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eBook

How to Better Measure Investment Costs

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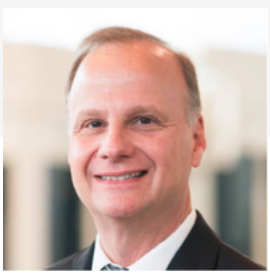
INVESTMENT MANAGEMENT

The only investment-related expense attributable to operations in financial accounting is depreciation expense. However, the backwards-looking focus of depreciation makes its usefulness as a measure in management accounting highly questionable. In addition, the failure to consider the cost of capital in financial accounting seems to imply that owners' investment in an organization is "free money."

PACE Profitability Analytics Framework (PAF) addresses both of these shortcomings by incorporating both a forward-looking Capital Preservation Allowance and a Cost of Capital in investment management. Taking into account these two items can greatly enhance organizations' return on investment. Read this eBook to learn how.

"Organizations need to rethink how they approach investment management. PACE's eBooks can show them how to do so."

Raef Lawson,
Executive Director, PACE





PRESERVING THE INVESTMENT BASE

Depreciation expense has long been considered a gauge as to how well an organization is preserving its existing investment base. A business whose annual capital spending is equal to its depreciation expense is thought to be spending enough to preserve the capital required to support its existing level of business into the foreseeable future. Although that might be a convenient and available yardstick for outside parties to use in evaluating an organization's level of capital investment, it's application to internal decision support is problematic.

Depreciation expense is a financial accounting concept designed to assign capital funds already spent to the specific time periods benefiting from the assets purchased. Its calculation begins with the amount paid for the asset (a sunk cost), followed by selection of one of the various permissible lives for the type of asset purchased, selection of one of the allowable methods for calculating depreciation, and application of the selected life and method to the sunk cost to arrive at, say, an annual depreciation expense.

Since sunk costs are irrelevant, the entire calculation is based on a cost that has no relevance to decision making. Add to that the fact that the selection of the life and depreciation method can significantly impact the resulting measure of depreciation expense – with those two decisions often based on an organization's desire to manipulate book or tax earnings – and the relevance of financial accounting's depreciation in any decision-making situation becomes questionable.

What is needed for decision making is a measure of the funds required to preserve an organization's existing investment base over time, funds that must be accumulated as the resources invested in both tangible and intangible assets are consumed, to ensure that their capabilities continue to be available to the organization in the future.

"By now you know my thoughts about using financial accounting's depreciation expense when developing cost information designed to support internal decision making. In short, I believe it's "the dumbest idea in the history of management accounting."

Doug Hicks,
Director, PACE





PRESERVING TANGIBLE RESOURCES

There are two factors to consider in measuring the cost of preserving the current operational capabilities provided by an organization's capital assets: the amount of preservation capital required and the drivers of the need to provide for the assets' preservation.

The amount required to preserve the capabilities of existing capital assets is not the cost of replacing the current capital assets themselves, but the cost of replacing their capabilities. In today's world of rapid technological change, the capital assets required to perform business processes in the future may be different than those used currently. Instead of producing parts using manual or computer-controlled machining centers, those same parts may be manufactured using 3-D printers. A fleet of lift trucks might be replaced with an automated material handling system. Printing presses might be replaced with computerized print-on-demand systems. Although tangible assets may often be replaced with newer models of the old equipment, such changing technology should also be considered in measuring the amount of capital that must be incorporated into the cost of current product and services.

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There are two drivers of the need to replace existing capital assets: chronological time and usage. Very few assets wear out due to the passage of time, but many become outdated or obsolete while they are still functional. For example, the rapid advance of technology can make office equipment and information systems obsolete long before their useful life has expired. To ensure that such resources continue to be available in the future, a chronological time-driven annual provision (in other words, a fixed annual amount) for replacing them can still be appropriate.

However, the need to replace many of an organization's costliest capital assets is often driven by their use, not the passage of time. The lives of equipment used in manufacturing or vehicles used in delivery are measured in terms of equipment hours or cycles and miles driven, not by their chronological age.



EXAMPLE

Consider two companies which purchase identical machines. Company A operates its machine for 7,000 hours per year while Company B operates theirs for only 2,000 hours per year. It's highly likely that the capability provided by Company A's machine will need to be replaced much sooner than will that of Company B's machine. In any given financial period, the amount required to preserve the capabilities provided by the machine at Company A should be much greater than that at Company B. Traditional financial accounting, however, would show otherwise.

Both Company A and Company B paid $400 thousand for a machine which has an estimated useful life of 70,000 operating hours. Following standard accounting practice, both companies would subtract an estimated salvage value of $50 thousand to arrive at a depreciable base of $350 thousand. Assuming an asset life of seven years and using straight-line depreciation results in a $50 thousand fixed, annual provision for depreciation. Even though Company A's usage of their machine is 350% of Company B's annual usage, the annual cost for both organizations will be the same.



Since it operates its machine 7,000 hours per year, this will make the depreciation cost per hour at Company A $7.14 for the first seven years it owns the machine while the same cost at Company B, with its usage at 2,000 hours per year, will be $25.00 for its first seven years. Then, seven years after being purchased and put into operation, both machines will be fully depreciated. Depreciation expense per hours for both companies' machines will be $0.00. The machine at Company A will still have an estimated useful life of 21,000 machine hours remaining and the machine at Company B will have 56,000 machine hours of useful life remaining.

Had both companies based the provision for preserving the capability of the asset on its usage, they would have estimated the net cost of its ultimate replacement and divided by its expected operating life of 70,000 hours. If replacement costs are $540 thousand and salvage value $50 thousand, the net cost of $490 thousand would be divided by 70,000 operating hours to arrive at a capital preservation allowance (CPA) of $7 per hour.

The Figure below is an example of a manufacturer using a Capital Preservation Allowance. The amount of capital required to support Building & Grounds, General Management, Information Technology, and Shipping & Receiving is not driven by usage. Instead, it is driven by time. Consequently, their Capital Preservation Allowance (or CPA) is a fixed annual amount.

	Fixed Annual Capital Preservation Allowance	Variable Capital Preservation Allowance				Capital Preservaton Allowance per Hour
		Identification	Measure	CPA per Unit of Measure	Capital Preservation Allowance	
Building & Grounds	$50,000				$50,000	
General Management	$10,000				$10,000	
Informaton Technologyu	$50,000				$50,000	
Material Handling - Owned	$0	Lift Truck Hrs	8,000	$2.50	$20,000	
Material Handling -Leased	$10,000	Lift Truck Hrs	2,000	$0.00	$10,000	
Shipping & Receiving	$20,000				$20,000	
Blasting - Owned	$0	Blast Hours	9,000	$2.00	$18,000	$2.00
Small Presses - Owned	$0	Press Hours	4,000	$5.00	$20,000	$5.00
Mid-Sized Presses - Owned	$0	Press Hours	8,000	$8.00	$64,000	$8.00
Large Presses - Owned	$0	Press Hours	4,000	$12.00	$48,000	$14.67
Large Presses - Leased	$40,000	Press Hours	2,000	$0.00	$40,000	
Totals	$180,000				$350,000	

Material Handling has five lift trucks, four of them owned and one of them leased. The four owned lift trucks have a CPA of $2 per hour. The lease for the other life truck is $10 thousand per year. Leased assets are preserved by paying the lease. As a result, the total CPA for Material Handling is $30 thousand per year.

Except for one large press, all manufacturing equipment is owned. The lease cost of the one large press is $40 thousand annually. Since the need to preserve these production assets is driven by usage, each category of the owned equipment is given a CPA per hour. Because large presses are both owned and leased, the result is a total CPA of $88 thousand and a composite rate of $14.67 (=88,000/6,000) for large presses. The rates used for production equipment, incorporated into their overall costing rates, should be used to assign capital preservation cost to products.

When business volume changes, the overall CPA required for usage-driven resources also changes while that for the time-driven resources remains the same. The Figure below shows the impact of a 20% reduction in volume on the example manufacturer's capital preservation requirements.

	Fixed Annual Capital Preservation Allowance	Variable Capital Preservation Allowance				Capital Preservaton Allowance per Hour
		Identification	Measure	CPA per Unit of Measure	Capital Preservation Allowance	
Building & Grounds	$50,000				$50,000	
General Management	$10,000				$10,000	
Informaton Technologyu	$50,000				$50,000	
Material Handling - Owned	$0	Lift Truck Hrs	6,400	$2.50	$16,000	
Material Handling -Leased	$10,000	Lift Truck Hrs	1,600	$0.00	$10,000	
Shipping & Receiving	$20,000				$20,000	
Blasting - Owned	$0	Blast Hours	7,200	$2.00	$14,400	$2.00
Small Presses - Owned	$0	Press Hours	3,200	$5.00	$16,000	$5.00
Mid-Sized Presses - Owned	$0	Press Hours	6,400	$8.00	$51,200	$8.00
Large Presses - Owned	$0	Press Hours	3,200	$12.00	$38,400	$16.33
Large Presses - Leased	$40,000	Press Hours	1,600	$0.00	$40,000	
Totals	$180,000				$316,000	

The lower volume of business results in 2,000 fewer lift truck hours and a $4 thousand decrease in Material Handling's CPA. The reduction occurs only for the owned lift trucks. Despite a 400-hour reduction in usage, "preserving" the leased lift truck still requires the same $10 thousand lease payment.

With 20% less activity, the CPA for production equipment fell by $30 thousand. Had the CPA been a fixed annual amount, like depreciation expense, the capital preservation cost per hour for each activity would have increased by 25%. With the CPA based on usage, however, the cost per hour for each unit of owned equipment will remain the same. The overall rate for Large Presses will increase 11.4% because one of the three presses is leased. A comparison of rates under time-based and usage-based assumptions is shown below.

Manufacturing Activity	Fixed Capital Preservation	@ 100%		@ 80%		@ 80% with Usage-Driven CPA
		Equipment Hours	Cost per Hour	Equipment Hours	Cost per Hour	
Blasting	$18,000	9,000	**$2.00**	7,200	**$2.50**	**$2.00**
Small Presses	$20,000	4,000	**$5.00**	3,200	**$6.25**	**$5.00**
Mid-Sized Presses	$64,000	8,000	**$8.00**	6,400	**$10.00**	**$8.00**
Large Presses	$88,000	6,000	**$14.67**	4,800	**$18.33**	**$16.33**

Keep in mind that we're talking about a long-term investment in the new machine. Unlike financial accounting, where subjective chronological (e.g., annual) periods are important, managerial costing assumes that an organization operates on a continuum and takes the long view of the economics underlying the resource.



PRESERVING INTANGIBLE RESOURCES

The long-term view should also be considered when determining the cost of preserving intangible resources. The amount spent to ensure a skilled workforce, establish/maintain/enhance a brand, sustain the organization's market position, maintain its technological position, protect its distribution system, or preserve any other intangible capability or resource must be segregated into three categories:

- investments required to preserve the resources and capabilities consumed in operating at an organization's current level of business,
- investments designed to grow the organization, and
- investments designed to compensate for failure to preserve its resources and capabilities in the past.

Only those funds required for the ongoing support current operations should be assigned to current products and services. (See our companion eBook, *How to Better Manage Strategic Investment*, for more discussion on this topic)



Intangible investments are sometimes characterized as appreciating or self-sustaining, but this only occurs if they are maintained, practiced, or enhanced to current standards. Physical assets often wear out even if they are expertly maintained due to use. Is the same true of intangible investments? We can all think of once famous brands that have died or companies with fantastic patents and unique processes that no longer exist. Intangible assets have a value, and the continuation of that value is best assured with continuous maintenance and investment.

Consider a brand name. It has been developed through years of advertising, quality production, and satisfying customers. Arguably each year it is maintained with advertising spending and continuous improvement in quality production, but is the current level of spending on advertising and production quality enough? With planning, you can estimate the value of the brand and a strategic level of spending for advertising and design enhancement to maintain its value. What is the impact on your company's value if you try to squeeze extra profit by cutting back on advertising and design enhancement? Answering these questions requires important managerial decision information that is not part of traditional financial accounting and budgeting.

Consider a manufacturing enterprise operating system on which you initially spent $5 million. This was capitalized, but probably depreciated very rapidly on financial statements in the first few years when little maintenance and enhancement was needed. You are now in the fourth year of using the system and it requires upgrades and enhancements to keep pace with new processes and products efficiently. The system is still valuable to the company, and you spend each year on enhancement and maintenance, but this is recorded for financial accounting purposes as an expense. Does this level of expenditure reflect the current value of your system and its probable replacement cost? A managerial costing system needs to reflect a more carefully designed Capital Preservation Allowance for the manufacturing enterprise operating system that can be applied to the costs of products and services.

"One significant difference frequently noted about investments in intangible capital is that they often appreciate in value over time if properly managed, nurtured, and cultivated while physical assets depreciate. Many forms of intangible capital build on each other and grow in capability when used frequently."

Larry White,
Director, PACE





RECOVERING THE COST OF CAPITAL

The financial goal of a for-profit organization is to earn a superior return on investment, one that is greater than the return owners could earn by investing their money elsewhere. To understand the value to the organization of each of its products, services and customers, an organization must understand how much of its investment is tied up in producing each product, providing each service, or serving each customer. This is accomplished by incorporating a cost of capital into the cost structure of the business.

Owners' investment should be measured by value, not the cost of the original investment. To measure the cost of capital, the organization must first establish the total value of its resources. In our example, which is designed to establish the principle, not to explore all possible scenarios, we assume an organization has tangible resources valued at $4 million as detailed below.

	"Value" of Resources
Accounts Receivable	$300,000
Raw Material Inventory	$200,000
Work-in-Process	$150,000
Finished Goods Inventory	$250,000
Building & Grounds	$1,100,000
General Management	$50,000
Informaton Technology	$200,000
Material Handling - Owned	$80,000
Shipping & Receiving	$40,000
Blasting - Owned	$80,000
Small Presses - Owned	$250,000
Mid-Sized Presses - Owned	$550,000
Large Presses - Owned	$750,000
Total	$4,000,000

Recently, however, the owners were offered $6 million for their company; $2 million more than the value of its tangible resources. That $6 million was the amount the owners now had tied up in the business. It's $6 million they couldn't invest elsewhere. The additional $2 million represents the value of its intangible resources. To include the cost of capital relating to this intangible investment, the company needs to identify and value those intangible resources that make the organization more valuable than value of its tangible resources.

After a careful analysis, the company determined that half of the intangible value came from its highly effective use of information technology. The other half came from the momentum it had built in developing and marketing the products in it two product lines. After further breaking down those into more detail, it detailed the $6 million value of the company as shown below.

	"Value" of Resources
Accounts Receivable	$300,000
Raw Material Inventory	$200,000
Work-in-Process	$150,000
Finished Goods Inventory	$250,000
Building & Grounds	$1,100,000
General Management	$50,000
Informaton Technology	$200,000
Material Handling - Owned	$80,000
Shipping & Receiving	$40,000
Blasting - Owned	$80,000
Small Presses - Owned	$250,000
Mid-Sized Presses - Owned	$550,000
Large Presses - Owned	$750,000
MOM Software	$400,000
Financial Accounting Software	$300,000
Managerial Costing Software	$150,000
Continuous Process Improvement	$150,000
Product Line A	$400,000
Product Line B	$600,000
Total	$6,000,000

The company has $1.5 million in interest bearing debt and averages $500 thousand in outstanding trade credit. The $4 million difference between the total resource value and company debt represents the value the owners have tied up in the business.

Interest on the interest-bearing debt instruments averages 6.7%. No interest is paid on the trade credit. After considering the return that could be earned on investments with the same relative risk as our manufacturer, its owners have targeted a 15% return on their investment. As detailed in the following figure, this indicates that a profit of $600 thousand on its $4 million investment is required to provide the owners with their expected return – a 11.7% return on the total company value.

	Amount of Investment	Net Cost of Investment	Cost of Capital
Interest-Bearing Debt	$1,500,000	6.7%	$100,000
Trade Credit	$500,000	0.0%	$0
Owners' Equity (Value)	$4,000,000	15.0%	$600,000
Totals	$6,000,000	**11.7%**	$700,000

Applying the 11.7% cost of capital to the value of the resources in each of the organization's activity centers determines how much of the overall cost of capital relates to each activity. This is detailed in the figure below. It then becomes part of each activity centers' total cost, just like salaries, utilities, supplies or any other indirect cost. It represents the profit that must be generated by the investment in each activities' resources if the owners are to achieve their targeted return of 15%.

Activity Center	"Value" of Resources	Cost of Capital 11.7%
Accounts Receivable	$300,000	$35,000
Raw Material Inventory	$200,000	$23,333
Work-in-Process	$150,000	$17,500
Finished Goods Inventory	$250,000	$29,167
Building & Grounds	$1,100,000	$128,333
General Management	$50,000	$5,833
Informaton Technology	$200,000	$23,333
Material Handling - Owned	$80,000	$9,333
Shipping & Receiving	$40,000	$4,667
Blasting - Owned	$80,000	$9,333
Small Presses - Owned	$250,000	$29,167
Mid-Sized Presses - Owned	$550,000	$64,167
Large Presses - Owned	$750,000	$87,500
Production Management (MOM Software)	$400,000	$46,667
Finance & Accounting (Financial Software)	$300,000	$35,000
Finance & Accounting (Costing Software)	$150,000	$17,500
Production Management (Continuous Improvement)	$150,000	$17,500
Product Line A	$400,000	$46,667
Product Line B	$600,000	$70,000
Total	$6,000,000	$700,000



The cost of capital included in support activities – those activities whose costs are not traceable directly to products, services, or customers – are distributed along with all the support activities' other costs following the cost model's causality-based structure until they are incorporated into the cost of activities that are traceable directly to products, services, or customers. The cost of capital included in those traceable activities are incorporated into the rates used to assign their costs.

Incorporating the cost of capital into the organization's costing rates resulting in rates that establish the price the organization must obtain from the sale of a particular product or service to the customer if it to earn the owners' targeted return on investment. Any price lower than that amount does not add adequate value to the organization while any price higher than that amount provides a return greater than the owner's target.

Unlike measures such as profit as percentage of sales, incorporating cost of capital into the organization's cost model recognizes that the owner's objective is an adequate return on investment.

INTANGIBLES PRESERVATION ALLOWANCE

Having identified its $2 million of intangible resources, the company realized that, just as it had to provide for the preservation of its tangible resources, it had to provide for the preservation of its intangible resources. A certain amount had to be attributed to the preservation of those intangible resources each year whether those funds were spent in that year. Using the same logic that it used for developing its Capital Preservation Allowance, it arrived at the amounts shown below.

Intangible Resource	Preservation Allowance
Manufacturing Operations Management Software	$40,000
Financial Accounting Software	$20,000
Managerial Costing Software	$15,000
Continuous Process Improvement	$40,000
Product Line A Value	$100,000
Product Line B Value	$100,000
Totals	$315,000

OVERALL IMPACT ON INVESTMENT RELATED COSTS

The figure below summarizes the investment-related cost incorporated into our example manufacturer's cost model.

Resource / Activity Center	"Value" of Resources	Cost of Capital 11.7%	Preservation Allowance	Investment Cost
Accounts Receivable	$300,000	$35,000		$35,000
Raw Material Inventory	$200,000	$23,333		$23,333
Work-in-Process	$150,000	$17,500		$17,500
Finished Goods Inventory	$250,000	$29,167		$29,167
Building & Grounds	$1,100,000	$128,333	$50,000	$178,333
General Management	$50,000	$5,833	$10,000	$15,833
Information Technology	$200,000	$23,333	$50,000	$73,333
Material Handling - Owned	$80,000	$9,333	$30,000	$39,333
Shipping & Receiving	$40,000	$4,667	$20,000	$24,667
Blasting - Owned	$80,000	$9,333	$18,000	$27,333
Small Presses - Owned	$250,000	$29,167	$20,000	$49,167
Mid-Sized Presses - Owned	$550,000	$64,167	$64,000	$128,167
Large Presses - Owned	$750,000	$87,500	$88,000	$175,500
Production Management (MOM Software)	$400,000	$46,667	$40,000	$86,667
Finance & Accounting (Financial Software)	$300,000	$35,000	$20,000	$55,000
Finance & Accounting (Costing Software)	$150,000	$17,500	$15,000	$32,500
Production Management (Continuous Improvement)	$150,000	$17,500	$40,000	$57,500
Product Line A	$400,000	$46,667	$100,000	$146,667
Product Line B	$600,000	$70,000	$100,000	$170,000
Total	$6,000,000	$700,000	$665,000	$1,365,000

Unlike when only using depreciation expense (an irrelevant cost) included in the organization's cost model, incorporating a cost of capital, capital preservation allowance, and intangible preservation allowance, provides a more accurate understanding of the economics of having funds tied up in the organization and the need to accumulate the costs to preserve the organization's existing resources into the future.

"Data quality is key to effective analytics in finance. Using appropriate measures, as suggested here, are an important part of data quality."

Gary Cokins,
Director, PACE





SUMMARY

The PACE Profitability Analytics Framework (PAF) is a process designed to produce high-quality internal decision-support information that supports decision making throughout the organization. It is built on a holistic view of revenue management, managerial costing, and investment management within an organization.

In this eBook, we've discussed one aspect of the application of the PAF to investment management - the need for organizations' financial modeling to clearly reflect economic reality for internal decision support. In a companion eBook we discuss another aspect of the PAF to investment management – the need to consider investment management, broadly defined, throughout the strategic management cycle. Employing the concepts in these two eBooks will help organizations create long-term value for their stakeholders.



Now that you know more about the PAF's approach to investment management, we invite you to explore the Profitability Analytics Center of Excellence Library for podcasts, webcasts, case studies, and articles on this and other related topics.

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