



ADDRESSING COMMODITY PRICE VOLATILITY IN PRODUCT DEVELOPMENT

This article provides guidance on approaches for responding to price volatility within the target costing process.

THROUGH A MATURE TARGET COSTING PROCESS

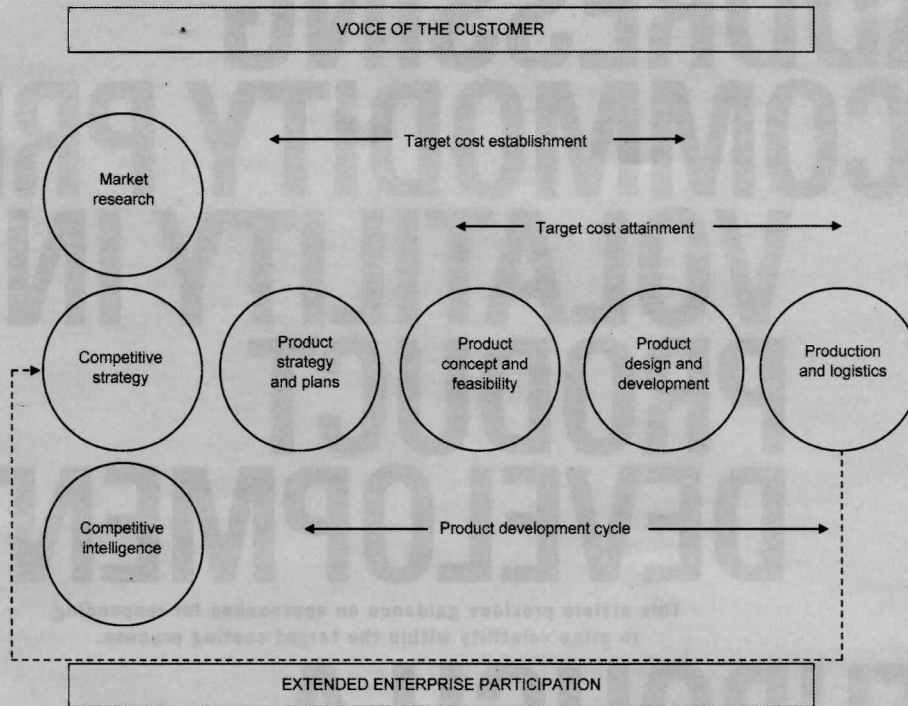
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To remain profitable and competitive, or to complete their programs within budget, private-sector companies and government agencies must be able to accurately predict the costs of their products or programs. Doing so is a particular challenge for organizations operating in a business environment in which their costs are highly dependent

on commodity prices and currency exchange rates. Predicting costs becomes an even greater challenge when the product or program is years away from delivery. This article suggests that the challenges can be met by addressing the volatility of commodity prices through a mature target costing process. More specifically, this article provides guidance on approaches for responding

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EXHIBIT 1 Extended Enterprise



Ansari, Shahid L., Bell, Jan E., and the CAM-I Target Cost Core Group, *Target Costing: The Next Frontier in Strategic Cost Management* (McGraw-Hill, 1997).

to price volatility within the target costing process. These approaches are offered as concepts to review and tailor for your organization; they are not intended as a single-solution road map.

For this article, a commodity is defined as a good that is in demand and supplied without qualitative differentiation across the marketplace. It is fungible — that is, it is the same no matter who produces it. Examples are petroleum, notebook paper, milk, and copper. Commodity price volatility refers to the fluctuation in the purchase price. A change in a commodity's price, or a currency exchange rate, carries through to a product's or program's cost. For example, during the Iraq War, the cost of petroleum increased, resulting in an increase in the prices of petroleum-based products such as gasoline.

Target costing process refers to the process of establishing the acceptable amount of cost that can be incurred on

a product while still earning the required margin from that product. It is a market-driven costing system in which cost targets are set early in the development of a product or program. To set a cost target, the process considers the voice of the customer, market research, competitive intelligence, and internal strategic plans. The cost target then guides the extended enterprise throughout the product development cycle to find the optimal concept and process design solution that meets the customer's value expectations and maximizes the potential for launching the product at the desired margin.¹ Exhibit 1 depicts the concept.

Meeting the cost target

To meet the cost target, commodity price fluctuations need to be monitored regularly and managed effectively. Typically, organizations manage commodity

EXHIBIT 2 Target Costing Maturity Levels for Commodity Volatility

Target Costing Maturity Levels for Commodity Volatility					
Attributes	Level 1 Initial	Level 2 Repeatable	Level 3 Defined	Level 4 Managed	Level 5 Optimizing
Contingency funds	Multiple contingencies are established ad hoc and at different levels of the product structure.	Contingencies are developed using a standard process.	Contingencies are established only at the total product level and updated periodically.	Contingencies are established at the program (cross-product) level and updated to reflect current risks.	An enterprise risk management system is in place, precluding the need for contingency funds.
Cost estimating and status to target tracking	Estimates are parametrically driven from historical data and are not tied to an official commodity price forecast.	Estimates are based on the initial commodity price forecast done in early product development.	Estimates are updated to reflect the latest commodity price forecasts.	Risks and opportunities are tracked and reflect commodity price forecasts. Estimates are updated with the latest commodity forecast after a major decision gate, or periodically to minimize uncontrollable estimate volatility.	Estimates are updated in real time when a change in the commodity price forecast creates a cost risk greater than the cost of switching to another commodity.
Cost accountability	Project teams are not aware of forecasted cost changes. Cost accountability is centralized through a costing group.	Project teams are aware of cost forecasts and are accountable for all costs.	Functions and organizations accountable for all costs, but responsibility and accountability not aligned.	All functions are given visibility of total costs but project teams are responsible only for controllable cost. Cost accountability is held by the responsible function or organization.	Cross-functional project teams have visibility of total costs and incentivized to reduce costs. Functions and organizations indemnified for uncontrollable costs if they follow mitigation plan.

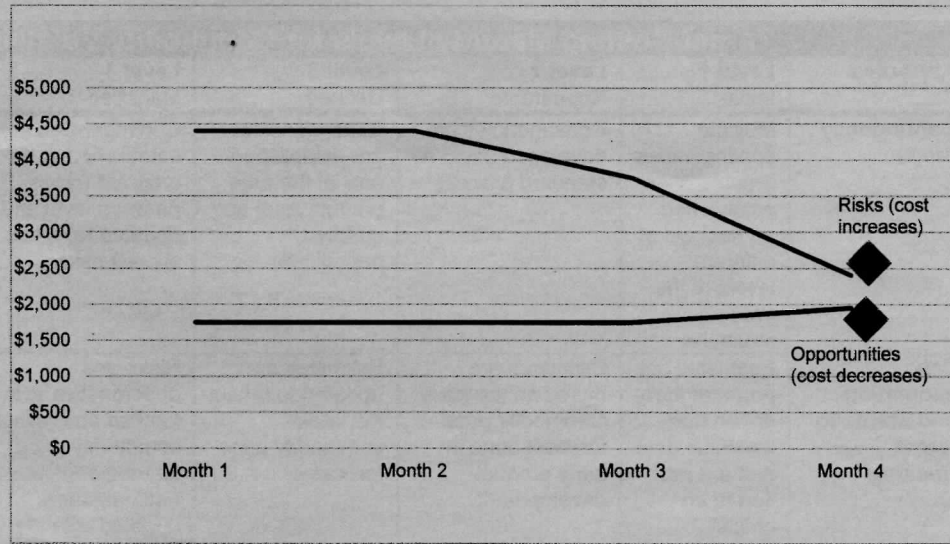
price fluctuations on their current products through hedging, futures, and fixed-price contracts. The authors contend that these same tools can be used to manage commodity price fluctuations during product development by integrating these process outputs as inputs into a mature target costing process. Exhibit 2 shows the key process attributes for managing commodity volatility down the left side and target costing maturity levels across the top. These maturity levels were adapted from the Capability Maturity Model.² The optimal solution for managing commodity price volatility

will depend on the organization's target costing process maturity level. The level may be different for each attribute: contingency funds, cost estimating, and cost accountability. To achieve the best outcome, organizations should take action to advance to the more mature levels as quickly as possible.

Contingency funds

To address some of the uncertainty that surrounds product development, some organizations create a product-level contingency fund. The contingency process

EXHIBIT 3 Status to Target Tracking



sets aside a management reserve or pool of funds from the total cost target, resulting in a more challenging than necessary cost target allocation for the project teams. These funds can be distributed to the project teams if unforeseen costs become evident. Contingency funds are used primarily by organizations that have a limited ability to forecast and mitigate commodity price volatility or need an extra cushion for unforeseen events, such as test and validation failure discoveries, that affect costs. It is also useful when organizations have challenges allocating costs to subsystems.

In Level 1 (Initial) multiple contingency funds exist at various levels throughout the project team structure. The pitfalls here are that the team may spend non-value-added time managing the contingency funds and that contingency funds incite a variety of negative behaviors. Contingency funds tend to be allocated politically or on a first-come-first-served basis, or held until near the end of the project and then consumed so that future budgeted contingency levels are maintained. A corollary of Parkinson's Law applies that the costs will expand to fill the budget, including contingency funds.³ Another concern is that an over-constrained team, one with an excessively challenging cost target,

puts reaching an optimal design solution in jeopardy.

As an organization's processes become more mature, the contingency fund becomes less specific, broader based, and updated in a controlled process. Organizations at Level 5, (Optimizing) do not use contingency funds. Instead, they have a robust risk and opportunity management process that includes the probability, consequence, mitigation plans, and responsibility for the contingency. Eliminating contingency funds eliminates the need to over-constrain project teams. These organizations also avoid the cost of the non-value-added activities (to the customer) to manage contingency funds and other negative budgeting behaviors.

Cost estimating and status to target tracking

The target costing process uses estimates of future cost to provide predictive feedback to project teams so they can quickly analyze, improve, and decide on the optimal design approach. By identifying and minimizing the impact of the cost drivers while products are still in the design phase, project teams will avoid surprises in the follow-on life cycle phases. The fre-

quency and timing of providing cost estimates are critical to an effective measurement system because if certain changes in costs are not visible, they will not be considered or addressed.

Cost estimating models and tools range from very simple to very complex. Organizations in Level 1 rely exclusively on historical data to develop parametric cost estimating relationships for the commodity forecasts. The pitfall is that parametric data may not address change or innovation. Historical cost correlation is not necessarily the same as causation, which could lead to faulty assumptions about the drivers of cost. As an organization applies more mature practices, the estimates are updated with commodity forecasts in a controlled manner to minimize volatility, discouraging or confusing teams and driving negative behaviors such as unnecessary engineering changes. In Level 5, cost estimates are updated regularly with the latest information available and are shared with the project teams when the change in a commodity price forecast creates a cost risk greater than the cost of switching to another commodity material, thus justifying an engineering change.

Risk and opportunity management can be used to complement cost estimates in order to bring visibility to the potential for commodity price volatility. Managing and reporting risks and opportunities constitute an effective measurement and communication system that should be incorporated in the target costing process. A risk is defined as the potential for an unfavorable event occurring in the future, while an opportunity is a favorable event. The measurement is the probability of occurrence of these events, and the associated consequence is the cost impact. Risks increase costs, while opportunities decrease costs. The key is to understand and communicate the cost impacts of risks and opportunities as soon as possible so there is sufficient time to influence them in the product design.

Reaching Level 5 requires building a plan to use validated data and implementing a cost status measurement system for project teams. Exhibit 3 represents

a sample cost status tracking report. The lines represent the current cost status (estimate) and the cost target, and the markers indicate the band of risk and opportunity possibilities that can still be managed on this project.

Cost accountability

Responding to commodity price movements requires the appropriate level of cost visibility and accountability for achieving cost targets. Even though commodity price movements are determined by external factors, the project teams must have knowledge of the total target cost of the system in order to define the optimal design solution and achieve their subsystems' cost targets. When commodity cost forecasts drive the cost status higher than the cost target, the project team can look at alternatives and other opportunities to bring the cost back in line. Early in the product development phase, design and material choices can still be changed before costs become committed, but as the product design is specified and released, fewer opportunities to manage cost become available.

Organizations at Level 1 do not have realistic commodity price forecasts reflected in their targets and are not held accountable for reaching the targets. They are accountable for other metrics, such as performance or schedule. An organization at the next level may hold accountability for the controllable or visible cost to the relevant functions (design, manufacturing, service) or organizations (customer, supplier) on the project teams. At the next level, responsibility and accountability are aligned. For instance, design is responsible for the cost of the impact of their decisions on manufacturing, supply chain, or service costs. As an organization increases in maturity, to lessen the pitfalls of contingency funds and limited cost visibility, progress review meetings should include a cost status chart for the program-level costs that outlines the commodity forecasts, risks, and opportunities so the project teams appreciate the cost

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challenges before them. With this knowledge, they can plan for accommodations like substitute commodities and associated engineering design changes.

In organizations that have achieved Level 5, cross-functional project teams have updated cost estimates and information on risks and opportunities that reflect the total cost for the system. Organizations share cost savings, and thus, are incented to help each other to reduce the total cost and provide the optimal solution.⁴ Risks and opportunities are assigned to functions or organizations that have control over them, and identified uncontrollable risks must have mitigation plans.⁵ If an organization/function does not identify an uncontrollable risk or does not follow the prescribed mitigation plan, then they are held accountable for the impact of this risk on their costs. With this information, they can be truly accountable for reaching controllable cost targets and incented to identify and mitigate uncontrollable costs. That understanding increases the likelihood that the teams will stay motivated to reach the cost targets in spite of the extra challenges posed by a volatile commodity market.

Summary

A mature target costing process establishes a cost target early in the development of a product and allocates the cost target to cross-functional subsystem project teams. To find the optimal design solution that meets the cost target, the project teams must have visibility into the target's assumptions about commodity prices and must continually monitor price fluctuations so that they can take appropriate actions, such as changing the design or material choices, before product costs are committed.

The best approach for responding to commodity price fluctuations in the target costing process depends on a com-

pany's process maturity level. Organizations that are unable to allocate the target cost to subsystems or to manage risk — Level 1 — may need to establish a contingency fund to cover cost increases. These organizations should work toward a higher level of maturity in which estimates are updated frequently and total costs are allocated to the subsystem project teams. Risk and opportunity management and reporting can complement cost estimates in order to bring visibility to potential commodity price volatility and to avoid the negative behaviors driven by contingency budgeting and management. Incentives for sharing cost savings and identifying, mitigating, and indemnifying risks can drive positive behaviors to reduce the cost and cost risks.

Even though commodity prices are determined by external factors, the project teams must have knowledge of the total cost of the system and aligned incentives in order to find the optimal design solution and achieve the target cost. In short, it is impossible to design out invisible costs.⁶ ■

NOTES

¹For more information on target costing, see Ansari, S. and Bell, J., *Target Costing, The Next Frontier in Strategic Cost Management* (CAM-I Irwin-McGraw Hill, 1997) and Ansari, S. and Bell, J., *Hitting the Target, the CAM-I Target Costing Implementation Guide* (Novus Publishing, 2005).

²Information about the Capability Maturity Model can be found at http://en.wikipedia.org/wiki/Capability_Maturity_Model.

³Parkinson's Law is the adage first articulated by Cyril Northcote Parkinson as the first sentence of a humorous essay published in *The Economist* in 1955: Work expands so as to fill the time available for its completion.

⁴Henke, J., SRM in turbulent times, *CPO Agenda* (Spring 2009). Available at www.cpoagenda.com/SRM.

⁵Adapted from Kenneth T. Sullivan's research in the area of best value processes and performance information concepts centered on risk minimization.

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