How Cost Allocation Systems Can Lead Managers Astray

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Business decisions can be no better than the information on which they are based. Cost allocation systems—given their emphasis on cost recovery rather than on cost causality—are incapable of providing managers with the cost information they need in order to make good business decisions. The traditional view of cost measurement as a relatively passive accounting tool is off the mark. Unfortunately, most firms never think to look to their cost systems as a source of competitive advantage.

While waiting for a flight in St. Louis recently, I started talking to a gentleman we'll call Mr. Smith who seemed even more frustrated than I with the lengthy delay we were experiencing. What Mr. Smith was really frustrated about—though I suspect he did not realize it at the time—was not the delay, but his firm's cost allocation system. Indeed, the following account of his story demonstrates tellingly how cost allocation systems can lead managers astray.

Cost systems run amok

Mr. Smith had recently flown into St. Louis on a commercial airline for a two-day business trip. While there, he learned that his company's private airplane had flown in the day before and would leave on the same day that he was scheduled to leave. Mr. Smith immediately cashed in his $200 commercial airline ticket and made arrangements to fly back on the company plane. He flew home on the company plane feeling pretty good about saving his company the $200 fare and being able to depart on schedule.

About two weeks later, however, Mr. Smith's boss asked him why the department had been cross-charged $400 for his return trip when the commercial air fare was only $200. Mr. Smith explained that "the company plane was flying back regardless, and there were a number of empty seats."

How could Mr. Smith's attempt to save his company $200 end up "costing" his department $400? The problem is that Mr. Smith recognized something that his company's cost allocation system did not: namely, that the vast majority of the costs associated with flying the plane home were already sunk and, thus, unavoidable at the time he made the decision to fly home. By failing to distinguish between sunk (i.e., unavoidable) and avoidable cost, the cost allocation system was causing the firm and its managers to make uneconomic business decisions.

It is now clearer why Mr. Smith was so frustrated the day I ran into him in St. Louis. His company's plane was sitting on the runway with a number of empty seats and ready to take off for the very same destination. Yet there was no way Mr. Smith was going to fly on that plane even though doing so was the "best business decision."

Not just another anecdote

The above true story could be dismissed as an amusing anecdote about corporate bureaucracy if it were limited to the Mr. Smiths of the world who fly (or, rather, don't fly) on company planes.

Unfortunately, it is not. Cost allocation systems like the one that caused Mr. Smith to make an uneconomic business decision are pervasive in business today. These flawed cost

systems are commonly used to make pricing and production decisions, with results that can be financially devastating.

But why do firms employ flawed cost allocation systems if they perpetuate inferior business decisions? As we shall see, this practice stems largely from a failure to understand the *dynamic* nature of costs and—perhaps even more importantly—to capture these dynamics in cost measurement systems.

To answer the question, this article demonstrates that dynamic costing can be a source of competitive advantage through improved decision making. The article also suggests a simple dynamic costing model for improved decision making.

Two fundamental costing principles

Two fundamental principles are critical to the development of a dynamic costing system:

- The principle of cost causality; and
- The principle of cost dynamics.

Collectively, these principles require that efficient and profitable business decisions be based on information systems that measure costs from a futuristic perspective rather than from a historical one. These principles can be stated as follows:

- *The only costs that are relevant for a given business decision are those costs that are caused by making that decision (or, equivalently, those costs that could be avoided if that decision were not made).*
- *Costs do not become sunk or unavoidable as a function of time, but as a function of business decisions—each of which has a specific time horizon associated with it.*

Short-run vs. long-run

It is common for costs to be referred to as short-run or long-run costs. This practice tends to create considerable confusion, because it leads managers to believe that costs become sunk (or unavoidable) as a function of time, rather than as a function of business decisions.

Time mainly serves as an index to chart the effect of past business decisions in rendering costs either avoidable or unavoidable. In the short run, some costs can be avoided while others are committed in advance and cannot be avoided. Conversely, in the long run the effects of all past business decisions work themselves out; therefore, all costs are avoidable.

Since business decisions constantly overlap, the long run is largely a theoretical construct. Businesses continually find themselves in the short run where some costs are avoidable and others are not. This is precisely why a dynamic approach to cost measurement is the *sine qua non* for profitable business decision making.

Cost/benefit trade-off. Little debate occurs over the proposition that virtually all business decisions have some semblance of a cost/benefit trade-off at their core. The particular decision may concern, for example, whether a price for a given product or service is "profitable," whether merchandise should be transported by air or rail, or even whether employees should fly on commercial airplanes instead of on the company plane.

Cost causality

The *principle of cost causality* explicitly recognizes that the only costs relevant in the cost/benefit trade-off are those that result from a particular business decision or that could have been avoided if that decision had not been made. For example, Mr. Smith went through a cost/benefit analysis (at least implicitly) to determine whether he should fly on the company plane. He reasoned that since the plane was committed to going anyway despite having empty seats, his flying would not displace anyone. His flying on the company plane would not cause his firm to incur any additional costs as a result of his decision. An advantage was that he would save $200 by cashing in his commercial airline ticket.

Cost dynamics

The *principle of cost dynamics* recognizes that each business decision has a time horizon associated with it that enables costs to be classified as either avoidable or unavoidable. Those costs rendered unavoidable because of a particular decision become irrelevant for any cost/benefit analysis within that particular time horizon. In Mr. Smith's case, the company plane was already committed to

flying back home—regardless of Mr. Smith's decision to fly on it. As a result, virtually all the costs (including the capital costs of the airplane, pre-flight maintenance costs, landing fees, and costs for the pilot and crew) were all sunk when Mr. Smith made the decision. These costs were rendered unavoidable simply because of the business decision that resulted in the company plane being flown to St. Louis in the first place.

Treating sunk costs as avoidable

The cost allocation system that Mr. Smith's company uses treats sunk costs as if they were avoidable, i.e., it cross-charged his department $400 for his return trip on the company plane. The damage to the company as a result of such a system is immediately apparent.

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When Mr. Smith was in St. Louis the first time, he decided to fly on the company plane. The implicit cost/benefit trade-off analyzed the costs as (effectively) zero and the benefits $200. Conversely, when Mr. Smith was in St. Louis the second time, he decided to fly on a commercial plan based on a cost/benefit trade-off that analyzed the benefits of $200 were dominated by the costs of $400. The $200 represents the savings to the firm if Mr. Smith cashed in his commercial ticket and flew on the company plane; the $400 represents what the firm's cost allocation system would charge his department for his flight on the company plane.

Theoretically, Mr. Smith made a good business decision for his department. The predicament he found himself in arose as a result of his being given the wrong cost information on which to base his cost/benefit analysis. The operative cost-benefit analyses for these two cases are shown above in Exhibits 1 and 2.

Exhibit 1. ***Cost/Benefit Analysis for Mr. Smith's Flight Decision (Based on Dynamic Costing)***

Fly	Benefits	Cost	Net Benefits	Decision
Company	$200	0	$200	Yes
Commercial	0	$200	−$200	No

Exhibit 2. ***Cost/Benefit Analysis for Mr. Smith's Flight Decision (Based on Traditional Cost Allocations)***

Fly	Benefits	Cost	Net Benefits	Decision
Company	$200	$400	−$200	No
Commercial	$400	$200	$200	Yes

Cost allocations and business decisions

A cost allocation system is any mechanism employed to account for all costs associated with a given business function or activity. These costs are then split up among the various departments, products, and services on some arbitrary basis—usually the basis of relative use.

For example, Mr. Smith's department was allocated $400 for his flight on the company plane. While this cost allocation could have been the result of any number of different costing exercises, it is most likely that the system tracked $4,000 worth of costs for that particular flight and then divided the $4,000 among the ten passengers on the plane that day. While the firm's system could utilize any number of different methodologies (some even giving the impression of science), the point is that the process of dividing up costs in this manner is inherently arbitrary and has absolutely no foundation in cost causation.

Sending the wrong signals

Because they violate the principles of cost causality and cost dynamics, most allocation systems break down and send the "wrong"

signals to managers. Costs that are already sunk and cannot be avoided only obscure and distort business decisions that a manager faces.

Cost allocation systems are inherently flawed on this score because they take a historical perspective on cost measurement instead of looking forward. In this sense, cost allocation systems rest on the principle of cost recovery: That is, they take costs that are already sunk and treat them as if they were not.

The adding-up property

It is only natural to ask why business firms rely on cost allocation systems that foster inferior business decisions. There is probably no unique answer to this, though many could be proffered. The primary function of cost measurement in most firms is to ensure that all costs have been accounted for—what we term the "adding-up property." Business firms are subject to a multitude of externally mandated accounting and reporting requirements (e.g., from the IRS, SEC, and various regulatory agencies). These agencies do not require that costs be developed in accordance with the two fundamental costing principles described above. Why? Because accounting and reporting agencies are concerned with accurate reporting of financial information, not with guaranteeing that companies make profitable business decisions.

The principle of cost dynamics recognizes that each business decision has a time horizon associated with it that enables costs to be classified as either avoidable or unavoidable.

Since most firms have only one costing system, the adding-up property generally takes precedence.[1] Consequently, managers are forced by default to make business decisions on the basis of costs that satisfy a number of externally mandated reporting requirements but have virtually nothing to do with cost causality. Since cost allocation systems satisfy the "adding-up property" by definition, it is only natural that they should be used to make business decisions as well. Unfortunately, as the example below shows, cost allocations serve only to distort the true cost/benefit trade-offs that underlie a firm's business decisions.

Cost/benefit analysis of discounting tolls

Suppose the up-front capital investment of building a toll bridge is $40 million. The economic life of the bridge is assumed to be twenty years, because after twenty years safety concerns will render the bridge no longer operational. The bridge developer estimates that given a toll of 25¢ per vehicle, approximately 8.8 million vehicles per year will use the bridge. The recurring or variable costs associated with operating the bridge are assumed to be 1¢ per vehicle crossing (a variable cost to account for degradation of the pavement due to usage).

The bridge is built and begins operations with a 25¢ toll. Initially, demand projections closely follow the developer's expectations regarding capital recovery. But, the market situation suddenly changes dramatically when a modern ferry line offering high-speed transport begins operations in direct competition with the new bridge. The bridge owner is approached by the local trucking and taxi companies (which account for a significant share of all bridge traffic) in an attempt to negotiate a lower toll for trucks and taxis. The companies tell the developer that unless he can reduce the current toll to 20¢ per vehicle, the trucks and taxis will start using the competing ferry.

The bridge developer is troubled. He calls in his two most trusted advisers, the corporate accountant and the business strategist. As it happens, these two have recently been debating the merits of a dynamic costing system versus a traditional cost allocation system. The bridge developer asks them whether he should grant toll discounts for the trucking and taxi companies, and is surprised at how differently they respond.

The corporate accountant. The corporate accountant tells the bridge developer that he should not discount the tolls because it is unprofitable to levy a toll of 20¢ per vehicle.

He also informs the bridge developer that the effective price floor is approximately 24¢; and that he must levy a toll of at least this amount to recover the capital costs of the bridge and the 1¢ variable cost per vehicle.

The business strategist. The business strategist cannot support the corporate accountant's assessment of what constitutes the effective price floor, because he knows that the accountant's answer is based on a failure to recognize the sunk cost of the investment in the bridge.

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The business strategist supplies the developer with a different perspective: The capital investment in the bridge is a sunk cost that will be incurred whether vehicles use the bridge or not. Therefore, as long as the toll levied on any particular vehicle covers its variable cost of 1¢, the firm is financially better off letting the vehicle use the bridge. This suggestion holds true as long as those vehicles for which tolls are being discounted do not displace vehicles that would have been willing to pay the full toll. The business strategist further contends that any toll over the avoidable cost contributes to overhead (in this case, the capital investment of the bridge), so the firm is better off with this contribution than it would be without the contribution (i.e., if the trucks and taxis started using the ferry).

Two twists

Two questions still remain. First, suppose the firm had negotiated a contract with the taxi and trucking company before the bridge was built; would the effective price floor still be 1¢ per crossing? Second, suppose that the taxi and trucking companies intend to use the bridge exclusively during peak periods when there is heavy traffic on it. Should the developer still adopt a discounting strategy?

The answer to the first question is "no." To the extent that the business decision to build the bridge is caused by the existence of a contract with the taxi and trucking companies, the effective price floor when the contract is entered into should reflect the capital costs that could be avoided if the bridge were not built. In other words, the capital costs of the bridge are avoidable before but not after the bridge is built.

The answer to the second question is also no. Discounting tolls during peak periods is a not a profitable business strategy if vehicles that are willing to pay 25¢ per crossing are turned away to create space for traffic willing to pay only 20¢ per crossing. In other words, there is an "opportunity cost" associated with discounting tolls (measured in terms of incremental revenues foregone) that must be reflected in the cost/benefit analysis underlying this business decision.

The opportunity cost is zero during off-peak periods, because an additional vehicle on the bridge would not cause another vehicle to be displaced. Conversely, the opportunity cost is 25¢ per vehicle during peak periods. The firm's effective price floor at any given time equals the greater of avoidable and opportunity costs: 25¢ during peak periods and 1¢ during off-peak periods. This analysis supports the strategy of discounting tolls only during off-peak periods.

Measuring costs dynamically

This example confirms the importance of measuring costs dynamically to take the two fundamental costing principles into account. Moreover, the value of cost measurement to the firm is seen as transcending its traditionally benign accounting function and encompassing issues of pricing, profitability measurement, and even the formulation of competitive strategy.

The remainder of this article sketches out a simple dynamic model of cost measurement that the firm can use as a generalized decision-making tool.

It is once again helpful to return to a stylized airplane example to illustrate the basic principles of the model. For reasons that will become clear, the model is called a *binary cost-matrix model.* The input costs associated

with an airplane and its operation are as follows:

- Capital costs;
- Storage;
- Insurance;
- Time-sensitive and use-sensitive depreciation;
- Ground operations;
- Landing fees;
- Labor;
- Fuel and food;
- Flight coupon processing and printing; and
- Baggage handling and passenger taxes.

In the example that follows, the primary user of the cost model is the airline's flight operations manager. The business decision she is constantly confronted with is that of assessing the ticket price floor (the price below which the sale of the ticket fails to contribute to the profitability of the firm).

Three specific scenarios to consider are described below. In the first one, the aircraft is ready to take-off with 50 percent of its seats empty. The terminal is filled with would-be passengers who are unwilling to pay the regular price but would pay a discounted fare. How steep should the manager be willing to discount fares to fill the empty seats on the plane?

In the second scenario, a second plane is sitting in the hangar. One flight has already taken-off, but a number of would-be passengers remain in the terminal. What costs are relevant for the manager's cost/benefit analysis of whether to schedule a second flight?

In the third scenario, the manager is considering the purchase of a new airplane. What costs are relevant for the cost/benefit analysis of this business decision? Does it matter that all labor is under a long-term contract?

Binary cost-matrix model

Exhibit 3 is the binary cost-matrix model given to the flight operations manager. A "1" in a designated column and row corresponds to a cost that is treated as avoidable for the particular scenario under analysis. Conversely, a "0" is a cost that is treated as unavoidable for the particular scenario.

For the first scenario (which parallels the Mr. Smith case from the beginning of this article), all costs are sunk except for those with a "1" in the first column. Consequently, as long as the price that the manager assesses would-be passengers covers the input costs, the airline is financially better off allowing those passengers to board the plane at a discounted fare rather than turning them away. (Interestingly enough, the now-defunct Civil Aeronautics Board used an argument much like this one to justify discounted air fares for standby passengers.)

Exhibit 3. *Binary Cost-Matrix Model for Airline Example*

Input Costs	Scenario I	Scenario II	Scenario III
Capital airline	0	0	1
Storage	0	0	1
Insurance	0	0	1
Time depreciation	0	0	1
Use depreciation	0	1	1
Ground operations	0	1	1
Landing fees	0	1	1
Labor/flight crew	0	1	1
Fuel	1	1	1
Meals	1	1	1
Flight coupon/printing	1	1	1
Baggage handling	1	1	1
Passenger taxes	1	1	1

Unfortunately, cost allocations serve only to distort the true cost/benefit trade-off that underlies a firm's business decisions.

For the second scenario, the cells marked "1" represent the costs that revenues from ticket sales on the second flight must cover to satisfy the cost/benefit test for an added flight. Finally, in the third scenario, the cost/benefit test for the purchase of another airplane treats all costs as avoidable, and compares them with anticipated revenues that could be generated over the expected life of the aircraft (net of salvage value).

Effect of long-term contracts

If the airline entered into long-term labor contracts that preclude downsizing the labor force for a specified period of time, the associated labor costs should be classified as unavoidable for the duration of those contracts and treated accordingly in a cost/benefit analysis.

It is important to note that the scarcity of a given skills set—regardless of the existence of long-term labor contracts—has much the same effect. A firm must retain labor having scarce skills during downturns in demand because of the difficulty of rehiring such labor during periods of upturns in demand. Labor having scarce skills should therefore be treated as an unavoidable (or overhead) cost to the firm as long as the labor remains in short supply.

The binary cost-matrix model illustrated in the three-scenario example can easily be generalized to serve as a decision-making tool for other companies. Unlike a cost allocation system, a dynamic cost measurement model helps ensure that managers make business decisions that enhance the profitability of the firm.

Conclusion

The essence of this discussion can be summed up succinctly: Business decisions can be no better than the information on which they are based. Cost allocation systems—given their emphasis on cost recovery rather than cost causality—are incapable of providing managers with the cost information they need in order to make good business decisions. The traditional view of cost measurement as a relatively passive accounting tool is off the mark. Somewhat paradoxically, most firms never think to look to their cost systems as a source of competitive advantage, which is precisely what cost systems can be for companies who know how to use them. ▲

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Notes

1. See Robert S. Kaplan, "One Cost System Isn't Enough," *Harvard Business Review* (January–February 1988): 61–66.