CHAPTER

3.7

Cost Accounting Seeks Real-Time Information and Improvement

The well-organized worksite and good housekeeping aided productivity of the foundation wall installation for the Wheaton Bible Church.

Cost Accounting Seeks Real-Time Information and Improvement

Project management seeks record keeping that is achievable with available personnel

The term *managerial accounting* is used in general business, *cost accounting* more frequently in manufacturing, and *job costing*, *job cost accounting*, or *cost engineering* in construction. The objective is the same, but the emphasis and details differ by industry. All seek to answer the following questions:

What is the intended project outcome?
What have we done to date?
What are we doing right now?
What is the impact of our performance on the intended outcome if nothing is changed?
What can we change to better achieve the project outcome?

Cost Accounting Detail and Importance Varies by Industry

Cost accounting is more precise and complicated in manufacturing than in construction

Manufacturing cost accounting seeks to determine the cost of a single manufactured part in a continuous production run. Variable operating costs of equipment types and labor groups, and different acquisition costs for batches of inventory all must be considered. And the selection of inventory group costs can also help manage taxable income. Cost accountant can be a full-time career job in these industries.

Although construction does not have this complexity, it can be useful to know this difference when constructing a building for a manufacturing owner. If construction cost data is shared, construction data, without explanation, could appear weak and lacking detail.

Many industries do not use cost accounting at all

Many industries, such as banking, insurance, telecommunication, and government, rarely attempt to use job costing. The project management concept of "earned value"—which requires job costing data—is completely foreign and incomprehensible to those who do not keep records in this manner. A lighter presentation of job cost data may be more appropriate when communicating job cost information in these industries.

Construction job costing is more focused, but timing is crucial

Construction projects have no inventory—material is delivered to the job site for a specific intended use—so costing of inventory batches is not needed or done. Also, unlike manufacturing, which is a continuous process, a construction project has a defined start and end date. This makes both timing of observations and correction of deficiencies more important for the project.

Financial accounting records historical data but uses time frames that are too long for job costing. For example, financial accounting payroll costs may not be accurately known for a year, and financial accounting of equipment costs including lease, or purchase and financing costs, and tax implications have a multi-year view. Job costing requires weekly payroll and equipment costs, so estimated hourly costs must be used. Presentation of these estimated costs to the project owner can be troublesome and requires management attention as discussed below.

Job costing involves accounting but also requires engineering judgment. Determination of the portion of work correctly and finally completed requires a theoretical understanding of construction plans, specifications, and engineering principles—coupled with a practical field understanding of construction

means and methods. This determination can be done by a skilled project manager or, on larger projects, by a cost engineer.

Combining accounting data and engineering judgment in a project management system assists understanding, management, and control of outputs. The level of detail, report form, and the method and timing of inputs varies hugely by project size, type, and availability of skilled personnel as discussed below.

Consistent accurate observations are key—and must match the capabilities of assigned personnel

Accurate observations recorded in the same way for the entire project are needed to produce reliable information. So, any job costing system must work within the capabilities and tendencies of the personnel continuously assigned to the project. Small projects staffed with a few or only one capable manager may require simple infrequent data entry into cleverly structured and organized job costing systems. Larger projects that can justify full-time cost engineers may use more robust systems with greater detail. One system does not fit every project—the selected system must match the capabilities of the available personnel or the results will be unreliable and unusable.

Organization Consistent with Both Accounting and Project Management is Needed

Reuse the WBS (work breakdown structure) from the cost estimate and alter slightly to accommodate data entry needs

Standard cost code systems

Building construction estimating overwhelmingly uses the CSI's (Construction Specification Institute) MasterFormat system. Power plants, heavy engineering such as dams, process plants such as oil refineries, and road construction find the CSI system provides insufficient detail for their most important and costly work items. These industries may borrow from the CSI system and add their own categories, or may develop a completely new system. But none of these systems have achieved the rigorous structure and wide acceptance of the CSI system.

One of these cost systems will be used for the organizational structure of the estimate—including the level of sub-detail necessary and appropriate for the project. This cost structure should be used in the job cost accounting system as well. This ensures that the planned task values are the executed and evaluated values and saves time and effort—while minimizing error.

A small extract from a quantity survey and cost estimate for gypsum framing and drywall shows the form of the labor and material cost data in the estimate.

QUANTITY SURVEY AND PRICING FOR: GYPSUM FRAMING, DRYWALL

PROJECT NAME:	Sample Project					DIFFICULTY OF PROJECT		1			PREPARED ON:	Sample Date			
PROJECT OWNER:	Sample Owner					DIFFICULTY OF WORK ITEM		1			REVISED ON:	No Revision			
PROJECT ARCHITECT:	Sample Architect					MH TO DOCK ONE WAY:		0.08			WASTE:	5%			
SALES TAX:	9.00%														
COST PER SF:	$3.64										TOTAL COST FOR GYPSUM FRAMING, DRYWALL:				$39,488.31
% OF TOTAL:	1.50%													SF IN PROJECT:	3877
		TOTAL LF OF PARTITION			796										
		LF OF PARTITION PER 100 SF:			21										
			GYPSUM TOTAL		15374	SF									
DESCRIPTION	L	W	H	QUAN.	UNIT	LABOR UNIT $	LABOR UNIT MH	LABOR COST	LABOR MH	MAT UNIT $	MAT COST $	TRASH COST $	ITEM TOTAL		
WALL 3-5/8", 25 GA, 5/8" GYPSUM X FULL HEIGHT INSULATED															
				48	LF										
	48		14	672	SF										
	0		0	0	SF										
	0		0	0	SF										
	0		0	0	SF										
	0		0	0	SF										
TRACK (RUNNER)				96	LF	$3.17	0.0455	$304.32	4	$0.45	$43.20				
METAL STUD				672	LF	$0.87	0.0125	$584.64	8	$0.57	$383.04				
INSULATION				672	SF	$0.87	0.0125	$584.64	8	$0.26	$174.72				
GYPSUM DRYWALL				1344	SF	$1.09	0.0157	$1,464.96	21	$0.30	$403.20				
ANCHORAGE											$58.77				
SUBTOTAL								$2,938.56	42		$1,062.93	$0.00	$4,001.49		

Project and company specific codes

Companies may seek to classify expenditures both for job costing and for nonproject management purposes, such as evaluation of profitability of all company projects by project type or geographical area. Additional cost codes may be added for this purpose. A few examples are listed below.

Project number. The numerical project identification.

Project initiation date. The year the project was started.

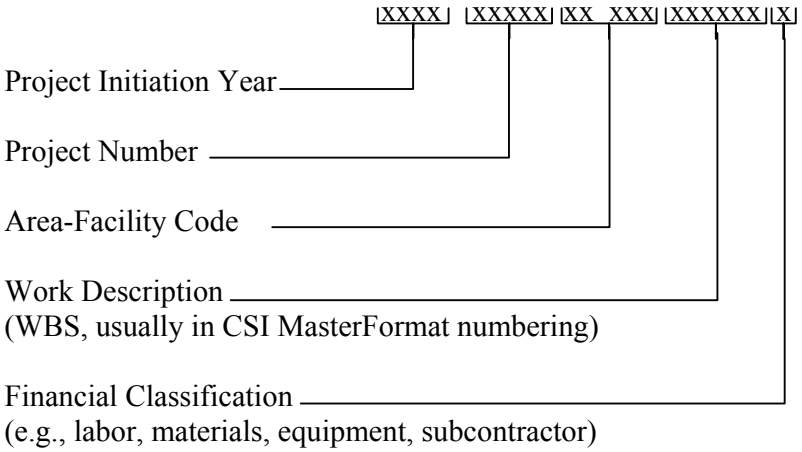
Area facility code. Subdivision of a larger project into identifiable, useful subcomponents. For example, on a project consisting of eight buildings, each building could be assigned an area facility code. Codes for each floor of a high-rise are also common.

Project type. Identifies unique project types such as building, highway, or power.

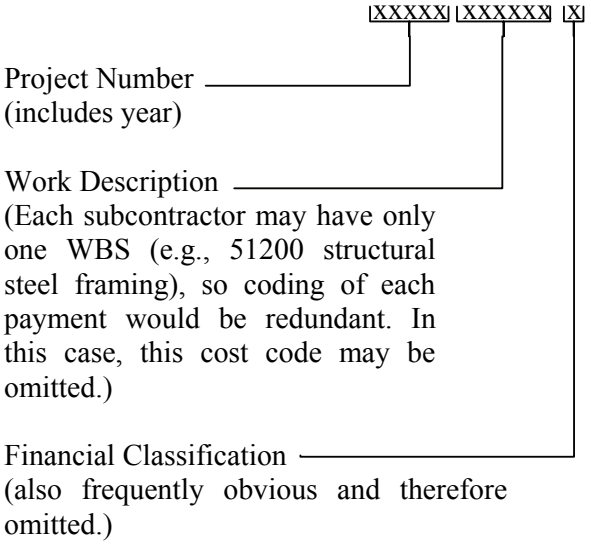
Work description A numerical code, usually in the CSI format, that identifies each task's work type such as concrete, masonry, or structural metals.

Financial classification. A numerical identification of the categories of labor, material, equipment, and subcontract costs.

There is no standard format for these codes, but a sample for a larger project is shown below.



A smaller project might abbreviate this cost coding system as shown below.



For small companies and projects, job cost codes entered by field personnel may be reduced to just a job number. This reduces effort of the field personnel but does not eliminate the coding. The office accounting personnel still code each payment.

Two weeks is a magic number

80 work hours is the suggested maximum task duration by the Project Management Institute, a respected project management authority. The 1-week midpoint is consistent with the usual maximum time horizon of a working foreman. And trade payroll and most material expenditures are paid and recorded weekly.

So, when these expenditures are recorded in 1 week, a week still remains to correct productivity deficiencies. The limits of accounting and management capabilities make a week the smallest achievable "real-time" interval. Comparing estimated and planned expenditures at these short durations makes variations crystal clear.

Documenting the Inputs

Much accounting, with some management judgment

Material financial accounting data can be used in job costing with limited adjustment

Invoices for basic materials such as lumber, concrete, and gravel are billed at the time of shipment. Payment is regularly due in 30 days, but prompt payment discounts, such as a 2% discount for payment in 10 days, are frequently offered. These expenditures can be accurately used in both financial accounting and job costing. However, if materials that will not be installed within a month are delivered, a temporary manual adjustment in material completed will be needed, as described below.

Labor costs are recorded weekly using estimated hourly unit cost

Trade labor is paid weekly, but the total costs of labor burdens are paid at irregular longer intervals, so weekly accounting costs are an unsatisfactory representation of actual labor cost. Estimated burdened labor hourly unit costs are required to approximate total short and long-term costs. For labor cost, the financial accounting and job cost entries differ.

Equipment costs should use an estimated hourly cost as well

Equipment may be purchased for cash, purchased and financed, or leased, and each of these acquisition methods has a different tax and accounting consequence. And the timing of each of these transactions is far different than the progress of the project. It is best to establish and use a calculated hourly equipment cost that fully reflects total ownership and maintenance costs. Again, the financial accounting and labor cost entries differ. (The tax benefits of ownership are too complex to be included in the calculated hourly rate. These tax savings then become a source of hidden profit.)

Subcontractor costs should be documented with change order management

Subcontractors agree to perform a specific scope of work for a specific cost. If the owner alters the agreed scope, the agreed cost will be altered as well, and there will be no budget over-run. If the subcontractors are managed well and no unjustified cost changes (that will not be reimbursed by the owner) are requested, the initial cost, plus approved changes, becomes the final cost and the anticipated profit remains unchanged.

Subcontractors usually bill monthly less 10% retention and expect payment within 30 days. The billed amount may imperfectly correspond to the work completed, and the retention and the payment time delay make actual expenditures a poor representation of work completed to date. Careful monitoring of change orders and documenting any subcontractor change orders that are approved but that are reimbursed by the owner will show subcontractor cost variation. Once again financial accounting and job cost accounting entries differ.

Job costing indirect costs use estimates also—discussion and agreement are required

The complexity of payment terms and differing time frames exceeds the patience of most

Indirect costs—cost for necessary efforts that do not become part of the permanent building—such as management and supervisory time, over-the-road vehicle expense, and general company insurance—can and should be job costed. All expenses related to the execution of the job should be job costed to identify the real total cost of the effort. This is definitely necessary under construction management or time and material contracts to capture all expended costs. The statement of home office overhead can help clarify the office-project cost distinction. If it is not on the office overhead schedule, it should be job costed.

The costs for full-time on-site activities are rarely controversial. But off-site activities, such as a project manager located in the home office but working on project matters or on-road vehicles that leave the site, can raise owner objections. Home office supervisory and clerical support, as well as general company insurance, are usually controversial. Clear definition in the original contract negotiations is the only solution.

Finally, small tools and equipment are commonly assigned to a tool crib on the job or to a specific crew. Costing of these tools as a percentage of labor is most common, but, with great effort, each individual tool can be identified and job costed. This is more common on time and material projects where all costs are reimbursed. This reimbursement can be a source of hidden profit. (The hourly tool cost is calculated with an assumed tool life. If careful use and maintenance extends the tool life, reimbursement then becomes profit.)

These indirect costs consist of material, labor, and equipment, so have the same job costing complexities described above. The estimated unit costs must be established at the project start and communicated to the project owner (for CM but usually not lump sum hard bid projects).

Good Job Cost Reports Require “Real World” Data Entry

Labor distributions attempt to measure expended labor for each task in the estimate

Labor expenditures are key to productivity and cost management. One approach is to export the very detailed WBS line by line from the cost estimate to form the labor data entry framework. Trade labor is then required to distribute their work hours into these categories on their time cards each day or week. An abbreviated sample appears below.

DAILY LABOR DISTRIBUTION REPORT

Sample CM Company

Date of Work: Sample Date
Prepared by: Sample Signature (Signature)
Approved by: Sample Signature (Signature)
Job No.: Sample Number
Job Name: Sample Name
Job Address: Sample Address
Job City, State: Sample City, State
Area - Facility: Warehouse

Work Hours by Cost Code

Employee No.	Employee Name	Time Code	Craft Or	31100 Concrete Forming	32100 Concrete Reinforcing	33100 Concrete Placing	33500 Concrete Finishing	38100 Concrete Cutting		Total Hours ST	Total Hours 1-1/2x	Total Hours 2x
				Hours	Hours	Hours	Hours	Hours	Hours			
1	Name 1	ST	15	4	4					8	0	0
		1-1/2x										
		2x										
2	Name 2	ST	10			8				8	0	0
		1-1/2x										
		2x										
3	Name 3	ST	10		2	6				8	0	0
		1-1/2x										
		2x										
4	Name 4	ST	10			8				8	0	0
		1-1/2x										
		2x										
5	Name 5	ST	14				8			8	2	1
		1-1/2x					2					
		2x					1					
		ST								0	0	0
		1-1/2x										
		2x										
		ST								0	0	0
		1-1/2x										
		2x										
		Totals		4	6	22	11	0	0	40	2	1

One problem with this approach is definition of terms. The terms from the estimate that now appear on the labor distribution are not defined and are frequently unclear. (The sample daily labor distribution report describes cost codes in words and number. In the real world, only numbers are commonly used.) Tradesmen will seldom exhaustively study all the plans when installing the work as the estimators did when preparing the estimate.

Another problem is that data entry is not contemporaneous. Tradesmen do not carry their time cards at all times, so data entry occurs daily or weekly. Multiple labor distribution work items may be performed at the same time (e.g., embeds may be attached to the forms as the forms are installed), so segregation of man-hours is unreasonable. When precise labor hours expended for undefined terms such as *edge form*, *set anchor bolts*, and *set embeds misc.* are to be recorded on time cards on Friday afternoon, the tradesmen frequently just guess and write down approximations, so they can go home. Unreliable data placed in a precise format produce unreliable information of little value.

The level of detail sought by a labor distribution can only be consistently achieved if cost engineers, not tradesmen, monitor the work and record results.

Accurate records of completed work in 2-week maximum task duration produce better results

Less precise but more accurate observations are key

Costs are recorded with this approach for all tasks for the entire project—no segregation by WBS task is attempted. Material costs are entered as invoiced. (If significant material is preordered, temporary manual adjustment may be needed.) The percent completed should be determined by the project management staff who will have access and knowledge of estimating terms and costs—so additional detail is available when needed. A very accurate percentage complete for the period and to date for each work item can be calculated using these short durations—weekly final completion of tasks minimizes the need for estimates that can produce bias and error. Confidence in this early accuracy aids timely corrective action.

The project manager should have an expected outcome in mind before inspections. Then, this expected value is compared with the observed and an explanation sought for the variance. After a project manager has repeated this exercise a few thousand times (only a few years' experience is required to reach this number), a feel for the amount of variance can be estimated in about 15 seconds. This is experience, not intuition. And tradesmen will recognize this capability and begin to offer explanations and answer questions that were not asked to defend their work—providing valuable insights about field conditions and attitudes.

Those performing the trade work should record the hours expended for the week—time cards that seek precise segregation of man-hours by task are not attempted. This segregation of duties helps manage the bias of both parties who might tend to show desired, not actual, results. Both can record their entries once a week—which is more realistic than in ½-hour increments expected by a labor distribution—and the results will still be adequate. Weekly observations that are inaccurate by plus or minus 10-25% will tend to cancel and produce overall project accuracy in excess of 95% for a 52-week project. Controlling bias and seeking accuracy over precision is key.

The schedule's task identification should use the WBS from the estimate and from the original project planning. These tasks must be subdivided, if necessary, into 2-week maximum durations so the problems are noticed as early as possible—when corrective action is feasible. An abbreviated job cost report appears below.

Job Cost Report

Division Number	Description	Contract with CO	% Complete	Labor Cost	Labor Overage	Material	Material Overage	Equipment Cost	Equipment Overage	Sub Cost	Sub Overage	Total Overage
1	General Requirements	$19,791	25%	$11,181	-$1,813	$6,310	-$451	$2,300	-$623			-$2,887
2	Earthwork	$41,860	100%							$41,860	$3,620	$3,620
	Demolition	$18,500	100%							$18,500		
	Landscaping	$23,769								$23,769		
3	Concrete	$62,683	83%							$62,683	$1,530	$1,530
4	Masonry	$86,500	90%							$86,500	$890	$890
5	Metals	$5,360	100%							$5,360		
6	Rough Carpentry	$79,215	91%	$42,737	-$7,200	$36,478	-$3,620					-$10,820
	Millwork	$23,339		$21,162		$2,177						
7	Roofing	$36,419	95%							$36,419		
	Fire Stopping	$1,850								$1,850		
	Caulk	$2,960								$2,960		
8	Hollow Metal	$4,390	18%			$4,390						
	Wood Doors	$5,272				$5,272						
	Finish Hardware	$4,688				$4,688						
	Door Hardware	$7,260	14%	$6,991	$182	$269						$182
	Double Acting Doors	$2,666								$2,666		
	Aluminum Framing, Glass & Glazing	$28,900								$28,900		
	Skylights	$2,400	100%							$2,400		
	Metal Cladding	$27,857		$10,640		$17,217						
9	Gypsum Drywall	$39,488	23%	$29,195	-$1,826	$10,294	-$830					-$2,456
	Painting	$34,700								$34,700		
	Fiberglass Reinforced Plastic	$3,913		$1,422		$2,491						
	Acoustic Ceiling Tiles	$14,109		$8,965		$5,144						
	Floor Preparation	$4,300								$4,300		
	VCT	$7,659								$7,659		
	Sheet Flooring	$11,109								$11,109		
10	Specialties	$5,819		$1,582		$4,237						
11	Equipment	$850				$850						
15	Sewer and Water	$12,550								$12,550		
	Plumbing and Process Gas	$58,760	38%							$58,760	$960	$960
	Natural Gas	$5,410								$5,410		
	HVAC	$78,200								$78,200		
	House VAC	$2,500								$2,500		
	Pipe Insulation	$2,860								$2,860		
16	Electrical	$56,839	18%							$56,839	$1,420	$1,420
	Subtotal	$814,635		$133,874		$99,818		$2,300		$578,643		-$7,661
	Overhead	$63,967										
	Total	$878,602										

This approach is the optimal approach that can realistically be achieved for all small and medium, and some large projects.

"Earned Value" Plans and Measures Cost and Schedule Performance Together

Earned value is a planning and measurement tool that integrates scope, schedule, and cost for the life of the project. This requires cost and schedule measurements integrated into a rigorous WBS. The schedule tasks must be resource weighted and driven—the task is assigned resources (that also have a currency cost), and these assigned resources determine the task duration.

Since each task has a currency value, currency values can also be used to monitor schedule progress. It is the integration of schedule and cost planning and management that makes earned value different from the other job costing methods described above.

Earned value was developed by the U.S. military—then slowly moved to the private sector

PERT (originally program evaluation research task, now performance evaluation and review techniques) scheduling was developed after World War II for complex weapon development projects. Since the schedule tasks also represented resources, the schedule and costs (cost is a resource) could be monitored at the same time with similar tools. The U.S. Department of Defense developed C/SCSC (cost/schedule control system criteria) in 1967 for this purpose.

The transfer of earned value methods to the private sector started with the Project Management Institute's inclusion of a mention of earned value in the 1987 edition of the *Project Management Body of Knowledge*—which was developed further in later editions. The American National Standard Institute codified and the Japanese Project Management Association adopted the methodology in 1998.

Because this system is structured, rigorous, labor intensive, and not immediately obvious, the reaction has been lukewarm or hostile. Only a small portion of the construction management community has adopted earned value.

How Earned Value Works—Analyzing Cost and Schedule Together

Part of project planning and execution, not just a control tool

Earned value is a powerful planning and analytical tool that integrates cost and time—two elements of the triple constraint of cost, time, and scope. The use of simple formulas to produce simple variance numbers or indices to express the cost–time relationship eases use and aids understanding.

The WBS schedule and cost from project planning must be used as the basis for earned value analysis. A late add-on of "now that we planned it, let's get a tool to control it" cannot work. Although frequently considered only a control tool, earned value can only work by integrating planning and control for the life of the project.

Inputs, Except "Earned value," Are Similar to Job Costing

The terms for earned value are similar to those for job costing except the term *earned value* itself. The earned value terms and explanation are listed below.

BAC (budget at completion). The budget for the project.

AC (actual cost). The costs expended at a point in time as documented by job cost records.

EV (earned value). The budgeted (currency) value of one or more completed tasks.

BAC × % actually complete

PV (planned value). The planned (budgeted and scheduled) cost for one or more scheduled tasks at a point in time.

BAC × % planned to be complete

CV (cost variance). The difference between actual and expected spending at a point in time.

EV–AC

SV (schedule variance). The difference between actual and expected schedule performance at a point in time.

EV–PV

CPI (cost performance index). How well project performance is meeting cost expectations.

EV/AC

SPI (schedule performance index). How well project performance is meeting schedule expectations

EV/PV

EAC (estimate at completion). The estimate at completion if present performance continues unchanged.

BAC/CPI

ETC (estimate to complete). The projected cost to complete.

EAC–AC

Earning rules must suit the nature of the project

Consistent determination of completion of tasks in progress requires rules. For the early Department of Defense projects, which involved significant risky innovation, a task would only be considered complete when finally complete—no partial credit was given for work in progress (a 0/100 rule). Although this rule recognized the possibility that an innovation might fail, when earned value also determined the amounts to be paid, the rule proved unworkable. A 25/75 rule (25% recognized at task start and 75% at completion) was used as a compromise. Many simple, complex, or fine-tuned earning rules can be developed to suit project requirements—there are no universally accepted standards. But the agreed rules must always be established at start and used for the life of the project.

Since most private construction projects usually have few or no truly innovative components, the tasks are usually recognized as earned when installed—partial payment is allowed for partial completion. Further, mechanic's lien law requires that the amount of payments corresponds to the amount of work installed (improvements to the real estate), so prepayment for work not yet installed is troublesome.

Analysis and Output—Simple Results Produce Useful Clarity

First, numerical measurement, then graphs

These simple measures (all built on job cost records and EV and PV) produce clear and consistent meaning: positive variances and indices greater than 1 are good—indicating the project is under budget and ahead of schedule. Cost variances produce a currency value that is useful for cost projections for a specific project but cannot compare different projects. Indices can compare performance of very different projects.

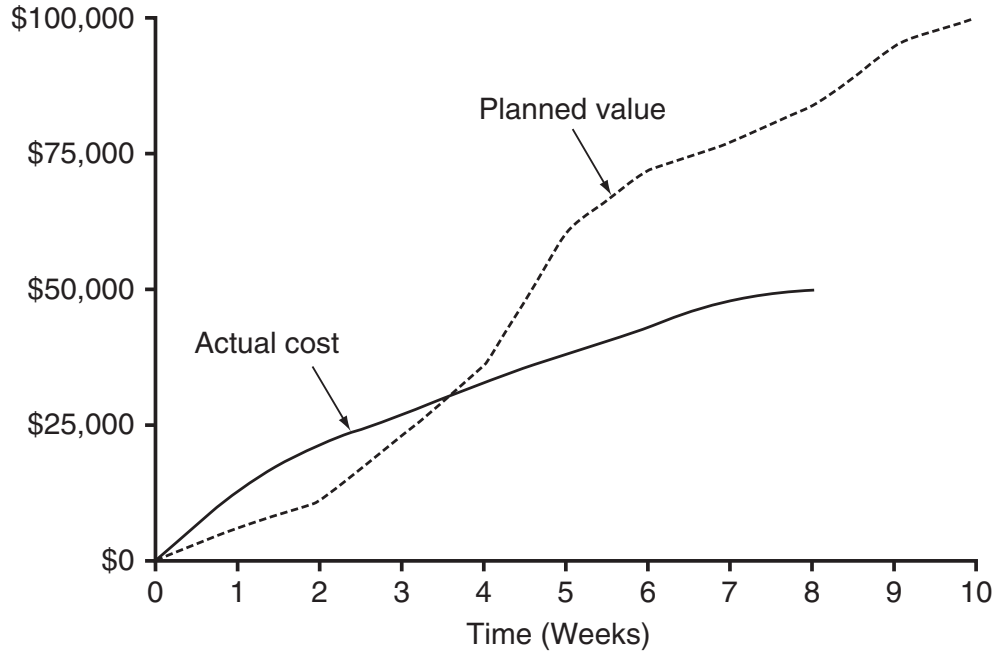
These are the basic building blocks of analysis needed to generate useful output and may be altered to produce more refined outputs such as:

EAC = AC + (BAC − EV)/CPI

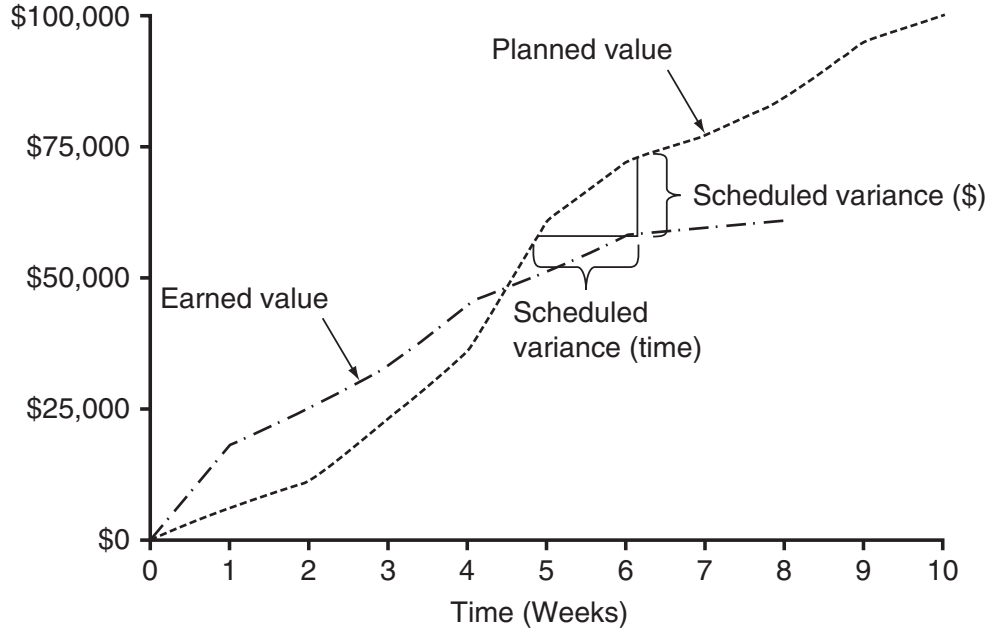
This states: "Actual costs expended to date are facts that cannot be changed. If performance to date continues for the rest of the project, this will be the cost outcome." Segregation of actual cost to date permits identification of different CPIs needed to achieve desired goals. In this way, earned value can be both a reporting system that aids understanding of present conditions and a management tool that aids correction.

Graphical Representation of Earned Value

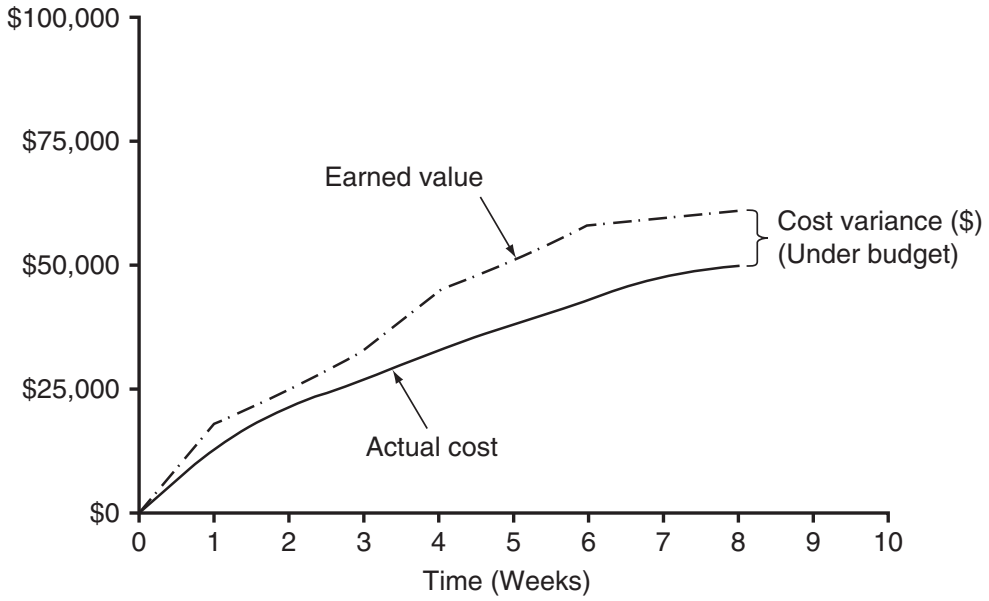
Earned value is frequently illustrated graphically as shown below.



Project tracking without earned value does not conclusively define cost and schedule performance together.



This project is behind schedule.



This project is under budget.

Time is usually shown on the *x*-axis and cost on the *y*-axis. The planned values are plotted using the estimated scheduled values and usually resemble an S curve. (Projects are slow to start, move faster in the middle, and are difficult and slow to finish.) Budget and schedule variations are also frequently noted graphically.

This graphic representation quickly alerts the construction manager to developing problems and opportunities. But the needed quantitative detail showing the size of the problem cannot be determined precisely enough from the graph—which limits the value of the graphing effort.

How Earned Value Is Used in Construction

Two numbers—the CPI and the SPI—can be used from afar by those unfamiliar with the project details to decide to kill a troubled project that cannot be saved. For complex military projects, the project output might be production of a prototype—with production of usable inventory delegated to a future project. If the prototype is troubled, the production will also be troubled, so immediate termination may be a wise decision.

And not only are military projects technically challenging but are also buffeted by the whims of changing elected officials—which compromises planning and correction possibilities. A U.S. Air Force study in the early 1990s found that a CPI at 20% completion does not change more than 10% for the remainder of the project.

However, in private sector construction, there are no prototypes. The cost to demolish or temporarily secure an abandoned project is high, and a completed project will usually have some value—so the voluntary decision to terminate a building project is rare. Private construction also has greater capacity for mid-project correction.

Earned value can also be used to calculate the value of progress payments due—if all parties are on board. Because of the differing accounting systems of subcontractors and project participants who change by project, earned value for payment calculation is not used in private sector construction.

Earned value can be used as a job costing and project management tool for construction projects. However, effective use requires commitment and competence by the owner, construction manager, and principal subcontractors and vendors, which are usually only found on larger multiyear projects. The powerful integration of cost and schedule can provide great benefits, but only if all project participants are capable and willing.

Steeple erection *photo 8 of 15*

Steeple erection *photo 9 of 15*

Smaller or midsize firms may have never used, or even heard of, earned value. But the understanding of the tools and process can aid the decision to begin to use earned value—or avoid it entirely.

Home office management commitment is needed for success

Segregating financial accounting from job costing is essential for real-time management, and this requires home office upper management support. Financial and tax accounting are important, but upper management must tell the comptroller that job cost accounting is important as well.

Field project managers and superintendents must be evaluated by their achievement of job cost targets. Project performance is the goal, and job cost accounting is the report card used to manage and monitor achievement of this goal. Evaluation by other financial accounting standards unknown to and beyond the control of field personnel will damage morale and degrade performance.

Summary

Cost accounting structures records to assist project planning and control. Data collection and organization must be consistent for the life of the project to be credible and useful. This requires selection of a cost system that can be executed by the personnel (who have certain capabilities and tendencies) who will be continuously assigned to the project. Accurate but not extremely precise results produce usable information. Seeking extreme but unachievable accuracy produces nothing.

The cost accounting system and information presented must be tailored to the sophistication of the project owner to maximize communication and understanding. Finally, the CM's firm must understand that financial and cost accounting must be segregated to maximize project performance and control.

Continuing use of the WBS started in the project cost and schedule planning is key. Use of maximum 2-week durations, and weekly accounting data minimize field record keeping and maximize the importance of the project manager's evaluation of the percentage of task completion. Once this structure is established, weekly monitoring can be done with minimal effort. And this is the closest to real-time evaluation possible for small, medium, and most large projects.

Review Questions (True or False)

1. Cost accounting, which has a different focus and purpose than financial accounting, seeks to answer the questions:
   a. What is the intended project outcome?
   b. What have we done to date?
   c. What are we doing right now?
   d. What is the impact of our performance on the intended outcome if nothing is changed?
   e. What can we change to better achieve the project outcome?
2. Hourly unit cost for labor and equipment represent exact financial accounting costs not estimates.
3. Cost codes include a minimum of the project number and WBS work description (usually in CSI format) for small projects, but may also include area or facility code and financial classifications for larger projects.
4. Two-week maximum job cost period for analysis is consistent both with sound management practices and with weekly trade labor payment procedures.
5. Payments for both materials and subcontractors accurately represent work completed and may be used in cost accounting without alteration.
6. Job costing of indirect costs such as management and supervisory time, over-the-road vehicle expense, and small tools and equipment is essential on both hard bid lump sum and construction management or time and material contracts. For construction management or time and material contracts, these indirect costs, if carefully defined during contract negotiations, can be a source of profit.
7. Data for labor distributions (which attempt to segregate payroll hours by detailed cost codes) can be accurately entered by the tradesmen or foreman performing the work.
8. Accurate job cost records can be obtained if those performing the trade work record hours expended for the period and experienced project managers or engineers record work completed for each work item for the same period.
9. Earned value measures cost and schedule performance together.
10. If both the CPI and the SPI are greater than 1, the project is under budget and ahead of schedule.

Test Your Understanding

1. Identify the cost expenditures from the list below that would be included in financial accounting but not cost accounting.
   Material costs
   Income taxes
   Depreciation
   Payment to subcontractors
   Payment and performance bond premiums
   Additional insurance premiums due to year-end audit
2. Using the quantity survey and pricing for gypsum framing and drywall shown earlier in this chapter, calculate the cost for 1 labor-hour. Then, calculate the total labor cost for a work item completed in 40 straight time hours, 2 hours of time and a half, and 1 hour of double time.
3. For a project with the costs and percent completion listed below, determine if the project is under or over budget and ahead or behind schedule by calculating the CPI and SPI.
   BAC (budget at completion) $100,000
   Percent actually complete 60%
   AC (actual cost) $55,000
   Planned percent complete 65%