic value.

**Earned Value (EV):** It refers to the budgeted value of the completed project activities. In the calculation of the earned value, the projected costs of the completed works can be easily obtained when they have been previously determined. However, some activities may not be completed at the time of performance measurement. Although these activities are not completed, time and money values that correspond to the completion percentages of the activities should also be considered for these activities to reach the current state.

There are some earned value measurement methods such as milestones with weighted values, fixed formula, percent complete estimates, the combination of percent complete estimates & milestones, equivalent units, and earned standards. The value earned should be calculated by choosing the appropriate method for the project being executed.

**Actual Cost (AC):** It expresses the real value of the completed activity. The internal and external source data used in calculating the actual cost must comply with the data used in the planning phase.

Earned value analysis is a method that provides information about the performance of the project by comparing the earned value compared to the planned value and the actual cost. Performance indicators of this method are known as deviations and indices regarding cost and schedule. These indicators are described below.

**Cost Performance Index (CPI):** It measures the value of the work completed compared to the actual cost spent. It is being calculated with this formula  $CPI = EV/AC$ . If  $CPI = 1$ ; activities fit the budget. If  $CPI > 1$ ; spending is lower than expected. If  $CPI < 1$ ; spending exceeded the budget.

**Schedule Performance Index (SPI):** It shows the pace of progress for a project. It is calculated with this formula  $SPI = EV/PV$ . The value obtained because of the calculation gives a clue as to whether the project can be completed in the planned time or not. If

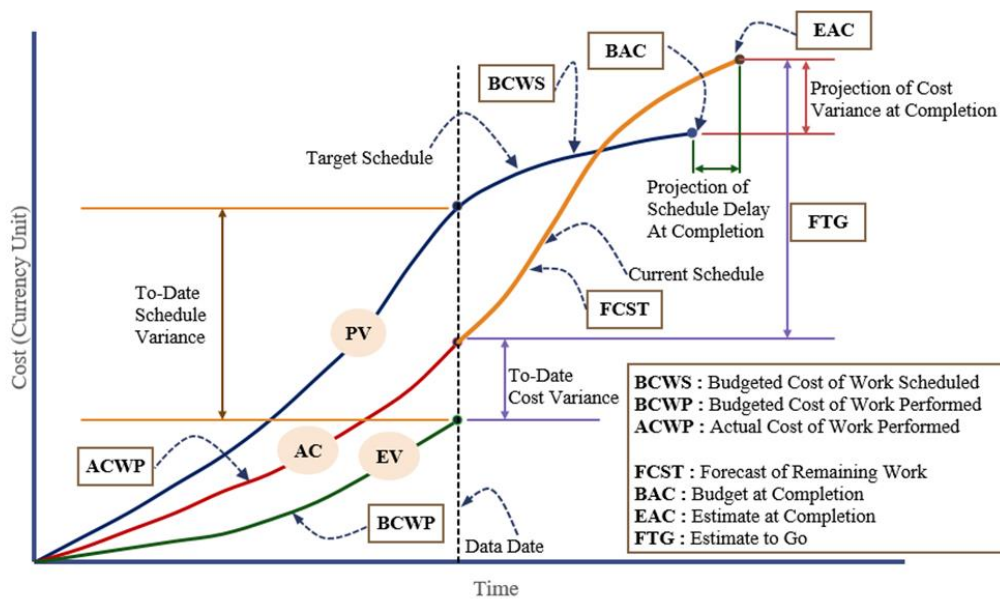
SPI = 1; activities continue in accordance with the schedule. If SPI > 1; activities are ahead of schedule. If SPI < 1; activities fall behind schedule.

**Cost Variance (CV):** It is simply the difference between what was budgeted for the work performed and what it actual cost. The formula is  $CV = EV - AC$ . It shows how far the project is from the planned budget.

**Schedule Variance (SV):** It shows the difference between the time needed for the accomplished activity and the time planned for the given activity. In other words, it determines whether a project is ahead of or behind schedule. SV is calculated with the following formula:  $SV = EV - PV$ . It shows how loyal it proceeds to the plan. All the above-mentioned concepts related to EVA are interrelated. This relationship is better understood through the graph. Figure 3 describes this relationship.

All the above-mentioned concepts related to EVA are interrelated. This relationship is better understood through the graph. Figure 3 describes this relationship.

**Figure 3: Relation with each other of Basic Parameters of Earned Value Analysis**



Note: Adapted from Sources: Zhong & Wang, 2011, <https://www.vertex42.com/ExcelTemplates/earned-value-management.html>, and [https://www.chambers.com.au/glossary/earned\\_value\\_management.php](https://www.chambers.com.au/glossary/earned_value_management.php), Access date: October 05, 2020).

The planned value is accepted as the reference value in the EVM method. At any control, the cost and earned values are calculated based on this reference value. If there is a deviation from the planned value, the causes of this deviation should be investigated, and the problem should be solved.

### 3. DATA AND METHODOLOGY

This research has been realized to analyze the success of the projects which have been carried out in the last two years, the choice of project management tools, and the point of view of the organization's employees towards EVM who are involved in a project-based environment.

The scope of the research is the employees of Turkish businesses that use the project management approach in their activities. The questionnaire that asked whether the participants use the project management approach is placed in the questionnaire form created accordingly, and the participants who do not use the project approach are not answered the other questions. In this context, the attached questionnaire was applied to the project managers with the convenience sampling method. 82 of the 538 participants of the survey in the research were excluded from the sample cluster with this method. The study was completed considering the responses of the remaining 456 participants.

The natural constraint of the research is the constraints arising from the fact that all the data obtained are responses to the questionnaire created and that the participants must evaluate their own project performance. These answers are conceptually and judicially open to mistakes.

The unnatural constraints of the research are the constraints arising from the participants' sensitivity to give information of strategic importance.

Being able to collect data the questionnaire method has been preferred. The questionnaire has been done web-based to increase participation and to speed up the feedback. The questionnaire had been online for 67 days and during these time participants were invited per e-mail to answer the questionnaire.

**4. FINDINGS AND DISCUSSIONS**

The data obtained from the participants and the findings based on these data are given below, respectively. In this direction, first, the importance of traditional project constraints is given in Table 1.

**Table 1: Importance of Traditional Project Constraints**

Scale Rank Order	Project Constraints and Frequencies		
	Budget	Time	Scope
1	3	1	2
2	9	5	10
3	39	25	57
4	101	86	139
5	304	339	248

Table 1, as expected, shows that traditional project constraints are quite important by managers. The striking detail at this point is that the scope constraint is significantly less important than the other two constraints. This indicates that project managers can make more concessions in scope constraints than other constraints. In order to better explain this situation, the radar chart in Figure 4 was created.

**Figure 4: Traditional Project Constraints**

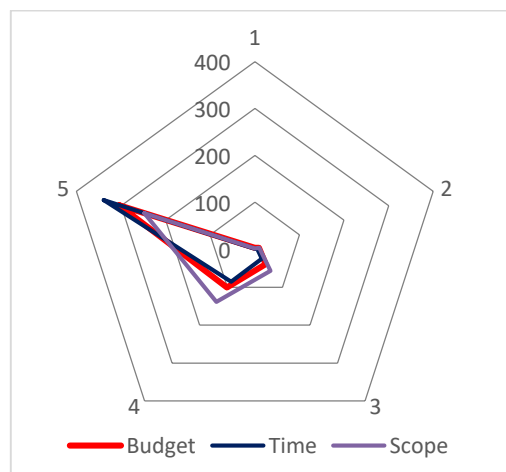


Figure 4 shows more clearly the tendency of project managers to make concessions to traditional constraints as a radar chart. Although traditional project constraints are equally important and cannot be compromised, today's competitive conditions are thought to be caused by project managers' tendency to compromise between constraints.

Projects are subjected to different performance measurements due to their types and sizes. This situation causes different metrics to be preferred according to the characteristics of the project in project performance measurement. These preferences of the project managers participating in the research are summarized in the table below.

**Table 2: Use of Project Performance Metrics**

Project Performance Metrics	f	%
Time	392	97.03
Cost	370	91.58
Customer satisfaction	274	67.82
Quality	266	65.84
Number of scope modification	185	45.79
Risk reduction activities	145	35.89
Rate of modification in requirements	140	34.65
Security considerations	104	25.74
Other	14	3.47

As far as one can see from Table 2 most of the participants are using time and cost metrics in performance measurement. This case is a coherent outcome of the importance of traditional project constraints with the data. It is assumed that less preference for metrics regarding the content is the outcome of tendencies in making a compromise in content constraint.

The tools used in project management have the features of supporting and supplementing each other. But just like in metrics, it differs from the characteristics of the managed project. Frequencies of the participants to use these tools is shown in Table 3.

**Table 3: Use of Project Management Tools**

Project Management Tools	F	%
Project schedule	406	89.04
Project budget	365	80.04
Work breakdown structure	315	69.08
Cost analysis	313	68.64
Risk analysis	301	66.01
GANTT chart	293	64.25
Critical Path Method	222	48.68
SWOT analysis	206	45.18
Lessons learned	191	41.89
Earned value analysis	183	40.13
Diary problems	156	34.21
Break-Even analysis	99	21.71
PERT method	89	19.52
Slip chart	48	10.53
Delphi method	37	8.11
Other	32	7.02
None	9	1.97

When Table 3 is examined, it is seen that only nine participants do not use any project management tools, while the other majority use at least one project management tool. The project schedule is the most common project management tool with an 89.04% usage rate among these tools. Project budget, work breakdown structure, cost analysis, risk analysis, GANTT chart is also widely used tools. However, EVA is a preferred tool by a small number of participants. Considering the data about EVA's awareness of the participants, this state is considered too quiet surprising. The reason why participants are not using EVA is listed in Table 4.

**Table 4: Used Project Management Software**

Project Management Software	F	%
Microsoft Project	338	74.12
Other Software	132	28.95
Primavera	103	22.59
None	41	8.99
HP Project and Portfolio Management (PPM)	31	6.80
VisionFlow	17	3.73
Redmine	17	3.73
Basecamp	9	1.97
Planbox Project Management	7	1.54
Workfront Project Management Software	6	1.32
Innotas PPM	4	0.88

As seen in Table 4, Microsoft Project software provides a superior advantage to other software in terms of being preferred. This is thought to be due to the fact that Microsoft company has a widespread marketing network and leads project management software. In addition, it is seen that 28.95% of the participants carry out their projects with software that is not known in the software market. This indicates that project managers tend to turn to more economical software to meet their needs.

Awareness of EVA, on the other hand, has a rather interesting distribution. This distribution is given in Table 5.

**Table 5: Earned Value Analysis Awareness Level**

Awareness Level	F	%
4	181	39.70
5	85	18.64
3	72	15.79
1	65	14.25
2	53	11.62

When Table 5 is examined, it is understood that 58.34% of the participants are knowledgeable or expert about EVA. Considering the data on the tools used in the project management in Table 3, it is understood that some participants do not prefer to use the EVA although they are knowledgeable or expert about the EVA. This indicates that the EVA may have some negative aspects in practice. To examine these aspects, the participants who did not prefer to use EVA in their activities were asked the reasons for their preferences and the following results were obtained. In this context, the reasons why the project managers do not use EVA contain important clues. Table 6 shows the distribution of the project managers' reasons for not using EVA.

**Table 6: Rationale for not using EVA**

Rationale	f	%
Customers have no such demand	112	41.02
Not having the necessary technical knowledge about the system	74	27.10
Top management does not support	59	21.61
The lack of a suitable system for the industry	45	16.48
Not wanting to change the current control system	45	16.48
Lack of technological infrastructure	44	16.11
It is not considered to work	29	10.62
The tediousness of collecting and processing data	22	8.05
The system has too many rules	10	3.66
It is a complicated system	9	3.29
It is a costly system	4	1.46
It is a failed system	3	1.09
Other reasons	29	10.62

As seen in Table 6, most of the reasons for not using the EVA are not the reasons for the structure of the method. The reasons arising from the structure of the system have a share of only 9.52%. This shows that EVA is preferred less than other tools for subjective reasons rather than structural deficiencies.

EVA offers significant advantages to project managers who use it. According to the participants who prefer EVA, the contributions of the method to the projects are given in Table 7.

**Table 7: Contributions by EVA**

Contributions	f	%
Provides early-warning about cost	128	69.95
Integrates cost and schedule	112	61.20
Data from the analysis sheds light on similar projects	107	58.47
Offers valuable numerical data	100	54.64
Provides early-warning about a schedule	99	54.09
Increases project success	97	53.00
It is increases productivity	83	45.35
Other	10	5.40

The data in **Error! Reference source not found.** shows that EVA has made significant contributions to project executives in project management activities such as providing early warning about cost and integrating cost and schedule in practice as in the literature.

The opinions of managers using EVA support this claim. General thoughts of the participants who prefer to use EVA are given in **Error! Reference source not found..**

**Table 8: Thoughts about EVA**

Thoughts	f	%
It is useful for most projects	84	45.90
It is an extremely useful system	58	31.69
It is suitable for some projects	35	19.13
It is a system worth trying	6	3.28
It is not worth the effort	0	00

When **Error! Reference source not found.** is analyzed, it is seen that most of the participants have positive opinions about EVA. The most striking point is that none of 183 participants preferring to use EVA think that EVA is not worth the effort. This indicates that the EVA is indeed a beneficial system.

To evaluate how these preferences of executives using EVA affect the performance of the projects they carry out, the participants who measured the performance of their projects were divided into two according to whether they used EVA or not, and whether this situation had an impact on the projects carried out was examined. Accordingly, data on the performances of the projects carried out by the participants were collected. For this process, the 5-point Likert scale, which includes seven performance criteria, was used. The scale was analyzed for reliability, and it was found to have 0.811 Cronbach's Alpha coefficient. In addition, the item analysis showed that the questions on the scale were related to each other and should not be removed from the scale. Thus, it was understood that the internal consistency of the scale was at a good level. The criteria forming the project performance scale are given in **Error! Reference source not found..**

**Table 9: Performance Variables**

Variables	Explanation
V1	The ability of projects to reach milestones on time
V2	The ability of projects to complete on a planned schedule
V3	The ability of projects to complete on a planned budget
V4	The ability of projects to meet customer expectations
V5	The ability of projects to adapt to scope change
V6	The ability of projects to meet the required safety conditions
V7	The ability of projects to keep risks under control

Scale data were subjected to a normality test to choose the right method for the analysis. Both Kolmogorov-Smirnov and Shapiro-Wilk tests indicate that the data are not normally distributed. In addition, the histogram views of the data and the Q-Q curves show that the data is not normally distributed. Based on the determination that the data are not normally distributed, the analysis was carried out with the Kruskal-Wallis test. The results obtained are listed in **Error! Reference source not found..**



**Table 10 Mann-Whitney Test Sequence Rankings**

Variables	Use of EVA	Mean Rank	Sum of Ranks
V1	Yes	218.28	37980.00
	No	190.57	43830.00
V2	Yes	217.14	37782.50
	No	191.42	44027.50
V3	Yes	195.27	33977.50
	No	207.97	47832.50
V4	Yes	204.16	35523.50
	No	201.25	46286.50
V5	Yes	208.79	36329.50
	No	197.74	45480.50
V6	Yes	205.03	35675.00
	No	200.59	46135.00
V7	Yes	213.78	37197.00
	No	193.97	44613.00

When **Error! Reference source not found.** is analyzed, it is seen that participants who use EVA have higher rank means than those who do not use EVA in the majority of project performance criteria. Mann-Whitney U test results showing the significance of the difference between these two groups are given in **Error! Reference source not found.**.

**Table 11: Effect of EVA Usage on Project Success Factors (Mann-Whitney U Test)**

Variables	Mann-Whitney U	Wilcoxon W	Z	Sig. (2tailed)
V1	17265.0	43830.0	-2.606	.009
V2	17462.5	44027.5	-2.383	.017
V3	18752.5	33977.5	-1.152	.249
V4	19721.5	46286.5	-.279	.780
V5	18915.5	45480.5	-1.034	.301
V6	19570.0	46135.0	-.411	.681
V7	18048.0	44613.0	-1.828	.068

The Mann-Whitney U test outcomes in Table 11 show that there is a significant difference at the level of 0.01 in V1 and 0.05 in V2, while there is no significant difference between the participants who use and do not use EVA in other criteria.

When the first and second variables where the significant difference was detected were examined, the fact that the participants who used EVA had higher rank means than the participants who did not use it is an indication of the positive effect of using EVA on the project performance. This indicates that the success of reaching milestones on time and completing the project on time is higher in projects using EVA than those who do not.

**5. CONCLUSION**

Day by day projects are getting more complex and this fact pushes managers to use new techniques in project management. However, this should not mean that traditional project constraints lose their importance. Even today the concept of time intensifying competitive environment has brought a much more important position. The fact that 74.34% of the participants consider the time constraint very important is an indicator of this state. Therefore, although EVA is a traditional project management tool, it continues to be one of the most effective methods in project management.

In this study, project management tendencies were examined, it was seen that the most time and cost metrics among the project performance metrics, the most preferred project calendar and project budget among the project management tools, and the Microsoft Project software among the project management software. In addition, the participants who measure the project performance were divided into two groups as those who use EVA and those who do not, and the project performances of the groups were compared, a significant difference was found between the two groups in terms of the performance criteria of reaching the milestones of the projects on time and completing the projects on time. When the average of the series of these criteria is examined, the group using the EVA has a better performance than the group that does not. This shows that it is possible to reach the milestones on time and complete the project on time using EVA.

When considering the findings obtained, EVA is one of the most important and effective tools for project management. Therefore, it is thought that project executives using EVA will have the opportunity to gain a competitive advantage. However, the fact that the EVA method does not consider the risks and uncertainties is the most serious problem. Studies should be done to solve this problem, and the EVA technique should be made a more effective method.

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**Annex: Survey Form**

<b>1- How important do you think traditional project constraints are? (1: very little, 5: very important)</b>					
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Time	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Budget	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Scope	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>2- Which tools do you use while carrying out your projects?</b>					
<input type="checkbox"/> Critical Path Method-CPM	<input type="checkbox"/>	Earned Value Analysis (EVA)			
<input type="checkbox"/> Breakeven Analysis	<input type="checkbox"/>	Work Breakdown Structure (WBS)			
<input type="checkbox"/> Diary problems	<input type="checkbox"/>	Lessons learned			
<input type="checkbox"/> Project schedule	<input type="checkbox"/>	Slip chart			
<input type="checkbox"/> Risk analysis	<input type="checkbox"/>	Cost analysis			
<input type="checkbox"/> SWOT	<input type="checkbox"/>	Delphi method			
<input type="checkbox"/> Project Budget	<input type="checkbox"/>	GANTT chart			
<input type="checkbox"/> Break-Even analysis	<input type="checkbox"/>	Other _____			
<b>3- Which software do you use while running your projects?</b>					
<input type="checkbox"/> Workfront- Project Management	<input type="checkbox"/>	BuildTools Construction Mgmt			
<input type="checkbox"/> Microsoft Project	<input type="checkbox"/>	Redmine			
<input type="checkbox"/> HP PPM	<input type="checkbox"/>	Primavera			
<input type="checkbox"/> Innotas PPM	<input type="checkbox"/>	PowerSteering			
<input type="checkbox"/> Instantis EnterpriseTrack	<input type="checkbox"/>	Easy Projects			
<input type="checkbox"/> VisionFlow	<input type="checkbox"/>	Basecamp			
<input type="checkbox"/> None	<input type="checkbox"/>	Other _____			
<b>4- Do you measure the performance of the projects you carry out? (If your answer is no, go to question 9.)</b>					
<input type="checkbox"/> Yes	<input type="checkbox"/>	No			
<b>5- Which of the following metrics do you use to measure performance?</b>					
<input type="checkbox"/> Time	<input type="checkbox"/>	Cost			
<input type="checkbox"/> Number of scope changes	<input type="checkbox"/>	Rate of change of requirements			
<input type="checkbox"/> Quality	<input type="checkbox"/>	Customer satisfaction			
<input type="checkbox"/> Safety considerations	<input type="checkbox"/>	Risk reduction activities			
<input type="checkbox"/> Other _____					

<b>6- What is the success level of your projects? (1: very bad, 5: very good)</b>					
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Reaching milestones on time	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Completion at the scheduled time	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Completion with planned budget	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ability to meet customer expectations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ability to adapt to scope changes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ability to provide security conditions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ability to control risks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>7- How do you monitor project costs?</b>					
<input type="checkbox"/> With Earned Value Analysis	<input type="checkbox"/>	With external data			
<input type="checkbox"/> With internal data	<input type="checkbox"/>	With integrated data			
<input type="checkbox"/> Other _____					
<b>8- How much do you know about earned value analysis?</b>					
<input type="checkbox"/> Expert	<input type="checkbox"/>	I am a little familiar			
<input type="checkbox"/> Knowledgeable	<input type="checkbox"/>	I am not familiar			
<input type="checkbox"/> Sounds familiar					
<b>9- Do you use earned value analysis techniques in your projects?</b>					
<i>(If your answer is No, go to question 13. If your answer is Yes, do not answer question 13.)</i>					
<input type="checkbox"/> Yes	<input type="checkbox"/>	No			
<b>10- Which type of projects do you use the earned value analysis system?</b>					
<input type="checkbox"/> Several pilot projects	<input type="checkbox"/>	Large and critical projects	<input type="checkbox"/>	All projects	
<b>11- What is your opinion about the earned value analysis system?</b>					
<input type="checkbox"/> Extremely helpful	<input type="checkbox"/>	Suitable for some projects	<input type="checkbox"/>	Not worth the effort	
<input type="checkbox"/> Useful for most projects	<input type="checkbox"/>	Can be tried			
<b>12- What are the contributions of earned value analysis to your project management activities?</b>					
<input type="checkbox"/> Offers valuable numerical data	<input type="checkbox"/>	Integrates cost and schedule			
<input type="checkbox"/> Provides early warning of cost	<input type="checkbox"/>	Analysis results shed light on similar projects			
<input type="checkbox"/> Provides early warning of calendar	<input type="checkbox"/>	Increases productivity			
<input type="checkbox"/> Increases project success	<input type="checkbox"/>	Other			
<b>13- Why don't you use the earned value analysis system?</b>					
<input type="checkbox"/> The lack of a suitable system for the industry	<input type="checkbox"/>	Customers have no such demand			
<input type="checkbox"/> Not having the necessary technical knowledge about the system	<input type="checkbox"/>	Not wanting to change the current control system			
<input type="checkbox"/> It is not considered to work	<input type="checkbox"/>	It's a costly system			
<input type="checkbox"/> The tediousness of collecting and processing data	<input type="checkbox"/>	The system has too many rules			
<input type="checkbox"/> Top management does not support	<input type="checkbox"/>	It's a complicated system			
<input type="checkbox"/> It's a failed system	<input type="checkbox"/>	Lack of technological infrastructure			
<input type="checkbox"/> Other reasons _____					