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## Earned Value Management and Performance of Youth Funded Projects in Kenya

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### **Abstract:**

*Project performance remains challenging despite many years of practice and learning. To make a project successful, it is very important for the project to be completed within schedule, completed within budget and the quality is good. To ensure that happens it is important to implement a control system which will be an alert signal to the manager so that corrective measures that are relevant to the project can be implemented. Earned Value management is one of the methods believed to be an effective control tool. The failure of youth funded projects is a problem that has been experienced in Kenya in the past and current and could persist in the future if managerial challenges are not addressed. Empirical evidence suggests that youth funded projects do not generally achieve the required scope, are often late, and perform badly on quality of deliverables as well as on cost budgets. EVM integrates project scope, time and cost through periodic measurements of actual cost and work completion. It views project progress in terms of cost as a function of time against a firm baseline set up at the start of the project. EVM can operate only if the baseline costs and the project plan are fully detailed at project initiation. This study reviews literature on earned value management and on performance of youth funded projects in Kenya. The study aims to recommend the use of EVM to address the performance issues in youth funded projects.*

**Keywords:** *Planned value, Earned value, Actual cost, earned value management, Performance, Cost variance, Schedule variance*

### **1. Introduction**

In project management the main objective is to complete a project within time and planned cost and the quality is good. For this goal to be achieved one of the most important steps is to develop an effective performance monitoring and control system. This system will allow efficient monitoring of cost, time and quality of the project. "Without a timely and regular performance control it becomes challenging to assess the project progress as well as the performance of the entire project" (Yang, 2010)

Project teams always aim control three key performance indicators, which are cost, time and scope. "Project monitoring is an iterative process, during which the actual values are compared to the planned values in order to predict the overall project cost and time and also undertake any preventive and corrective measures based on these predictions"(PMI, 2013).

#### *1.1. Youth Funding Initiatives*

According to world youth report Youth unemployment has become a major challenge globally. Currently youth account for about 55% of the unemployed in Kenya with over 15 million living below poverty level. Kenyan youth constitute about 37% of the country's population justifying why youth employment should be prioritized in the Country's development plans including Vision 2030. According to the Kenyan Constitution youth is anyone above the age of 18 years and below 35 years.

To mitigate the growing unemployment crisis the government in collaboration with NGO's has implemented various strategies and programmes to address these unemployment challenges. One of the most notable government initiatives is Youth Enterprise Development Fund (YEDF) which was established in 2006 to boost employment and entrepreneurship among youth. YEDF finances youth projects to registered youth groups through constituency youth enterprise scheme. Another initiative was kazi kwa vijana(KKV) programme launched in 2009 by the president. Its mandate was to tackle poverty and unemployment among the youth by creating various employment opportunities through government related projects. (Isahakia, 2010). Kenya youth empowerment project document was released in 2010 to meet the World Bank requirement for the development of a management framework to aid if financial assistance from the World Bank. It allowed the government to identify alternative ways of managing projects from initiation to handing over the project. The document was updated in World Bank project update in May 2010 to support the government of Kenya by increasing access to youth targeted programmes. (world bank,2010)

KEPSA was given a mandate to launch the private sector internships and training with the purpose of improving youth employability by providing skills and work experience through internships in the formal and informal sectors. Other initiatives were launched by the united states government like youth innovate for change and yes youth can with the purpose of funding youth development projects and to support activities of the national youth forum.(kepsa,2011)

Past studies indicate that slightly above 50% of these projects fail from year one to three due to project managerial challenges. (Bowen, Morara & Murithi, 2009). Project performance remains challenging despite many years of practice and learning. Past studies on the performance of youth funded projects show that the major reasons for these failures are lack of project management training and lack of an efficient monitoring and evaluation system, and the recommendations from these studies is that the youth should be trained on project management and establishing an efficient monitoring and evaluation system.

In order to make a project successful, it is very important for the project to be completed in time within the correct budget and the quality expectation is achieved. In order achieve that, a control system needs to be implemented. This will assist the project manager to have up to date information about the project and to ensure that the project is going according to plan and if there is a deviation then a corrective measure relevant to the project can be implemented. Earned Value Management is one of the most reliable methods used in monitoring and controlling project performance (PMI, 2011). EVM evaluates project performance in three dimensions: schedule, scope and cost as recognized by PMI (Project Management Institute) as the “iron triangle” PMBOK (2013).

Earned Value management is a monitoring and evaluation system believed to be an effective control tool. EVM helps project managers to measure planned value against earned value and monitor schedule and cost variances as well as measure how efficient the project is performing in terms of costs and schedule and also able to forecast the completion time and cost. EVM is an effective tool for monitoring and control in projects and has been commonly used to measure project performance (PMI, 2011). Far from the traditional approaches used to monitor progress like reviews, management reports, day to day monitoring, EVM monitors cost and schedule by comparing the earned value and planned value. It gives an objective measure of the cost and schedule variance as well as the performance index and is also able to forecast the completion cost and schedule. This will aid risk management by providing early identification of areas that need corrective action.

### *1.2. Problem Statement*

Unemployment among the youth is one of the biggest development challenges in the World today. Youth account for around 55% of the unemployed in Kenya. The failure of youth development projects is a major problem that has been experienced in Kenya and could persist if the project management challenges are not addressed. Past Studies reveal that the failure rate of these projects stand at over 50% in the first three years. Statistics also indicate that 75% of the failures are caused by project management challenges (Bowen, Morara & Murithi, 2009).

Over the past youth funded projects have not been performing to the government expectation of employment creation and self-reliance among the youth. Empirical studies on the performance of these youth funded projects finds out that projects activities are never implemented on time and according to plan, group members do not play their roles and projects are never completed on time due to lack of training, effective monitoring and evaluation as well as leadership, Amenya, Onsongo, Huka and Onwong’a (2011) Onger (2012), Ng’ang’a (2012), Gioche, (2012), Karanja (2014)

This study is emanating from the recommendation by scholars that it is important to implement an efficient monitoring and evaluation technique and proper training to be conducted on its applicability so as to improve the performance of these youth projects,. Earned Value Management has been practiced in a many sectors including defense, engineering and project management and has been proven to be effective and efficient monitoring and evaluation technique. (De Marco A. a., 2013)

### *1.3. Significance of the Study*

The main purpose of this study is to provide information to project managers especially in youth funded projects in Kenya on how they can use earned value management to address the challenges they have been facing in performing monitoring and evaluation on their projects which will at the end help improve performance of projects in terms of timely delivery on cost and schedule.

The study will also benefit academicians and other researchers in future who would want to broaden their knowledge on the use of earned value management to improve project performance since this study add to the wealth of already existing knowledge on the relationship between earned value management and project performance.

### *1.4. Objectives of the Study*

#### 1.4.1. General Objective

To study the relationship between earned value management and project performance in youth funded projects in Kenya

#### 1.4.2. Specific Objectives

- To examine the relationship between forecast measurement and project performance in youth funded projects in Kenya.
- To study the relationship between cost measurement and project performance in youth funded projects in Kenya.
- To examine the relationship between schedule measurement and project performance in youth funded projects in Kenya.

### *1.5. Scope Statement*

This study will review studies done on earned value management and how projects that have adopted EVM have performed in terms of scope and cost.

### *1.6. Limitations of the Study*

The major limitation for this study is shortage of literature relating to the adoption of earned value management in Kenya, however this study will focus on the performance of projects that have adopted EVM in developed countries and how the results can be replicated to address the monitoring and evaluation challenges facing youth funded projects in Kenya.

## 2. Theoretical Review

### 2.1. Theory of Constraints

The Theory of Constraints explains that every process has a single constraint and that the entire process can only be improved when the constraint has been improved. This theory focuses on improving the current constraint until it no longer limits output, then the focus moves to the next constraint. The Theory of Constraints uses a specific methodology for identifying and eliminating constraints, known as the Five Focusing Steps, the steps include identifying the constraint, making improvements to the output of the constraint, reviewing all other activities in the process to ensure they are aligned and truly support the needs of the constraint, after elimination then the final step is to move to the next constraint.

This theory will be useful in this study in the sense that we are trying to improve performance by identifying the constraint that is currently limiting performance and in this case monitoring and evaluation and making improvements by introducing earned value management as a solution to improving the constraint.

### 2.2. Systems Theory

Systems theory originates from the idea that everything is part of a larger system which and all the parts are interdependent. This theory aims to clarify the relationship between the parts and the entire system. A systems approach is useful for viewing the relationships between inter-dependent parts on these relationships affect the performance of the overall system. This study uses this theory to understand the contribution of earned value management to the performance of the entire project. We are viewing the project as a system that has many interdependent parts which have to be coordinated to bring about good performance in terms of costs, scope and quality.

### 2.3. Contingency Theory and Approach

Contingency theory explains that management practices and principles are applied depending on which strategy is appropriate at that particular time. "The traditional approaches to management were not necessarily wrong, but today they are no longer adequate. The needed breakthrough for management theory and practice can be found in a contingency approach." Luthans (1976) This theory is very useful in this study because the traditional approaches to monitoring and evaluation were not necessarily wrong, but today they are not useful anymore, and are not efficient and this calls for the introduction of a better method to mitigate the challenges faced in M & E. Earned Value management is a monitoring and evaluation system believed to be an effective control tool.

### 2.4. Theory of Change

Theory of change explains how a particular intervention is expected to have some positive impact. The theory of change illustrates the presumed relationships between: Inputs, Activities, outcomes at various levels and the intended impact. If there is evidence of success after the intervention then that confirms the initiative is effective. Outcome from the change made should have indicators that guide and facilitate measurement. This theory is useful in the implementation of earned value management process which involves setting up defined work breakdown structure, comparing earned value vs. planned value and making corrections on the deviations in order to achieve the desired performance.

## 3. Empirical Review

### 3.1. Earned Value Management

In a market full of competitiveness, customer satisfaction is key, In order to deliver customer satisfaction, it is important for the project to be completed on time, within schedule and budget and the quality is good. To ensure that happens it is important to implement an efficient monitoring and control system. Earned Value management is a performance measurement method believed to be an effective control tool. Project Managers can compare earned value to the planned value. EVM facilitates the calculation of schedule variance, cost variances and also allows forecasting of completion cost and the remaining schedule. "EVM has become the most commonly used method of project performance measurement" (PMI, 2008). Since 1996, the emergence of EVM has moved to becoming a very useful and tool which project managers could use (Fleming and Koppelman, 2010).

Earned Value Management System is a process which can be incorporated by companies as a management control system. EVMS provides a guideline for implementing EVM; this will aid project managers to monitor the project status. If there is any deviation from the set plans then a corrective action can be taken. Therefore, organization needs to have EVMS to guide the management team in a right direction. Bhosekar and Gayatri (2012)

EVM was first used at the US Department of Defense in 1967 and defense contractors were mandated to use to report progress in a specified format. Project Management Institute adopted EVM and it was included in PMP. "Earned value management is one tool that has confirmed itself as the most proficient and reliable in measuring project performance and managing projects" (PMI,2011) EVM is a process that helps project managers in estimating the future performance of their projects (Tabriz, Farrokh, Nooshabadi, & Nia, 2013). The elements of scope, time and cost are very important in ensuring that a project is successful. Tabriz et al. (2013). EVM enables the project team to have a wide view of the current performance of the project so as to avoid deviations from the original action plan (Czarnigowska, Jaskowski, & Biruk, 2011). EVM has been used in many sectors ranging from engineering, defense to project management (De Marco & Narbaev, 2013)

For EVM to work efficiently it is important for users to ensure that there is a detailed project plan in place and that there is adequate ways of measuring performance and reporting progress (Wilson *et al.*, 2013). Despite the many arguments that the EVM is challenging and a bit difficult to use recent studies show that it is becoming acceptable as an effective system for performance monitoring.

“EVM provides up to date information on project performance. The technique gives true and comprehensive verdict of time and cost of a project at any stage of life allowing easy track of the project and easier administration of its activities on every step of the way” (PMI, 2011). Vanhoucke and shtub (2011) point out that by the use of project performance measures and metrics set for the entire project at the work breakdown structure, EVM will have the ability of detecting when a project is not moving towards the right direction at any point of the project life from project activities to the project level. EVM will only be able to work efficiently when the project plan and the baseline costs are fully detailed during project initiation. These include the project scope, goals, WBS, master schedules, work package definitions and cost budgets.

(Jose Angelo Valle, 2010) did a study on the construction industry on the factors that influenced the use of EVM. The results showed that EVM had a very important role in the management of the project scope, cost, time, risk and the entire project progress, EVM contributed to the success of the projects and they were finished on time and at the right budget. EVM allowed for scope and change management and cost and this helped to keep the project on check by giving alternatives to decide the activities that can reduce scope in order to avoid cost overruns.

(Lipke, 2007) Did a study on TCPI and found out that that the TCPI value of 1.1 is a reasonable criterion for determining when a project is out of control. TCPI index was used in the evaluation of the project and the performance transformation envisioned for recovering the project.

(Vandenbussche, 2010) Did a study on the performance of the EVM in the construction industry and found out that EVM helps project managers to be able to monitor and control their projects by giving accurate forecasts and early warning signs. It provides managers with quantifiable data on the project performance. This quantifiable data will allow better estimates for new projects. For EVM to be implemented successfully appropriate training and organizational support is required.

(Marko Häkkinen, 2015) Did a study on the benefits of EVM on ICT projects and found out that with EVM a Project manager has more data available for decision making. With more accurate and timely correctly collected data, a project manager can be more productive because the right decisions can be made faster and less corrections will be done during the life cycle of a project.

(Ali, 2016), Did a study on Measuring the Energy Cost Performance of Green Buildings using Earned Value Management and found out that EVM facilitates an exhaustive cost impact analysis of energy performance. “The traditional cost performance measurement which compares the actual energy cost with the baseline costs shows that the total energy cost saving in the case study is around 66.99% compared to the industry baseline. While the earned value analysis reveals that the energy cost saving is around 71.18% compared to the baseline, and this is because the earned value approach allows isolating the impact of energy price increase on the energy cost performance of the building.”

(Robert P Hunt, 2007) Did a study on Applying EVM to Software Intensive Programs and found out that Using EVM can help prevent failures. “Earned value should be based on establishing a reliable baseline estimate for cost and schedule, selecting effective software metrics, applying Performance-Based Earned Value (PBEV), and using analytic processes to project cost and schedule based on actual performance.”

(Koppelman, 2008), did a study on CPI and TCPI and found out that Employing the EVM technique can provide a project with data not available with any other performance management tool that the two metrics (cpi & tcpi) are useful in the management of any project, or portfolio of projects.

(Peter Putz1, 2006) Did a study on Earned Value Management on NASA projects and found out that EVM was successful in saving time and there was reliability and consistency of reports across different projects. Before EVM it took them between about two weeks to gather all the relevant cost and schedule data from all the projects, but with EVM the time duration came down to a maximum of two days and the project managers could focus on analyzing variances and taking necessary actions.

(Radoslav 2014) Did a study on application of EVM on small-scale construction projects, and found out that EVM is a reliable means for predicting the project schedule and project cost in the early stages of the project. Regardless of any project, a well-designed plan and an appropriate monitoring approach, EVM can serve as an early warning tool and clearly showing that some parts of the project is not being executed according to plan.

### 3.2. EVM Parameters

PMI (2011) classifies EVM into parameters and measures. The parameters are; Planned Value (PV) which indicates the initial estimate for the planned work based on a Project Work Breakdown Structure. Earned Value (EV) is the amount of work that has been accomplished and expressed in reference to the initial budget. Actual Cost (AC) is the true cost of work that has been performed. (PMI 2011, Fleming and Koppelman 2010).

### 3.3. EVM Measures

EVM measures includes; Schedule Variance (SV) calculated as  $SV = EV - PV$  and it represents how much the project is ahead or behind schedule. Cost Variance (CV) calculated as  $CV = EV - AC$  and it represents how much the project is under or over budget. Schedule Performance Index calculated as  $(SPI = EV/PV)$  represents the rhythm of production and It varies around 1: SPI greater than one indicates that time performance is better than expected. Cost Performance Index calculated as  $(CPI = EV/AC)$  represents how

efficiently the project is using resources. A CPI smaller than 1 indicates that the project is heading to a cost overrun, since what has been achieved do not correspond to what had been estimated, for the same set of activities. (PMI 2005, Fleming and Koppelman 2010)

<b>EVM Performance Measure</b>	<b>Formulae</b>	<b>PM Question</b>	<b>Interpretation</b>
Cost Variance (CV)	Earned Value (EV) – Actual Cost (AC)	Are we under or over budget?	+VE project is experiencing an “Underrun” -VE, project is experiencing an “Overrun”
Schedule Variance (SV)	Earned Value (EV) – Planned Value (PV)	Are we ahead or behind schedule?	+VE, project is on schedule or exceeding the schedule -VE, project is behind schedule
Cost Performance Index	Earned Value (EV)/Actual Cost (AC)	How efficiently are we using our resources?	If less than 1.0, cost is GREATER than budgeted If greater than 1.0, cost is LESS than Budgeted
Schedule Performance Index	Earned Value (EV)/Planned Value (PV)	How efficiently are we using our time?	If less than 1.0, project is “BEHIND” schedule If greater than 1.0, project is “AHEAD of schedule
VAC	BAC – EAC	Will we be under or over budget?	+VE, project is projecting an “Underrun” -VE, project is projecting an “Overrun”
TCPI	BAC-EV/BAC-AC	How efficiently must remaining resources be used?	Provides an estimate of the CPI to be used to complete the project.
EAC	BAC/CPI	What will be the likely cost of the project?	Provides the estimate cost to complete the project at any given time.
TEAC	BAC/SPI	When are we likely to finish work?	Provides the estimate time to complete the project at any given time.

Table 1: Forecasting Indicators by EVM technique (PMI, 2011)

#### 4. Discussion

Failure of youth projects could persist if managerial challenges are not addressed. Empirical studies show that project activities are never implemented on time and according to plan, group members do not play their roles. One of the major challenges is the lack of a lack of monitoring and evaluation system. All the studies recommend adequate training and the implementation of a monitoring and performance system which can be able to monitor project progress and easily identify deviations from the set project objectives. This will allow a corrective measure to be taken immediately. EVM has the ability to provide up to date information on project performance, the technique gives a true and comprehensive picture of time and cost of a project at any stage of the project life cycle allowing easy track of the project activities and thus helps to detect when the project is not going on the right direction at any point from the activity level to task and to the project level. . By implementing EVM project managers will have the up to date information about the project and if there is any problem in the project, the control system can act as an alert signal so that corrective measures relevant to the project are undertaken. EVM is a powerful methodology that gives the project manager and other stakeholders the ability to visualize a project’s status at various points during the project life cycle and consequently manage projects, programs, and portfolios more effectively. This system can help address the performance issues currently experienced in youth funded projects. Project managers need to be trained on project management and how to implement the EVM system in their respective projects.

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