

Impact of Revenue Recognition Methods in Project Cost Control Through Earned Value

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Earned value theory or earned value management (EVM) is a standardized method used to monitor and control projects. It introduces an objective criterion about the status of projects through measures for deviations in costs and schedule. It also permits a quick evaluation of the status of projects with regard to execution timelines, costs, and tasks. EVM can be seen as a unique and simple system that integrates multiple evaluations into a unique reporting system. Through this method, it is possible to monitor and control, in a homogeneous way and using the same methodology, different projects with different timescales, different volumes, or different resource needs.

One of the inputs EVM uses to obtain an indicator about the cost performance of projects is the cost incurred by the project until a certain date. Typically, such information about costs incurred is provided by the finance departments of organizations. If this is the case, the project manager will need to know and understand how the finance department is calculating and measuring these incurred costs.

This paper reviews the different methods that can be used by the finance departments to calculate and measure the incurred costs in projects, and how these methods may impact

the way the project manager applies the EVM to measure, control, and track the status of his or her project.

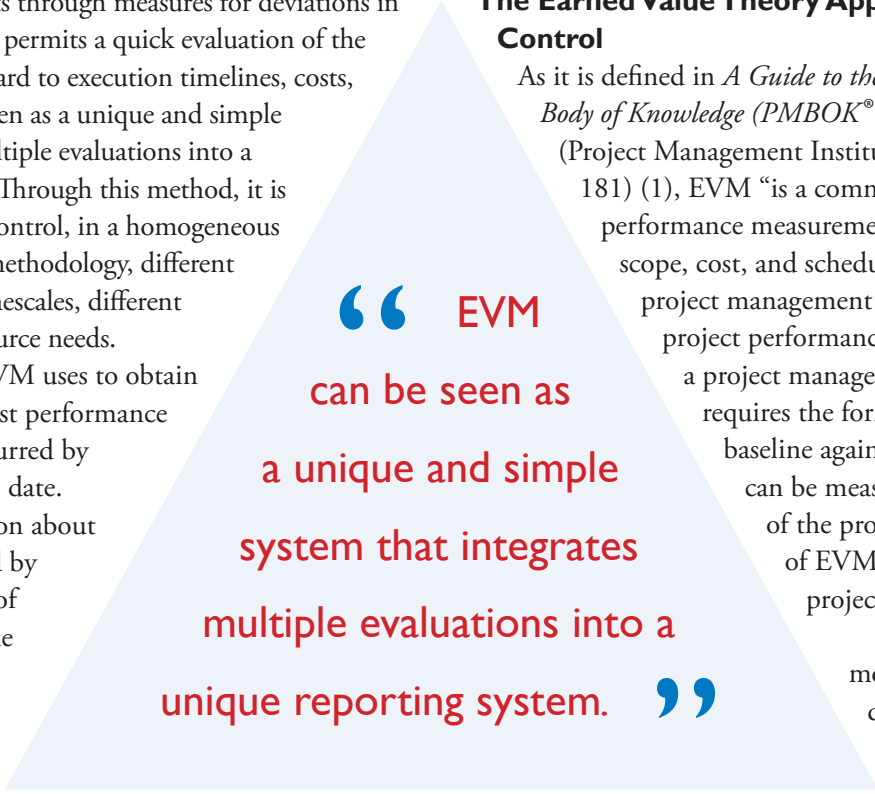
The Earned Value Theory Applied to Project Cost Control

As it is defined in *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)*—Fourth edition (Project Management Institute [PMI], 2008, p. 181) (1), EVM “is a commonly used method of performance measurement. It integrates project scope, cost, and schedule measures to help the project management team assess and measure project performance and progress. It is a project management technique that requires the formation of an integrated baseline against which performance can be measured for the duration of the project. The principles of EVM can be applied to all projects, in any industry.”

EVM defines and monitors three key dimensions, which are defined in the *PMBOK® Guide*—Fourth edition (Project

Management Institute [PMI], 2008, p. 182) (1) as follows:

- Planned value (PV) “is the authorized budget assigned to the work to be accomplished for an activity or work breakdown structure component.”



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- Earned value (EV) “is the value of work performed expressed in terms of the approved budget assigned to that work for an activity or work breakdown structure component.”
- Actual cost (AC) “is the total cost actually incurred and recorded in accomplishing work performed for an activity or work breakdown structure component. It is the total cost incurred in accomplishing the work that the EV measured.”

One of the indicators introduced by EVM is the cost performance indicator (CPI), defined as $CPI = EV / AC$. As has been seen, this indicator compares the EV (or the planned value of work performed) with the AC (or the cost actually incurred in the work performed). This indicator is considered the most critical EVM metric, as it measures the cost efficiency for the work completed. A CPI value greater than 1.0 indicates a cost underrun of performance to date.

Planned value of work performed (EV) will have to be calculated by the project manager during the executing phase, taking into account the planning of costs (PV) done in the planning phase; and applying those planned costs (approved budget) to the work actually performed. On the other hand, figures for the cost actually incurred in the work performed (AC) will usually be provided by the finance department during the executing phase. And the finance department will measure the project’s costs using a revenue recognition model.

So, in order to do a meaningful comparison between EV and AC to obtain the CPI, both values must be referred to the same reference. That is, there must be a correspondence between the way incurred costs are measured in the executing phase, with the way costs were planned in the planning phase. As it is the responsibility of the project manager to monitor and control the project execution, and the responsibility of the finance department to report the incurred costs, the challenge here for the project manager is to know and understand how the finance department will be measuring the costs actually incurred in the project during the executing phase. This requires early involvement of the project manager with the finance personnel in the planning phase of the project.

Definition of Revenue Recognition

Revenue recognition is the process of recording an item in the financial statements of the company when earned, regardless of when cash is received or paid out. This means that revenue recognition is independent of cash flow, even though revenue recognition could influence and be influenced by cash flow.

Why is revenue recognition able to influence and be influenced by cash flow? Because at some point in time, and depending on the payment and collection terms and conditions,

recognized revenue will have to be collected (cash in), and recognized costs will have to be paid out (cash out). In an unbalanced situation between recognized revenue (or recognized sales) and collection for those sales, and recognized costs and payments for those costs, it could happen that a company is performing well from the recognized revenue (or recognized sales) point of view, and at the same time be undergoing if that company is not able to collect the cash of those recognized revenue or sales. That is why, in order to understand the real situation of a company, it is necessary to pay attention not only to its financial statements (costs and sales), but also to the company’s treasury situation (cash in influenced by collectability; and cash out influenced by payments).

To return to the definition of revenue recognition: revenue recognition allows revenues to be recognized (a) when revenues are realized or realizable and (b) when revenues are earned (2, 3):

- a. Revenues are realized when products are exchanged for cash or claims to cash; and revenues are realizable when related assets received are readily convertible to cash or claims to cash.
- b. Revenues are earned when the products are delivered, or when services are performed.

Revenue recognition process has become an extremely critical (and expensive) process for companies at the United States stock exchange markets since approval of the Sarbanes-Oxley Act in 2002. This law was promulgated after several scandals in North American companies in 2001. One of the primary goals of this law is just to ensure that companies are reporting accurate revenue numbers (4).

According to the United States Generally Accepted Accounting Principles (US GAAP) revenue generally is realized (or realizable) and earned when all of the following criteria are met (2, 3):

- 1. Persuasive evidence of an arrangement exists.**
Normally, through contracts, purchase orders or any other legal document establishing contractual obligations between the parts.
- 2. Delivery has occurred or services have been rendered.**
Criteria to determine if delivery has occurred or services have been rendered will depend on the type of contract or agreement between the parts, i.e., sell of a product, service, construction, leasing, intellectual property, etc.
- 3. The seller’s price to the buyer is fixed or determinable.**
Here, there are factors that can lead to variable pricing, such as factors in the customer’s control, factors in the seller’s control, factors in control of third parties, or factors based on external indexes.

4. **Collectability is reasonably assured.** If it is not reasonably assured, revenue shall be deferred until collection becomes more certain or it finally occurs.

The Revenue Recognition Process

The application of the revenue recognition process can be described through the following steps:

1. **Identify the arrangement,** where an arrangement is defined as the result of the complete negotiations between the parts.
2. **Identify the deliverables,** where a deliverable is defined as any performance obligation of the seller to the buyer, as per the arrangement terms.
3. **Identify the elements,** where an element is defined as the individual deliverables or combinations of deliverables within an arrangement. An element is defined as a combination of deliverables when the functionalities of services or products are dependent on each other or do not have value to the customer on a standalone basis.
4. **Identify the units of accounting,** where a unit of accounting is defined as the level at which revenue and costs are recognized.
5. **Identify applicable accounting guidance.** This refers to the legal considerations to take into account or internal policies to be applied to the revenue recognition process.
6. **Revenue recognition conclusion,** where revenue recognition methods are applied to units of accounting. The basic revenue recognition criteria defined in the previous section must be met before revenue can be taken.

Consider, for instance, a project where a company must deploy a new cellular network for a telecom operator. Suppose the project is a turnkey project, where the performing company must build a number of sites in a certain period of time to expand the existing network of the telecom operator. In that period of time, the performing company will be in charge of the acquisition of sites, of the civil works, of the installation of equipment, of the integration of the new sites in the telecom network, and of the maintenance of the sites. Suppose also that the contract establishes that the seller will only send invoices to the buyer in a per site basis, as sites are being completed.

Under this example, application of six steps defined above could be as follows:

1. **Identify the arrangement.** In this case, the arrangement could be a detailed description of the terms and conditions described in previous paragraph.
2. **Identify the deliverables.** In this example, at least three different deliverables are found:

- Deliverable #1: The telecom equipment.
 - Deliverable #2: The full turnkey services, including acquisition of sites, civil works, installation of equipment, and integration of the new sites in the telecom network.
 - Deliverable #3: Maintenance of the new sites for a period of time.
3. **Identify the elements.** In this case, two first deliverables described above could be merged in a single element, as long as they depend on each other.
 - Element #1: Combination of deliverables #1 and #2, i.e., full turnkey services plus the telecom equipment.
 - Element #2: Maintenance of the new sites for a period of time.
 4. **Identify the units of accounting.** In this example, units of accounting could be directly linked to the elements defined in previous step.
 5. **Identify applicable accounting guidance.** As in the definition above, this refers to the legal considerations to be taken into account or to the internal policies to be applied to the revenue recognition process.
 6. **Revenue recognition conclusion.** This refers to the revenue recognition methods that will be applied to the units of accounting previously defined.

In the six-step process above:

- Steps 1 through 4 should be done before (or at least, should be taken into account during) the planning phase. This means that the project manager, during the planning phase, should understand how the revenue (and hence the gross profit, and the incurred costs) of his or her project will be calculated by the finance department during the executing phase. This requires an early involvement of the finance department in the planning of projects.
- Step 5 falls under the responsibility of the finance department in the sense that the finance department should take into account the legal considerations and the internal procedures to apply in order to measure incurred costs and to calculate revenues and gross profit for projects.
- Step 6 is performed during the execution of the project (during the executing and monitor and control phases), and provides one of the inputs that the project manager will use as part of the EVM.

Revenue Recognition Methods

Several revenue recognition methods can be found in the different bibliographical sources. Normally, they are classified

depending on the moment during the project when the revenue is recognized. Some of these methods can be found in (5):

a. Revenues recognized at delivery

As a general rule, revenue from selling inventory should be recognized at the point of sale. This is, for instance, the case in selling products or hardware equipment where, depending on the terms and conditions of the contract, the seller recognizes the revenue at the moment that the equipment leaves the seller's warehouse or when the equipment reaches the buyer's warehouse.

In the example introduced in previous section about the deployment of a new cellular network for a telecom operator, if telecom equipment (deliverable #1) were independent from turnkey services (deliverable #2), this revenue recognition method could be applied to the equipment.

In general, this revenue recognition method where revenues are recognized at delivery is more related to the selling of products or goods than to projects. In any case, from the application of EVM point of view, if this method is applicable, the project manager will have to consider in the planning phase how the items or products related to the project will be delivered during the executing phase. By doing things in this way, it will make sense to compare actual costs (AC) with the earned value (EV) and hence, to calculate CPI.

There are some exceptions where revenues should not be recognized at the point of the sale:

- **Buy-back agreements:** Buy-back agreement means that a company sells a product and agrees to buy it back after some time. In this situation, the inventory remains on the seller's books. In other words, there is no sale or revenue to recognize.
- **Returns:** Companies which cannot reasonably estimate the amount of future returns, and/or have extremely high rates of returns, should recognize revenues only when the right to return expires. Those companies that can estimate the number of future returns, and have a relatively small return rate, can recognize revenues at the point of sale, but must deduct estimated future returns.

b. Revenues recognized before delivery

These methods are typically used in long-term contracts (longer than one year) such as construction projects, manufacturing, development, defense, telecom network deployments, etc. These contracts must allow the builder (seller) to bill the purchaser at various parts of the project.

Some specific examples of revenue recognition methods where revenue is recognized before delivery are:

- **Percentage-of-completion (PoC):** If (1) the contract clearly specifies the price and payment options with

transfer of ownership, (2) the buyer is expected to pay the whole price of the contract, and (3) the seller is expected to complete the project, then revenues, costs, and gross profit can be recognized each period based upon the progress of construction (that is, percentage of completion).

Application of this method requires a careful planning, measuring, and tracking of costs throughout the duration of the contract. It allows revenue to be recognized throughout the performance of the work (instead of being deferred until the completion of the contract), and cannot be used if reliable estimates (and ability to track performance against those estimates) do not exist.

Provided that PoC criteria is met, progress of construction will usually be measured through internal milestones. For instance, in the example introduced in the previous section about the deployment of a new cellular network for a telecom operator, PoC could be applied to element #1, defined as the combination of deliverable #1 (telecom equipment) and deliverable #2 (turnkey services).

In this case, milestones used to measure the progress of the project could be, for instance, number of signed contracts with land owners, approval of technical projects, installation of telecom equipment, sites integrated in the telecom network, and sites with final acceptance signed off with customer. All of these milestones could be associated with a percentage of the total cost of each site and the performing company could recognize its costs based on the achievement of those milestones. Once costs are recognized, revenue will be calculated (as well as recognized) as those recognized costs plus the estimated gross profit for the project. This is why it has been said that this method can only be used if there are reliable estimates for the gross profit that the project will generate.

So, in order to apply EVM with PoC, in the planning phase it will be necessary first to define the internal milestones that will be used to measure progress, and second, to do the planning and scheduling of the project in accordance with those milestones. In the Executing and Monitor and Control phases, it will be necessary to measure and record the progress of the project against those internal milestones. In this way, it will make sense to compare actual costs (AC) calculated through PoC with the earned value (EV) and hence, to calculate CPI.

The main problem of this method occurs when there is not a one-to-one link between the internal milestones used by the performing company to recognize its costs (and the associated revenue measured as costs plus estimated gross profit), and the milestones used by the performing company

to invoice the customer. This situation could lead to a cash problem in the performing company if there is an unbalanced situation between the cash in and cash out. For instance, this situation could happen in the example of the deployment of a new cellular network for a telecom operator. In this situation, it has been said that the performing company will recognize its revenue based on its incurred costs according to certain milestones as works progress (this will influence the cash out, from the seller point of view). However, it has also been said that the performing company is only allowed to invoice the customer as sites are being completed (and this will influence the cash in, from the seller point of view).

- **Straight line method:** This method can be seen as a particular case of PoC. Under this method, revenues, costs, and gross profit for a project are linearly distributed over the duration of the project. This method is mainly used in maintenance contracts or customer support projects where the value of the contract (and its costs) are known beforehand and are evenly distributed over the period of the contract.

For instance, in the example introduced in the previous section about the deployment of a new cellular network for a telecom operator, straight line method could be applied to element #2 consisting of deliverable #3, which is the maintenance of the new sites for a period of time. Note here in this example that the performing company will recognize revenue based on element #2 (because maintenance has a value to the customer on a standalone basis), even though the performing company will not invoice the customer for this concept (as per the contract terms described in the previous section).

Once an element where the straight line method can be applied has been identified, the application of EVM is quite simple, provided that costs are properly estimated in the planning phase. If this is the case, those costs will only need to be evenly distributed over the project duration and they will be recognized in the same way during the executing and monitor and control phases, leading CPI to be equal to 1.

- **Completed contract method:** This method should be used only if PoC is not applicable or if the contract involves extremely high risks. Under this method, revenues, incurred costs, and gross profit are recognized only after the project is fully completed. This means that incurred costs during the project are deferred by the finance department until the completion of the contract, and they are recognized only at that point.

For instance, this method is typically used when the delivered product is software. Consider, for example, a

project consisting of the activation of a new software feature for communications in the cellular network of a telecom operator. This could be an example of a project of several months' duration where all of the revenue will be recognized only at completion of the contract. Why? Because it makes sense to consider that the contract is completed only when the new feature is ready for the whole network of the telecom operator, and not when it is only partially ready.

So, from the EVM point of view, in order to not be blind about the status of the project until the end of the project (after waiting for the actual costs provided by the finance department), the project manager will need to keep a separate accountability about the incurred costs as the project goes by. By doing it in this way, and having used the same criteria in the planning of those costs, it will make sense to calculate the earned value (EV) and to compare it with the deferred costs in order to have a meaningful CPI value.

c. Revenues recognized after delivery

In those cases where the collection of receivables involves a high level of risk, or where there is a high degree of uncertainty regarding collectability, a company must defer the recognition of revenue.

There are three methods that deal with this situation:

- **Installment sales method:** This method allows recognizing proportional gross profit on cash collection. For example, if a company collected 45% of total product price, it can recognize 45% of total profit on that product.
- **Cost recovery method:** This method is used when there is an extremely high probability of uncollectible payments in exchange to the sell of a product or service. Under this method, no profit is recognized until cash collections exceed the seller's cost of the merchandise sold.
- **Deposit method:** This method is used when the company receives cash before sufficient transfer of ownership occurs. Revenue shall not be recognized because the risks and rewards of ownership have not transferred to the buyer.

From the EVM point of view, these methods have the same limitations as the completed contract method. That is, information about actual costs provided by the finance department cannot be used to track the status of projects because the finance department will defer (totally or partially) the recognition of incurred costs till the end of the project. So, as in the completed contract situation, the project

manager will have to keep a separate accountability about the incurred costs as the project goes by. By doing it in this way, and having used the same criteria in the planning of those costs, it will make sense to calculate the earned value (EV) and to compare it with the deferred costs in order to have a meaningful CPI value.

Possible Conflicts Between Operations and Finance Departments

Because of the ways in which the different revenue recognition methods can impact and influence the application and utilization of EVM in project cost control, some conflicts may arise between the operations department and the finance department.

On the one hand, for the operations department, goals are typically defined per project. This means that each project manager will be responsible for the accomplishment of the goals for his or her project, and the operations director will be responsible for the accomplishment of the project goals for the different projects under his or her responsibility. Typical examples of goals for the operations department are based on:

- Revenues or sales
- Costs
- Gross profit

On the other hand, goals for the finance department are typically defined for the set of projects within the company. In this case, the finance director will be responsible for the accomplishment of the financial goals for all the projects within the company. Examples of goals for the finance department can be:

- Cash generation
- Financing needs

So, where could a possible conflict arise? Well, consider for instance the application of PoC. It has been seen that under this revenue recognition method, revenues can be recognized as recognized cost plus estimated gross profit. So, the goal for the operations department based on revenues or sales directly depends on the recognized costs (i.e., the more costs are recognized, the more revenue the project generates). And the more costs are recognized, the less cash will be available for the company in the short term, depending on the payment terms and conditions (or the financing needs for the company will be higher), which plays against the typical goals for the finance director.

Consider again the example of the long-term telecom deployment project, where the performing company has to build for a customer (telecom operator) a number of

sites at which to install telecom equipment for cellular communications. Suppose that the performing company decides to use PoC as revenue recognition method. Under this method, costs (and gross profit, and revenue) will be recognized by the performing company as works go on. The physical evidence that allows the performing company to recognize its costs will be based on the invoices received from its subcontractors doing the work. Remember that the customer (the telecom operator) only allows the performing company to invoice once sites are completed.

In this example, the project manager of the performing company will meet the project goals based on revenue, sales, or costs, as the project goes on, independently if the sites are fully completed or not. That is, part of the revenue will be recognized based on the number of initiated sites and on their progress, and will not be affected by the number of finalized sites. On the other hand, this project will only generate incomes (cash in) for the performing company when sites are finalized. So, it could happen that the project manager will be achieving his or her sales goals just with the initiated sites (even if they are just initiated, not completed). In this situation, cash will only be going out from the performing company as long as project costs are recognized based on progress, and the way to recognize those costs is by allowing subcontractors to invoice the performing company for the works partially completed. In this case, there will not be incomes (cash in) from the customer, as long as sites are not fully completed. If this situation were not acceptable for the finance department, the finance director could order not to initiate new sites (which would play against the goals for the project manager), and just dedicate resources to complete the already initiated sites, in order to reduce the financing needs of the performing company and to get incomes (cash in) from the customer.

Conclusion

- Revenue recognition is the process of recording an item in the financial statements of the company when earned, regardless of when cash is received or paid out. This means that revenue recognition is independent of cash flow, even though it could influence and be influenced by cash flow.
- In order to apply EVM for the project cost control, if the project manager is going to use the data provided by the finance department about project incurred costs, he or she must take into account that those costs are probably calculated through a revenue recognition method, so they will be “recognized” costs.
- So, during the planning of project costs (planning phase), the project manager will need to know (and take into

account) the method that will be used to recognize those project costs during the executing phase (executing and controlling phase). For this reason, an early involvement of the project manager with the finance department is needed.

- During the executing phase, the project manager will have to be ready to cope with possible conflicts between the project goals (set by the operations department) and the finance goals.

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Since 2007, he has been combining his career at Motorola with teaching fundamentals of project management at AEDE Business School in Madrid, Spain. He is also a regular collaborator of the PMI Madrid Chapter, where he has given conferences about revenue recognition and project cost control through earned value.