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## *Accounting for Decision Making and Control*

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### Chapter 1: Introduction

#### A. Managerial Accounting: Decision Making and Control

Organizations must obtain the knowledge to make certain decisions. Most information systems consist not only of formal, organized tangible records such as payrolls and purchasing documents, but also informal, intangible bits of data such as memos, special studies, and managers' impressions and opinions. The firm's information system also consists of nonfinancial information such as customer and employee satisfaction surveys.

The **internal information system** includes budgets, data on the costs of each product and current inventory, and periodic financial reports. This book focusses on how internal accounting systems provide knowledge for decision making.

After making decisions, managers must implement them in organizations in which the interests of the employees and the owners do not necessarily coincide. Organizations do not have objectives; people do. One common objective of owners of the organization is to maximize profits, while employees usually have their own objective, which is maximizing their self-interest. There is a **conflict of interest**. To control this conflict, systems are designed to monitor employees' behavior and incentive schemes are designed to reward employees for generating more profit. All successful firms must devise mechanisms that help align employee interests with maximizing the organization's value. These mechanisms constitute the control system: they include performance measures and incentive compensation systems, promotions, demotions, ... etc.

No matter what the firm's objective, the organization will survive only if its inflow or resources is at least as large as the outflow.

As part of the firm's control system, the internal accounting system helps align the interests of managers and shareholders to cause employees to maximize firm value. Internal accounting serves two purposes:

- 1) **Decision making:** to provide some of the knowledge necessary for planning and making decisions
- 2) **Control:** to help motivate and monitor people in organizations

This gives rise to the fundamental trade-off: between providing knowledge for decision making and motivation/control.

#### B. Design and Use of Cost Systems

Accountants (controllers) are charged with designing, improving, and operating the firm's accounting system – an integral part of both the decision-making and performance evaluation systems. An internal accounting system should have the following characteristics:

- 1) Provide the information necessary to assess the profitability of products or services and to optimally price and market these products or services
- 2) Provide information to detect production inefficiencies to ensure that the proposed products and volumes are produced at minimum cost
- 3) When combined with the performance evaluation and reward systems, create incentives for managers to maximize firm value
- 4) Support the financial accounting and tax accounting reporting functions
- 5) Contribute more to firm value than it costs

### C. Marmots and Grizzly Bears

Benchmarking is defined as a process of continuously comparing and measuring an organization's business processions against business leasers anywhere in the world to gain information which will help the organization take action to improve its performance.

Economic Darwinism predicts that successful firm practices will be imitated. In a competitive world, if surviving organizations use some operating procedure over long periods of time, then this procedure likely yield benefits in excess of its costs. Economic Darwinism helps identify the costs and benefits of alternative internal accounting systems.

Two caveats must be raised concerning too strict an application of economic Darwinism:

1. Some surviving operating procedures can be neutral mutations. Just because a system survives, does not mean that its benefits exceeds its costs...
2. Just because a given system survives does not mean it is optimal.

## Chapter 2: The Nature of Costs

### A. Opportunity Costs

The **opportunity cost** is the benefit forgone as a result of choosing one course of action rather than another. The alternative actions comprise the opportunity set. The characteristics of opportunity costs are:

- 1) Opportunity costs are not necessarily the same as payments
- 2) Opportunity costs are forward-looking and are based on anticipations
- 3) Opportunity costs differ from (accounting) expenses. Opportunity costs is the sacrifice of the best alternative for a given action, while an accounting expense is a cost incurred to generate a revenue.

### B. Cost Variation

**Cost behavior** is defined relative to some activity, usually units produced. Fixed costs are costs incurred by the firm even though there are no units being produced. By definition, a **fixed cost** is not an opportunity cost of the decision to change the level of output. The **marginal cost** is the cost of producing one or more unit. Average cost is the cost per unit of producing a certain number of units. It declines as output increases, and only increases as output nears capacity. **Variable costs** are the additional costs incurred when output is expanded. The **relevant range** encompasses the rates of output for which the sum of fixed and variable costs clearly approximates total cost. Step costs are expenditures fixed over a range of output levels. **Mixed or semivariable costs** are cost categories that cannot be classified as being purely fixed or purely variable.

**Output** is the measure of activity. The **cost driver** is the measure of physical activity most highly associated with variations in cost. The choice of the activity/volume measure is often critical to the perceived variation of costs. The problem with using a single activity measure is that is can be correct for one class of decisions but incorrect for others.

## Chapter 4: Organizational Architecture

### A. Basic Building Blocks

#### 1. Self-interested Behavior, Team Production, and Agency Costs

Individuals act in their self-interest to maximize their utility. Limited resources force people to make choices. Individuals form a firm because it can (1) presumably produce more goods and services collectively than individuals are capable of producing alone and (2) thus generate a larger opportunity set.

**Team production** implies that the productivity of any resource owner is affected by the production of all the rother team members, because output is a joint product of all the inputs. Thus, measuring the productivity of one team member required observing the inputs of all the other team members, which is difficult to observe. A resource owner's input cannot be directly observed, and so team members have the incentive to shirk their

responsibilities. This is known as the **free-rider problem**. Teams try to overcome this problem through the use of team loyalty – pressure from other team members – and through monitoring.

When hired to do a task, agents maximize their utility, which may or may not maximize the principal's utility. This is known as the **principal-agent problem**, or the **agency problem**. Differences among employees' risk tolerances, working horizons, and desired levels of job perks generate agency costs – the decline in firm value that results from agents pursuing their own interests to the detriment of the principal's interest. Agency problems arise because of **information asymmetry**. Most agency problems involve balancing stronger incentives for the agent to work hard against the higher risk premium required by the agent to compensate for the additional risk imposed on the agent.

Because executives have less incentive to maximize shareholder value than if they owned the entire firm themselves, **incentive compensation plans** are introduced to tie the executive's welfare more closely to shareholder welfare. Agency problems can also arise because most supervisors find it personally unpleasant to discipline or dismiss poorly performing subordinates. The difference between the value of the firm with and without the poorly performing subordinate is the agency cost imposed on the owners of the firm by the shirking supervisor.

Another problem is the **horizon problem**: managers expecting to leave the firm in the near future place less weight than the principal on those consequences that may occur after they leave. In other words, agents facing a known departure date place less weight on events that occur after they leave than on events that occur while they are still here; the short-term consequences of current decisions will matter far more to them than the long-term consequences.

To reduce agency costs, firms incur costs, such as hiring security guards or installing accounting and reporting systems, however it is usually not cost-efficient to eliminate all divergent acts.

If the board fails to reduce the firm's agency costs, the firm's stock price declines. Low stock prices encourage takeovers. If both the job and corporate control markets fail, other firms in the same product market will supply better products at lower prices and eventually force firms with high agency costs out of business.

Agents maximize their utility, not the principal's. **Goal incongruence** is when individual agents have different goals from their principal. The firm can reduce the agency problem, if not goal incongruence, by structuring agents' incentives so that when agents maximize their utility, the principal's utility is also maximized.

## 2. Decision Rights and Rights System

Decision rights over the firm's assets are assigned to various people within the firm who are then held accountable for the results. If an individual is given decision-making authority over some decision, that person has the decision right.

Employee empowerment is a term that means assigning more decision rights to employees.

## 3. Role of Knowledge and Decision Making

Since information (**knowledge**) is costly to acquire, store, and process, individual decision-making capacities are limited. The process of generating the knowledge necessary to make a decision and then transferring that knowledge within the firm drives the assignment of decision rights. A key organizational architecture issue is whether and how to link knowledge and decision rights.

Firm value might be higher if another manager with less knowledge makes the decision. This will occur if the costs from the inferior decisions made by the manager with less knowledge are smaller than the agency costs that result from giving the decision rights to the person with the better knowledge.

## B. Organizational Architecture

The firm cannot always use the external market's price to guide internal transactions, but must rather design administrative devices to

1. **Measure performance** (through objective or subjective criteria; though it is advised to do subjective)
2. **Reward performance** (through monetary or nonmonetary rewards)
3. **Partition decision rights** (the CEO retains some rights and reassigns the rest to subordinates)

These three activities make up the **organizational architecture** of a firm. They are like a **three-legged stool**: each of the three systems that compose the organization's architecture must be coordinated with the other two, or else the stool is out of balance.

The internal accounting system is a significant part of the performance measurement system. Changes are often made to this system without regard to their impact on the performance-reward and decision-assignment systems, causing the stool to be out of balance.

**Performance measurement systems** generally use financial and nonfinancial measures of performance. Nonfinancial measures provide information for making decisions. Financial measures of performance tend to be for controlling behavior. One problem with using nonfinancial measures is that they tend to proliferate to the point that managers no longer jointly maximize multiple measures. If senior management does not specify the weights, subordinates are uncertain which specific goal should receive the most attention.

Perhaps the most important mechanism for resolving agency problems is a hierarchical structure that separates decision management from decision control. **Decision management** refers to those aspects of the decision process in which the manager either initiates or implements a decision. **Decision control** refers to those aspects of the decision process whereby managers either ratify or monitor decisions. In general, the steps in the decision process are: (1) **initiation** (management), (2) **ratification** (control), (3) **implementation** (management), and (4) **monitoring** (control). Organizations separate decision management from decision control. Before implementing a decision, someone up in the organization must ratify it. However, this is not separated if it is too costly to separate them (ex. When it takes too long to receive ratification that one loses opportunities or other adverse consequences can occur).

## C. Accounting's Role in the Organization's Architecture

Accounting systems play a very important role in **monitoring** as part of the performance evaluation system. Accounting numbers are more useful in decision monitoring than in decision initiation and implementation. As a monitoring system, the accounting function is usually independent of operating managers whose performance the accounting report is measuring. To use the accounting system for control of the CEO and senior management, the shareholders and outside directors on the board insist on an internal, third-party audit of the financial results.

Another important agency conflict exists between the shareholders and debt holders of the firms. In this case, accounting numbers are used in debt contracts to better align the interests of shareholder and debt holders.

## D. Executive Compensation Contracts

Senior executives are usually paid a salary plus an annual bonus. The compensation committee sets performance goals and if executives meet their targets, a compensation is paid. To protect shareholders from excessive payouts, the total payout bonus to all eligible managers is limited to some fraction of accounting earnings.

Accounting numbers enter executive compensation in two ways. First, accounting earnings are often used as individual performance measures. Second, accounting earnings constrain the total amount of compensation paid out to the executives. Accounting profits are either used directly in setting executive compensation or are highly correlated with performance measures used in setting pay.

## Chapter 5: Responsibility Accounting and Transfer Pricing

### A. Responsibility Accounting

**Responsibility accounting** begins with formal recognition of subunits as responsibility centers. A responsibility accounting system is part of the performance evaluation system. The decision rights assigned to a subunit categorize the unit as a cost center, a profit center, or an investment center. These particular decision rights are the key determinants of how the unit's performance is evaluated and rewarded. In each case, the decision rights are linked with the specialized knowledge necessary to exercise them.

#### 1. Cost Centers

**Cost centers** are established whenever a subunit is assigned the decision rights to produce some stipulated level of output and the unit's efficiency in achieving this objective is to be measured and rewarded. Managers of cost centers are evaluated on the efficiency in applying inputs to produce output, and are not judged on revenues or profits.

To evaluate the performance, its output must be measurable. Also, some higher unit in the organization with the specialized knowledge and decision rights must specify the department's output or budget. In addition to measuring the quantity of the output, its quality must be monitored effectively. The cost center manager has the incentives to reduce costs (or increase output) by lowering quality.

Various **objectives** are used for evaluating cost center performance. One is the minimize costs for a given output, which is consistent with profit maximization as long as central management has selected the profit-maximizing level of output. Another is to maximize output for a given budget, which provides incentives equivalent to the first criterion, as long as the specified budget is the minimal budget necessary for producing the profit-maximizing quantity of output. For both objectives, the manager is constrained by total output or by budget. The two objectives are optimal if the central management chooses (1) the profit-maximizing output level or (2) the correct budget for efficient production of this output level.

Sometimes cost managers are evaluated based on **minimizing average cost** (which is not the same as maximizing profit). A cost manager who is evaluated based on minimizing average unit costs has incentives to increase output, even as inventories mount.

Cost centers **work effectively** if

- 1) The central managers have a **good understanding** of the cost functions, can measure quantity, and can set profit-maximizing output level and appropriate rewards
- 2) The central managers can observe the **quality** of the cost center's output
- 3) The cost center manager has specific **knowledge** of the optimal input mix

#### 2. Profit Centers

**Profit centers** are composed of several cost centers. The profit center managers are given a fixed capital budget and have decision rights for input mix, product mix, and selling prices (or output quantities). Profit centers are most effective when the knowledge required to make these decisions is specific to the division and costly to transfer.

Profit centers are usually evaluated on the difference between the actual and budgeted accounting profits for their division. When interdependencies exist among business units, motivating individual profit centers to maximize their unit's profits will not generally maximize profits for the firm as a whole. To help managers internalize both the positive and the negative effects that their actions impose on other profit center managers, firms often base incentive compensation not just on the manager's own profit center profits but also on a group of related profit centers' profits and/or firm wide profits.

### 3. Investment Centers

**Investment centers** are similar to profit centers, except that they have additional decision rights for capital expenditures and are evaluated on measures such as return on investments (ROI). The manager of the unit has to have specific knowledge about investment opportunities as well as information relevant for making operating decisions for the unit.

Investment managers do not have decision rights over the quality of products they can sell and the market niches they can enter, as to prevent them from debasing the firm's reputation (which is one example of an adverse effect that one responsibility center can have on another). Managing these interactions is critical to the successful linking of decision rights to individual(s) with the specialized knowledge.

The simplest of the three performance measures is accounting **net income**. Net income does not consider all the investment used to generate income. It usually incorporates interest on any debt used to finance the assets, but does not include any equity financing charge. Measuring investment center performance using net income creates dysfunctional incentives in investment centers to overinvest. Two investment centers with the same net income, but one has more investment than the other, the one with the smaller investment is yielding a higher rate of return. Managers have an incentive to overinvest as long as the new investment yields positive net income.

Another performance measure is the **return on investment**, which is the ratio of accounting net income generated by the investment center divided by the total assets invested in the investment center. ROI reduces the overinvestment problem of net income by holding the investment center manager responsible for earning a return on the capital employed in the center. However, ROI does carry some problems. ROI is not a measure of the division's economic rate of return because the accounting net income excludes some value increases. Accounting net income tends to be more conservative in that it recognizes most losses and defers most gains. Furthermore, the total assets invested excludes many intangible assets. Therefore, using ROI often leads to an underinvestment problem. Managers have an incentive to reject profitable projects with ROIs below the mean ROI for the division. Overinvestments can also occur using ROI. Moreover, riskier projects require a higher cost of capital to be compensated to the investors bearing the risk. If managers are rewarded for increasing their division's ROI without being charged for any additional risk imposed on the firm, they have an incentive to plunge the firm into risky projects. Also, a manager with a short time horizon will have a higher incentive to accept risky projects that boost ROI in immediate years, but that can be unprofitable over the life of the project.

**Residual income** measures divisional performance by subtracting the opportunity cost of capital employed from division profits. The opportunity cost of capital is measured using the firm's weighted-average cost of capital, which reflects the cost of equity and debt. The cost of equity is the opportunity cost that the shareholders bear by buying the company's stock. The cost of debt is the current market yield on debt of similar risk. Residual income also has its problems. Because it is an absolute number, it makes relative performance-evaluation comparisons across investment centers of different sizes more difficult. And like ROI, it measures the performance over one year and does not measure the impact of actions taken today on future firm value.

Generally, identifying the "better" division requires establishing a benchmark.

### 4. Economic Value Added

Many use EVA as performance measure:

$$\text{EVA} = \text{Adjusted accounting earnings} - (\text{weighted-average cost of capital} \times \text{total capital})$$

EVA measures the total return after deducting the cost of all capital employed by the division of firm. It **differs from residual income** formula in two ways. First, different accounting procedures are often used to calculate adjusted accounting earnings than are used in reporting to shareholders. For example, managers with a short horizon have the incentive to cut R&D spending. One adjustment to accounting earnings that EVA suggests is adding back R&D spending and treating it as an asset to be amortized, because total capital in the EVA formula

consists of all the division's or firm's assets. Second, many companies implementing EVA not only adopt EVA as their performance measure, but also link compensation to performance measured by EVA. Because adopting EVA-based compensation plans imposes more risk on managers, EVA increases their incentives to maximize firm value. However, this is a complicates process that requires employees receiving EVA-based bonuses to be trained in how EVA is measured and how their actions affect EVA.

### 5. Controllability Principle

Responsibility accounting seeks to identify the objectives of each part of the organization and then develop performance measures that report the achievements of those objectives. Holding managers responsible for only those decisions for which they have authority is called the **controllability principle**. Controllable costs are all costs affected by a manager's decisions. Some people argue that managers should be solely judged on those items under their control, however this has **two major drawbacks**. First, it does not give the managers the incentive to take actions that can affect the consequences of the uncontrollable event. Second, it ignores the often useful role of relative performance evaluation.

Whenever the controllability principle is applied and managers are held accountable for their actions, **dysfunctional actions** can occur. Managers can manipulate accountings by choosing depreciation methods of estimates that reduce expenses and increase reported earnings. That is why it is important to careful monitor to reduce dysfunctional suboptimal subordinate behavior.

Two important points must be stressed regarding the controllability principle:

- 1) Performance measurement schemes used mechanically and in isolation from other measures are likely to produce misleading results and induce dysfunctional behavior.
- 2) No performance measurement and reward system works perfectly. The key question is whether the current system outperforms the next best alternative after considering all costs and benefits.

## B. Transfer Pricing

When goods are transferred from one profit (or investment) center to another, an internal price (the transfer price) is assigned to the units transferred. There are basically two main **reasons** for transfer pricing within firms: international taxation and performance measurement of profit and investment centers.

### 1. International Taxation

When products are transferred overseas, the firm's corporate tax liability in both the exporting and importing is affected if the firm files tax returns in both jurisdictions. The firm will set a transfer price that minimizes the joint tax liability in the two countries to shift as much of the profit into the lower-rate jurisdiction as possible. Small differences in tax rates can generate large cash flow differences, depending on the transfer prices. Firms can also have two sets of transfer prices: one for taxes and one for internal purposes.

### 2. Economics of Transfer Pricing

Whenever responsibility centers transfer goods or services among themselves, measuring their performance requires that a transfer price be established for the goods and services exchanged. Some managers mistakenly view the transfer pricing problem as unimportant, however the choice of transfer pricing method does not merely reallocate total company profits among business units, but it also affects the firm's total profits. If, from the firm's perspective, these transfer prices do not reflect the true value of the resources, managers will make inappropriate decisions and the value of the firm will be reduced. Also, because transfer prices affect the manager's performance evaluations, incorrect transfer prices can result in inappropriate promotion and bonus decisions. Furthermore, disputes over the transfer price between divisions are inevitable. The optimal transfer price for a product or service is its opportunity cost.

*See book: transfer pricing with perfect information VS transfer pricing with asymmetric information*



### 3. Common Transfer Pricing Methods

**Market-based transfer prices:** Given a competitive external market for the good, the product should be transferred at the external market price. Such external prices are not subject to manipulations as are accounting-based transfer prices. The market-based transfer prices are assumed to produce the correct make-buy decisions; however, they will not provide an accurate reflection of opportunity costs. Firms produce internally when there are important interdependencies or synergies among the products. As the synergies increase, then the external market price becomes a more inaccurate reflection of the opportunity cost of internal production. In such cases, using the market price as the transfer price may understate the profitability of the product and its contribution to the value of the firm.

**Variable-cost transfer prices:** If no external market for the intermediate good exists or if large synergies that exist from internal production cause the market price to be an inaccurate measure of opportunity cost, then variable production cost may be the most effective alternative transfer price. However, it comes with problems. One being that Manufacturing does not necessarily recover its fixed costs and may appear to be losing money. Another problem is in situations where the variable cost per unit is not constant as volume changes, and may result in conflicts. Variable-cost transfer pricing also creates incentives for Manufacturing to distort variable cost upward by misclassifying fixed costs and variable costs, reducing the value of the firm.

**Full-cost transfer prices:** Full cost includes both direct material and labor, as well as a charge for overhead. Since full cost is the sum of the fixed and variable cost, full cost cannot be changed simply by reclassifying a fixed cost as a variable cost. However, full-cost transfer pricing frequently overstates the opportunity cost. Regardless, full-cost transfer pricing has its advantages: it has the ability to deal with the problem of changes in capacity; it is simple; it has a low cost of implementation; and it has fewer disputes over the transfer price calculation. Keep in mind, if the opportunity cost is substantially different from full cost, the firm's foregone profits can be large.

**Negotiated transfer prices:** The method of negotiating can result in transfer prices approximating opportunity cost, because the negotiating parties will have the incentive to set the number of units to maximize the combined profits of each division. Yet, there is no guarantee that they will arrive at the transfer price that maximizes firm value. Other drawbacks include: it can produce conflicts among divisions, it is time-consuming, and the divisional performance measurement can become sensitive to the relative negotiating skills of the division managers.

## Chapter 6: Budgeting

A budget is management's formal quantification of the operations of an organization for a future period. It is an aggregate forecast of all transactions expected to occur. Budgets are an integral part of decision making by assembling knowledge and communicating it to the managers with the decision rights. They are developed using key planning assumptions or basic estimating factors. Each key planning assumption must be forecast using past experience, field estimates, and/or statistical analysis.

### A. Generic Budgeting Systems

In summary, organizations use budgets to

1. Assign decision rights
2. Communicate and coordinate information both vertically and horizontally
3. Set goals through negotiation and internal contracting
4. Measure performance

Budgets are used to **assign decision rights** and create incentives for employees to act in the owner's interest. In the example given, decision rights are assigned to the board of directors. Their budgets translate the plans for the next year into financial terms. The board reviews and modifies these plans to reflect member preferences and to ensure that monies are available to implement the plans. Decision rights are linked with knowledge. The budgets assigned to the superintendent the decision rights to implement a specific set of actions. There is a bottom-up nature of the budgeting process.



Budgets are also a **performance measurement system**. It shows whether the club manager met revenue and expense targets. Member satisfaction will also show up in revenues and expenses. Budget variances are indicators of whether managers are meeting expectations and they are used in the performance reward system to determine pay increases or, in the case of extremely unfavorable variances, the need to terminate the responsible manager. However, favorable budget variances need not indicate superior performance. If less was spent than was budgeted, quality may have been sacrificed.

One **danger** is the tendency to focus the managers' attention on next year's operations only, ignoring the long-term well-being of the organization. That is why many organizations prepare long-term budgets of three- to five-year duration along with a short-run budget.

But budgeting is also an important device for **assembling specialized knowledge horizontally** within the firm. An important part of the budgeting process is sharing and assembling knowledge about key planning assumptions. In the process of assembling the knowledge, people will change their expectations of the key planning assumptions. Managers are then required to approve it and then build their budgets using it. Each manager's approval helps ensure that expectations are consistent throughout the firm.

The corporate budgeting system is also a **communication device** through which some of the specialized knowledge and key planning assumptions are transmitted. It involves a process by which various individuals arranged vertically and horizontally in the organization negotiate the terms of trade among the various parts of the organization. Moreover, the senior management likely has specialized knowledge to forecast some assumptions and to arbitrate disputes that arise between departments during the budgeting process.

Many budgeting systems involve a bottom-up, top-down approach. At each level, managers ensure that the budget assumptions are consistent and that each forecast is reasonable. Each manager also modifies subordinates' plans with any specialized knowledge the manager has acquired.

As the budget is passed from one level of the organization up to a higher level, potential bottlenecks are uncovered before they occur. At some point, key assumptions may be challenged by managers with better knowledge. The assumptions are then revised and updated.

## B. Trade-off between Decision Management and Decision Control

In **decision management**, budgets serve to communicate specialized knowledge about one part of the organization to another part, thereby improving decision making. In **decision control**, budgets are part of the performance measurement system. The budget becomes the benchmark against which to judge actual performance. If too much emphasis is placed on the budget as a performance benchmark, then managers with the specialized knowledge will stop disclosing unbiased forecasts of future events and will report conservative budget figures ex ante that enhance their performance measure ex post.

Whenever budgets are used to evaluate managers' performance and then to compensate (or promote) them based on their performance relative to the budget target, strong incentives are created for these managers to game the system and create **dysfunctional behavior**. Such behaviors include negotiating easier targets to help ensure they will receive bonuses ("sandbagging"), spending money at the end of the year to avoid losing it in the next budget period, deferring needed spending (maintenance and advertising) to meet the budget, accelerating sales near the end of the period to achieve the budget, and taking a "big bath" when budgets cannot be achieved in order to lower next year's budgets. In rare cases, trying to achieve budget targets has induced managers to commit fraud by recording fictitious revenues or misclassifying expenses as assets.

The **ratchet effect** refers to basing next year's budget on this year's actual performance. These performance targets are only adjusted upward. It is found that favorable budget variances are more likely to lead to larger increases than unfavorable variances are to lead to decreases. However, dysfunctional behavior can be induced by the ratchet effect: incentives for managers to just barely exceed their quota; salespeople would try to defer some sales into the next fiscal year, delaying processing a customer's order; incentives for managers to defer making big productivity improvements in any one year, preferring to spread them over several years.

One possible reason why budget ratcheting is widely used is because even more perverse incentives might arise if it isn't used.

While the ratchet effect creates dysfunctional behavior, the alternatives might prove costlier. Asking salespeople to estimate next year's sales instead of ratcheting would eliminate the perverse incentives of the ratchet effect, but will cause the salespeople to forecast next year's sales far below what they expect to sell, to increase their expected compensation, which would affect the communications to manufacturing. Another solution may be having a central group prepare top-down budgets by using past sales and cost patterns, macroeconomic trends, and customer surveys. This, however, can be more expensive than ratcheting. Finally, another solution would be to have more frequent job rotation, however, this destroys job-specific human capital.

The **trade-off between decision management and decision control** is often viewed as a trade-off between bottom-up and top-down budgeting. Top-down budget would be the higher level's use of aggregate data on the lower level's trends to forecast for the entire firm and then disaggregate this firm-wide budget into field office targets. This provides greater decision control. Bottom-up budgets are those submitted by lower levels of the organization to higher levels and usually imply greater decision management. This is also called participative budgeting and enhances the motivation of the lower-level managers by getting them to accept the targets.

Whether budgeting is bottom-up or top-down depends in part on where the **knowledge** is located. Bottom-up is used when knowledge and decision rights are found with the lower level, and top-down when they are found with central management. In a study, it is found that participative budgeting is used more frequently when lower-level managers have more knowledge than central management.

Some experts argue that the budget should be **"tight" but achievable**. If budgets are too easily achievable, they provide little incentive to expend extra effort; if they are too unachievable, they provide little motivation. Most budgets are set in a negotiation. Lower-level management have incentives to set a loose target to guarantee they will meet the budget and be favorably rewarded. Higher-level managers have incentives to set a tight target to motivate the lower-level managers to exert additional effort.

No simple "one-size-fits-all" panacea exists for resolving the conflict between decision management versus decision control when it comes to budgeting. Budgets are criticized often because they are time consuming to construct and add little value, are developed and updated to infrequently, are based on unsupported assumptions and guesswork, constrain responsiveness and act as a barrier to change, are rarely strategically focused and often contradictory, concentrate on cost reduction and not value creation, encourage gaming and perverse behaviors, reinforce departmental barriers rather than encourage knowledge sharing, and make people feel undervalued. However, one reason why firms retain their budgets is because budgets often remain the only central coordinating mechanism within the firm. Two different approaches are proposed **to improve the budgeting process**:

1. One method involves building the budget in two steps. The first step, which involves the lowest level of the organization, is to construct budgets in operational, not financial terms. The second step develops a financial plan based on the operational plans. This two-step process makes the budgeting process more representative of how the organization actually operates by balancing operational requirements; however, it can be costlier and does not involve a third step in which the organization iterates between steps one and two until all the various inconsistencies are resolved.
2. A second method involves breaking the annual performance trap, by not using budgets as performance targets. This decouples the decision management from the decision control. First, a peer benchmark group is set for each budget unit. Then, the unit's actual achieved performance is compared to the actual performance achieved by the benchmark. Then, actual rewards are determined subjectively. As a result, decision management is improved, because executives have less incentive to game the initial budget estimates, however, there are certain other problems. Managers still have incentives to game how the benchmarks are chosen; there is no guarantee that the subjective evaluations are done in an unbiased manner.

### C. Resolving Organizational Problems

**Strategic planning** refers to the process whereby managers select the firm's overall objectives and the tactics to achieve them. Like short-run budgets, long-run budgets force managers with specialized knowledge to communicate their forecasts of future expected events under various scenarios. While in short-run budgets the key planning assumptions involve quantities and prices, in long-run budgets, they involve what markets to be in and what technologies to acquire.

A typical firm integrates short-run and long-run budgeting into a single process. The **short-run (annual) budget** involves both decision management and decision control functions, whereas long-run budgets are hardly ever used for decision control, but primarily for decision management. **Long-run budgets** reduce managers' focus on short-term performance. Without it, managers have an incentive to cut expenditures at the expense of the long-term viability of the organization to balance short-term budgets.

**Line item budgets** refers to budgets that authorize the manager to spend only up to the specified amount on each line item. It reduces agency problems because managers cannot reduce spending on one item and divert the savings to items that enhance their own welfare. By maintaining tighter control, the organization reduces possible managerial opportunism. The manager does not have the decision rights to substitute resources, and require approval from a higher level in the organization to make such changes. Line-item illustrates how the budgeting system partitions decision rights.

**Budget lapsing** is when unspent funds cannot be carried over to the next year. It creates incentives for managers to spend all their budget. They provide tighter controls; however, the opportunity cost of lapsing budgets can be less-efficient operations. In addition, budgets that lapse reduce managers' flexibility to adjust to changing operating conditions. But without budget lapsing, managers could accumulate substantial balances in their budgets. Furthermore, budget lapsing prevents risk-averse managers from saving their budget for a rainy day.

**Static budgets** are those that do not vary with volume and each line is a fixed amount. In contrast, a flexible budget is stated as a function of some volume measure and is adjusted for changes in volume. Flexible budgets are better than static budgets for gauging the actual performance of a person or venture after controlling the volume effects – assuming that the individual being evaluated is not responsible for the volume changes. When should a firm use static budgeting and when should it use a flexible budget? If the manager has some control over volume or consequences of volume, then static budgets should be used as the benchmark to gauge performance. And if the manager does not have any control over either volume or the consequences of volume, then flexible budgets should be used as the benchmark, as they reduce the risk of volume changes borne by managers.

In **incremental based budgets**, only detailed explanations justifying the increments are submitted as part of the budget process. These budgets are reviewed and changed at higher levels in the organization, but only the incremental changes are examined in detail. Under zero-based budgeting (ZBB), each line item in total must be justified and reviewed annually. It causes managers to maximize firm value by identifying and eliminating those expenditures whose total cost exceeds total benefits, while under incremental budgeting, incremental expenditures are deleted when their costs exceed their benefits. In practice, ZBB frequently deteriorates into incremental budgeting. ZBB is most useful in organizations with considerable turnover in middle- and senior-level ranks. Also, ZBB is useful in cases where there has been substantial strategic change or high uncertainty. However, ZBB is costlier to perform than incremental budgeting.

## Chapter 7: Cost Allocation Theory

### A. Pervasiveness of Cost Allocations

**Cost allocation** is the assignment of indirect, common, or joint costs to different departments, processes, products or services. It is a form of transfer pricing within the firm.

A **common cost** arises when a resource is shared by several users, because it is less expensive for the firm to provide the service than for each individual user or department in the company to acquire the service. They are sometimes called indirect costs because they cannot be directly traced to units produced or cost objects precisely because such costs are incurred in providing benefits to different cost objects.

Cost allocation requires the following **steps**:

1. Define the cost objects. The cost object is often a subunit of the organization. Costs are often allocated to subunits to better evaluate the subunit's performance and to assess product-line profitability. Or costs are allocated as a control device.
2. Accumulate the common costs to be assigned to the cost objects.
3. Choose a method for allocating common costs accumulated in step 2 to the cost objects defined in step 1. An allocation base, a measure of activity associated with the pool of common costs being distributed to the cost objects, must be selected.

### B. Reasons to Allocate Costs

Some responsibility proponents argue that managers should only be allocated a cost if they have some control over that cost. The **three reasons** why organizations allocate costs are:

1. External reporting (including taxes): external financial reports and tax accounting require that inventory be stated at cost, including indirect manufacturing costs. The manufacturing overhead costs, including indirect costs, must be allocated to products. To avoid extra bookkeeping costs, firms use the same accounts internally as externally.
2. Cost-based reimbursements: To help regulate the cost allocation contractors use in government contracts, federal government established the Cost Accounting Standard Board (CASB).
3. Internal decision making and control: cost allocations are an important part of the organization's budget system and performance evaluation system. They change how decision rights are partitioned within the firm and hence managers' incentives and thus their behavior.

### C. Incentive/Organizational Reasons for Cost Allocations

Cost allocations act as an **internal tax system**. Like a tax system, they change behavior. The tax discourages use of the item levied with the tax. Overhead rates and cost allocations are de facto tax systems in firms. The factor input used as the allocation base is being taxed. The tax also "distorts" the price of the factor input. Compared with no allocations, cost allocations

- Reduce the manager's reported profits
- Change the mix of factor input; less of the input taxed by the cost allocation is used, and more of the untaxed factor inputs are used

Cost allocations can be used to **approximate hard-to-observe externalities**. Externalities in economics are costs or benefits imposed on other individuals without their participation in the decision and without compensation for the costs or benefits imposed on them. They can be positive (education) or negative (pollution). One way to handle these externalities is to tax them via a cost allocation.

As seen from the analysis presented from the three cases, it is better to **allocate overhead**. The allocation decision depends on the exact shape of the cost curve of the overhead department and where the firm is on the curve. It also depends on whether other inputs are allocated and the relation among inputs. If marginal cost is above average cost, then consider allocating, but if marginal cost is below average cost then allocating may not be a good idea. Generally, the firm should consider allocating overhead when average cost is

increasing, because in this case we also know that marginal cost is always above average cost. To summarize, cost allocations are average costs and are proxy for difficult-to-observe marginal costs. This is an example of using cost allocations to improve decision making.

However, some care should be exercised in using cost allocations as internal taxes. In some cases, the cost allocation rate can be significantly larger than the marginal cost of the externality, which might cause managers to reduce consumption of the allocation base. The allocation base chosen determines whether the firm value is enhanced or harmed by cost allocation. The more indirect the measure of consumption, the less useful is the cost allocation because the allocated cost bears less relation to opportunity cost. Often, allocation bases are chosen that have the greatest association with the cost being allocated.

Assume two divisions sharing a common ground. Should the common costs be allocated to the two divisions? If so, how should they be allocated? Assume that both profit center managers' compensation is based on accounting profits, therefore, cost allocations affect the managers' welfare. If common costs are not allocated, the managers have less incentive to invest in the specialized knowledge necessary to determine optimum level of the common costs. If the decision rights over the level of common costs do not reside with the managers and common costs are not allocated back, then the division managers will demand more common resources. If these managers individually or collectively have the decision rights but are not charged for the common costs, these costs grow rapidly as the managers invent ways to substitute off-budget common costs for currently consumed inputs included in their budget. Most firms allocate common costs to prevent individual divisions from overconsuming the common resource. Then comes choosing an allocation base, which causes it to be taxed and managers will reduce their consumption of the taxed item.

Cost allocations can **promote or discourage cooperation** between the two managers depending on the type of allocation method. With an **insulating allocation**, the costs allocated to one division do not depend on the operating performance of the other division. With a **noninsulating allocation**, the allocated costs of one division do depend on the other division's operating performance. Both insulating and noninsulating methods give the division managers an incentive to economize on common costs. Noninsulating allocations create incentives for mutual monitoring and cooperation by managers. The disadvantage of a noninsulating method is that it distorts the performance measure of one division by tying it to another division's performance. If there is a large interaction effect between the two managers in that one can significantly affect the other's performance, then each manager is held responsible for the other's performance through a noninsulating allocation method. However, noninsulating allocations can reduce the risk managers bear. They can act like shock absorbers for random events and reduce the variability of all managers' performance measures. Decreased variability matters for risk-averse managers.

To summarize

1. Common costs should be allocated for decision making and control whenever  $MC \geq AC$
2. Common costs should be allocated using an allocation base that does not insulate subunits whenever interactions among subunits are high and cooperation is important
3. Noninsulating cost allocations can reduce the risk managers bear
4. Noninsulating cost allocations cause one manager's performance to be distorted by other manager's performance

## Chapter 8: Cost Allocation Practices

### A. Death Spiral

Cost allocations involve apportioning common (or indirect) costs to cost objects. These common costs often arise because of scale economies, and hence contain significant fixed costs. If the common cost is purely variable, each user could purchase their own amount and the resource becomes a direct cost to that user.

When common costs consist primarily of fixed costs and users have discretion over using the service being allocated, a **death spiral** can occur. The death spiral results when utilization of a common resource falls, creating excess capacity. Average (full) cost transfer pricing charges the users for the common resource. The

fixed costs are borne by the remaining users who have incentive to reduce utilization, further raising average cost and causing additional defections. Notice that the death spiral can occur whenever full cost transfer pricing is used, there are significant fixed costs, and the user has some discretion over the quantity of the common resource to use.

There are several **solutions**.

1. When excess capacity exists, users should only be charged for the variable cost of the common resource. Alternatively, some of the fixed costs could be excluded from the transfer price.
2. Use practical capacity instead of actual utilization in calculating the overhead rate. Practical capacity represents the amount of capacity the common resource was expected to provide when it was purchased and used under normal operating circumstances. It reduces the likelihood of a death spiral because the cost of unused capacity is not imposed on the remaining users of the common resource.

With excess capacity and substantial fixed costs, managers are tempted to add new products or services solely to lower the average fixed costs on existing products.

## B. Allocating Service Department Costs

In order to compute the manufacturing cost of the final products for inventory valuation, the cost of the service departments must be allocated to the operating divisions. There are **three reasons** to allocate the service department costs:

1. By charging a positive price, users reduce their consumption from what it would be under a zero price (no cost allocations)
2. By allocating service department costs, senior management receives information about the total demand for the service at the allocated cost
3. By comparing the internal allocated cost with the outside external price of comparable services, senior management can assess the service department's operating efficiency

There are several ways to allocate service department costs to the operating divisions:

### Direct Allocation Method

Direct allocation ignores each service department's use of the other service departments. Though this simplifies the allocation calculations, inaccurate transfer prices for the service can result. Because it excludes the service departments' use of other service departments, it incorrectly states the opportunity cost of each service department. Another problem is that each service department will overuse the other service departments, because they are viewed as 'free'. They are not charged for their use of other service departments and therefore have no monetary incentive to limit their use. Accordingly, nonfinancial methods, such as rationing, must be employed to control the excessive use.

### Step-Down Allocation Method

The step-down method partially overcomes the problems with direct allocations. The procedure begins by choosing a service department and allocating all of its costs to the remaining service departments and operating divisions. Then, a second service department is chosen and all of its costs are allocated to the remaining service departments and operating divisions. This process continues until all service department costs are allocated. The main question, however, concerns the sequence of departments.

### Reciprocal Allocation Method

The reciprocal allocation method is the most precise way to allocate service department costs when each service department uses other service departments. Under this method, a system of linear equations is constructed, one for each service department containing the use of that department by all other service departments. The reciprocal allocation method produces neither the highest nor the lowest unit cost, but avoids distortions in unit allocated costs observed in the step-down method. This method is more accurate in assessing the opportunity cost of other service departments than either other allocation methods, assuming all service department costs are variable. It produces a transfer price that can be compared with an outside price

for the service: if the outside bid is less than the internal price, then it should be accepted. However, combining fixed costs with variable costs in the service departments can compromise the reciprocal method's ability to produce marginal cost transfer prices. So, in order to take full advantage of the reciprocal method's ability to estimate marginal cost transfer prices, only the variable cost should be allocated. This method is, however, not widely used for a number of reasons: (1) calculating reciprocal allocations requires substantial computing power, (2) few accountants were trained in solving systems of equations or how to formulate the problem, (3) it is difficult (and costly) to intuitively explain the reciprocal method to nonfinancial managers, (4) the dysfunctional aspects of the step-down method can be minimized by ordering the departments in the step-down sequence, (5) the primary role of cost allocations is not decision making.

### C. Joint Costs

A **joint cost** is incurred to produce two or more outputs from the same input. Joint costs and common costs are similar in definition. The major distinction between the two is that common costs are incurred in both assembly and disassembly processes, but joint costs are incurred only in disassembly processes. In an assembly process, many inputs are assembled into a few final outputs. In a disassembly process, a few inputs are disassembled into many final products. There are many ways to allocate joint costs to joint products. It is fundamental to remember that joint cost allocations can cause a spiral death.

The **net realizable value method** of allocating joint costs uses as the allocation base the difference between sales revenue and the additional costs required to process the product from the point at which the joint products are split off until they are sold. The relative profitability of each joint product depends only on its selling price less its costs beyond the split-off point, which is called the net realizable value. Allocating joint costs using net realizable value as the allocation base does not distort product line profitability, and does therefore not cause one product to bear a disproportionately larger percentage of joint costs than it generates in NRV. NRV does not distort the product line profits because joint costs are allocated based on ability to pay, however, on the other hand, NRV allocation does not provide any additional information for decision making beyond whatever information is already contained in the NRV from further processing.

Managers producing joint products must make two different, but interrelated, decisions:

1. Which joint products to further process: a joint product should be further processed if its final sales price exceeds the additional processing cost plus its unprocessed sales value.
2. Given the answer in 1, whether to process any joint inputs: managers continue processing joint inputs as long as the sum of the joint products' NRV exceeds all the costs up to and including the split-off point.

Any joint cost allocation scheme other than NRV can lead to erroneous decisions regarding eliminating joint products. However, this does not mean that NRV is the best way of allocating joint costs. For the specific decision to eliminate a product, NRV is best because other allocation schemes distort the incremental profitability of the product or division. However, an allocation scheme other than NRV can be better for controlling agency problems. Only NRV allocations do not distort product line profitability.

### D. Segment Reporting and Joint Benefits

Read pp. 353-354

## Chapter 9: Absorption Cost Systems

**Absorption cost systems** ensure that all manufacturing costs are directly traced or allocated to the various products made. They display the same trade-off between decision making and control. They are widely used in financial reporting for calculation the book value of inventory and cost of goods manufactured. There are two types of absorption systems: job order costing and process costing.

### A. Job Order Costing

**Job order costing** is used in departments that produce output in distinct jobs (job order production) or batches (batch manufacturing). It is also widely used in assembly processes.



Several important features of job order costing:

- The item being produced by the job are the objects being costed
- All direct costs of manufacturing the job are traced directly to the job
- Each job is charged for some indirect manufacturing overhead
- An input measure is used to allocate overhead costs to jobs. An input measure is the allocation base
- The overhead rate is set at the beginning of the year, before the first jobs are started
- Reported product costs are average rather than variable or marginal costs. Each job is assigned a portion of the overhead. Since overhead contains both variable and fixed costs, overhead distributed to jobs contains some fixed costs.

## B. Cost Flows through the T-Accounts

pp. 396-397

## C. Allocating Overhead to Jobs

This section describes the mechanics of using overhead rates to distribute indirect costs to jobs. The most interesting aspect of job costing is its treatment of overheads because it involves management's judgement and offers managers discretion in product costing and income determination. The innovation of job order costing is the accumulation of all indirect costs in an overhead account and the subsequent distribution of these costs to individual jobs through the use of an overhead rate. An **overhead allocation base** is chosen to allocate the indirect costs to jobs. A **prospective overhead rate** is set at the beginning of the year and allows jobs to be costed as they are produced. Using a prospective overhead rate allows more timely reporting of total costs, including indirect costs, instead of actual overhead rates, which is only available at the end of the year.

It is important to note that volume is usually measured using an input measure. The input measure selected is usually the one that has the greatest association or cause-and-effect relation with overhead. Overhead consists of both fixed and variable indirect costs. In the long run, fixed costs can be adjusted to changes in volume.

If the **overhead rate** (which is the average cost) is less than or equal to the marginal cost imposed on the firm when output expands by one more unit, allocating overhead is better than not allocating. Ideally, the overhead rate provides an estimate of the opportunity cost of using one more unit of the allocation base. It is worth noting that:

- The overhead rate equals the annual budgeted overhead divided by budgeted volume
- Budgeted volume is measured using an input
- The measure of volume chosen as the allocation base is usually the one that has the greatest association with overhead
- The choice of the overhead volume measure is critical; because it is the taxed input, managers will seek to reduce its use

Sometimes an accounting system can charge WIP with more overhead than was actually incurred. This can arise because actual overhead differs from budgeted overhead and/or because the volume measure differs from budgeted volume. Chapter 13 will analyze how over/underabsorbed overhead determines the cause of variance. There are **three ways of disposing of the over/underabsorbed balance** at year-end:

1. Write it off to costs of goods sold
2. Allocate it among work-in-process, finished goods, and costs of goods sold T-accounts based on the amount of overhead in these categories
3. Involves recalculating the cost of each job using actual overhead incurred and actual volume to compute a revised, end-of-year overhead rate

A flexible budget provides one way to forecast the overhead rate. The first step requires estimating **budgeted annual overhead**:

$$\begin{aligned}\text{Budgeted annual overhead} &= \text{fixed overhead} + \text{variable overhead} \\ &= \text{fixed overhead} + (\text{variable overhead per unit volume} \times \text{budgeted volume})\end{aligned}$$

The second step involves calculating the **budgeted annual overhead rate** (prospective) :

$$\text{Budgeted overhead rate} = \frac{\text{budgeted annual overhead}}{\text{budgeted volume}}$$

**Budgeted volume** can be determined in two ways: it can either be estimated as the volume expected for the coming year (expected volume) or as the long-run average volume (normal volume: average volume over both upturns and downturns in the economy).

Basing overhead rates on short-run fluctuations in volume causes accounting costs, but not opportunity costs, to rise when volume falls and causes them to fall when volume rises. This occurs because overhead contains some fixed costs. When volume declines, overhead costs per unit rise, and vice versa. This sends inappropriate signals to managers to raise prices when demand falls and to lower prices when demand rises. To avoid incorrect pricing decisions, managers should be wary of altering overhead rates due to short-run fluctuations in volume. This case, normal volume should be the allocation base.

Using normal volume rather than expected volume to set overhead rates creates **underabsorbed overhead** when actual volume is less than normal volume (work-in-process, finished goods, cost of goods sold do not contain all overhead costs incurred). When this underabsorbed overhead is written off to COGS, COGS rises and net income falls. When actual volume exceeds normal volume, **overabsorbed overhead** results (more overhead is included in product costs than is actually incurred). When this overabsorbed overhead is written off, COGS falls and net income rises.

Using normal volume improves decision management, however, for decision control, it is advisable to not use this measure. Using normal volume, managers have more discretion in managing earnings because setting normal volume is more objective than setting expected volume. Most firms use expected, not normal, volume. Thus, it appears that decision control is more important than decision management.

#### D. Permanent vs. Temporary Volume

Basing overhead rates on normal volume prevents reported unit costs from falling when volume increases and from rising when volume falls. With normal volume, unit costs do not vary with economic booms and busts. Once the capacity is in place, long-run average volume may very well differ from anticipated volume used to justify acquiring the capacity. However, managers are **reluctant to make the write-off** for a number of reasons:

- Such a write-off is a public admission by the managers that they overinvested in capacity, which can be damaging to their careers
- Write-offs can provide competitors with useful strategic information

In summary, temporary changes in volume are assumed to average out over the business cycle, and no asset write-offs or other accounting changes are necessary. However, to prevent dysfunctional pricing decisions, fixed asset write-offs can accompany permanent declines in volume, thereby preventing overhead rates and hence unit costs from rising.

#### E. Plantwide vs. Multiple Overhead Rates

This section describes alternative methods of aggregating overhead costs and allocating them to products. A **single, plantwide overhead rate** is the method where by, first, all the overhead costs are accumulated in a single overhead account or cost pool and then allocated to products using a single plantwide overhead rate. Alternatively, in **multiple overhead rates**, each component of overhead is treated as a separate cost pool. Another method is **departmental overhead rates**, where instead of being allocated by cost category, overhead costs are first grouped by departments, each a separate cost pool. (see fig. 9-2 until 9-4).

Choosing to use which method depends on the plant's organization, the incentive systems in place, management's demand for accurate cost data for decision making, and the incremental cost of using more complex cost systems. It is commonly believed that plantwide rate is a less accurate measure of the cause-and-effect relation in plants composed of several heterogeneous processes. It is also often assumed that multiple overhead rates for different classes of overhead costs are more accurate estimates than plantwide rates. No costing system, however, can accurately measure opportunity costs. The accuracy of a product costing system depends on how costs vary with various decisions.

## F. Process Costing

Some assembly processes and continuous flow production processes use **process costing**. Production in these settings is continuous and distinct batches do not exist. Costs are assigned to the production processes and ultimately to the product flowing through the various processes.

# Chapter 10: Criticisms of Absorption Cost Systems: Incentive to Overproduce

## A. Incentive to Overproduce

Absorption cost systems include both job order and process cost systems, which are designed to absorb all manufacturing costs into product costs. They often create **incentives to overproduce**. (see exercise p. 450)

There are several ways **to mitigate the incentive to overproduce**.

1. The first is to charge managers for inventory holding costs. If a manager is evaluated based on residual income instead of net income, managers are charged the cost of capital for holding inventory. If the manager overproduces, inventories increase, and residual income falls. Residual does not eliminate the incentive to overproduce. It does, however, make it less profitable to the manager.
2. A second method is a strict senior management policy against building inventories. However, such strict constraints are cumbersome and generate influence costs.
3. The third method, in a single-plant, publicly traded firm, compensation can be used on stock prices instead of on accounting earnings, which removes the incentive for managers to overproduce. However, this method imposes additional risk on managers for general marketwide events. In multiplant firms, the plant manager's overproduction has a small effect on the value of the firm. Hence, free-rider problems in multiplant firms decrease the ability of stock-based compensation to eliminate the overproduction incentive.
4. A fourth possibility is to use JIT production systems to reduce inventory levels. It removes from managers the decision rights to set production levels. These decision rights are replaced by demand-driven market orders
5. A final option is to change the costing system

## B. Variable (Direct) Costing

**Variable costing** (direct costing) is claimed to eliminate the incentive to build inventories, although, it is not entirely successful. Under variable costs, all fixed costs are written off against income in the year they are incurred. The only difference between absorption costing and variable costing is the treatment of fixed manufacturing costs. The purported advantages of variable costing are that it eliminates distortions to income and product costs when volume changes, and it reduces the dysfunctional incentives to overproduce.

Under variable costing, profits do not vary with production volume changes, thus eliminating the incentives of managers to show higher profits by overproducing. However, this claim is not entirely accurate. At the beginning of the year, the flexible budget is a useful tool to forecast total overhead as a function of volume, however, at the end of the year, any deviation between actual spending and the flexible budget can be due to changes in fixed costs, in variable costs, or both. The question is how to book the additional overhead: fixed or variable. If the additional overhead is treated as a variable cost, then even under variable costing, managers have an incentive to overproduce.

### C. Problems with Variable Costing

How does one determine which costs are fixed and which costs are variable at the end of the year? It is **difficult and time-consuming** to sort out whether the difference is due to a change in fixed costs, variable costs, or both. By classifying all of the excess overhead costs as variable, managers using variable costing can inventory some of these extra costs by overproducing. Therefore, even under variable costing, building inventories can result in higher reported profits whenever actual overhead exceeds the flexible budget amount.

Another problem with variable costing is that it **produces misleading unit cost figures**. Inside the firm, market prices do not exist to guide the allocation of scarce resources. Management must devise alternative accounting and administrative systems to allocate scarce resources. If variable costing is used, unit cost figures do not contain any amount for the opportunity cost of the production capacity. Full absorption costs, while not an exact measure of opportunity costs, can be a better measure than variable costs especially when the firm is capacity constrained. If fixed costs are ignored, managers have incentives to overconsume the fixed capacity resource. On the other hand, if the firm has excess capacity, including fixed charges in unit costs overstates opportunity cost and discourages use of excess capacity. In the extreme cases, a death spiral can be induced.

## Chapter 11: Criticisms of Absorption Cost Systems: Inaccurate Product Costs

### A. Inaccurate Product Costs

If the cost allocation system does not use allocations that represent the cause-and-effect relations with overhead, then **inaccurate product costs** are generated. Overhead costs are not being tracked to the activities causing the costs, but rather are being combined with other cost pools, and overly aggregated cost pools are then being allocated to products using allocation bases that do not capture the actual cause-and-effect relation.

**Activity based costing** is a modification of the absorption cost. Managers seeking to control costs must manage the cost drivers. Controlling costs requires identifying and managing key factors that generate costs, not massaging the cost numbers or cost allocation procedures. ABC intend to provide more accurate product costs and to give managers the data to manage the cost drivers.

### B. Activity-Based Costing

Activities are repetitive tasks performed by each specialized group or activity center within the firm. Activity centers are cost centers. Costs are assigned to activities in the initial step of the process, and then these activity center costs are either directly traced or allocated to products.

Installing an ABC system begins with an analysis of the types of transactions that generate costs in each support department. For each support department studied, the primary cost driver is identified. Once the cost driver is determined, it can be classified into one of four mutually exclusive categories:

- **Unit-level costs:** they arise from activities that are performed at least once for each unit of product. Eg. Direct labor and material, and variable overhead.
- **Batch-level costs:** they arise from activities performed once for each batch or lot of products. They occur once for each batch, independent of how many units are in the batch.
- **Product-level costs:** they arise from activities to support the production of the product type or model.
- **Capacity-sustaining costs:** they arise from all remaining activities required for the overall productive capacity of the factory. These are common costs, shared by all the products produced. These capacity-sustaining costs are not caused by, and hence cannot be tracked to, any particular product, batch, or product line.

See example p. 495

### C. Analyzing ABC

A study was done to compare product costs computed using a traditional unit-based absorption costing system with product costs computed using an ABC system. The data indicate that for most of the products, ABC and traditional generate roughly comparable product costs, but for a few products, dramatic changes in product costs result when computed under ABC. The authors of the study find that (1) high-volume products have lower ABC unit costs relative to traditional and (2) low-volume products tend to have higher ABC costs than traditional.

ABC systems claim to offer **several advantages**. ABC increases the percentage of product costs directly traced to individual products. Also, ABC provides an understanding of how costs are consumed by individual products, the activities required to produce them, the direct and indirect costs in the various activity centers, and how indirect costs are generated by cost drivers. ABC focus cost control at the activity level and product design level. Allocating overhead costs using direct labor encourages managers to reduce the direct labor content in products. ABC focus managers' attention on controlling costs in the activity center and reducing the content of the cost drivers in the product.

ABC systems are promoted as a way to develop more accurate product or product-line costs. Accuracy means that changes in product volume, batch size, or product design characteristics cause reported cost changes to be more highly correlated with changes in opportunity cost.

Furthermore, ABC **changes the incentives** of operating managers. Identifying the underlying cost drivers allows managers to focus their attention on them. But these managers must have the decision rights to alter the levels of the cost drivers and there must be a performance evaluation system that gives them incentives to minimize cost. Once the cost system has been converted to ABC, managers presumably have more accurate product cost information to make pricing decisions and to improve operating efficiencies. **Activity-based management (ABM)** is a process whereby business activities are identified and evaluated for potential streamlining or elimination. Each activity is evaluated based on those that add value to the product and those that don't. Those that do are improved, and those that don't are eliminated.

It can be argued that ABC provides **more accurate product cost data for decision making**, and that accuracy generally increases with the number of cost drivers. An increase in accuracy also means better operating, pricing, and resource utilization decision result. However, at some point, the cost of adding more cost pools and cost drivers exceeds the benefit, in terms of better decisions resulting from the additional accuracy. In terms of decision control, as more cost drivers are introduced, lower-level managers have more discretion in choosing the "cost drivers" because they usually have specialized knowledge of the factors driving costs in their departments. Increasing discretion usually reduced the ability of the system to monitor their behavior. Hence, more accurate product cost knowledge is undesirable if it leads to poorer decision control.

ABC provides an alternative allocation of historical costs, but does not allocate opportunity costs. To the extent that these historical costs are reasonable approximations of opportunity cost, the ABC can improve decision making. However, to the extent that product costs contain significant amounts of accounting depreciation and the accounting depreciation grossly misstates the opportunity cost of the capacity, then **ABC is no more an accurate estimate of opportunity cost**.

It is important to realize that ABC **measures costs, and not benefits**. A firm producing a single product in its only plant will not use ABC because all the indirect costs are being incurred to support this single product. There is no need to allocate these indirect costs across multiple products. Product costing becomes more challenging in multiproduct plants that produce a variety of low- and high-volume products that place differential demands on the plant's common resources. ABC provides a more accurate representation of how each product consumes common factory resources, however it does not capture the benefits of producing and selling multiple products. Although ABC captures how different products consume resources, they are unable to capture the joint benefits of having multiple products. Likewise, suppose a new product allows the firm to smooth production and utilize excess capacity, then ABC analysis might still show this product is unprofitable (example text p. 504).

### D. Acceptance of ABC

Several **problems** exist in implementing ABC. First, to implement ABC, cost analysts use interviews, time logs, and direct observation of the time people spend on various activities to estimate the resource expenses assigned to an activity. This can be time-consuming and costly. The high cost to maintain the ABC model has caused many firms to update the information infrequently, leading to out-of-date activity cost driver rates and inaccurate estimates of product and customer costs. A second problem involves the complexity of many ABC systems. The third problem encountered in ABC is the increased ability of employees and managers to game the numbers. Employee welfare is affected, because the subjective estimates are difficult to verify objectively and can lead to inaccurate estimates of ABC costs. ABC's inherent subjectivity makes it susceptible to gaming and hence lowers its value in decision control.

## Chapter 12: Standard Costs: Direct Labor and Materials

**Historical costs** satisfy financial reporting requirements for valuing inventories (balance sheet) and determining cost of goods sold (income statement), and is also a useful starting point for estimating opportunity costs. However, they do not tell us what costs should be but rather what costs were. They are therefore not useful to be used as benchmarks, only if future costs are expected to be similar to past costs. **Standard costs** are benchmarks and represent the expected or desired future cost of a product, process, or subcomponent. The amount by which actual and standard costs differ is the **standard cost variance**. They alert senior management that something is wrong.

### A. Standard Costs

**Standard costs** arise from the budgeting process. *Standard cost is the expected cost that is reasonably required to achieve a given objective under specified conditions.* It represents the relation between inputs and outputs. In a standard cost system, each product has a set of standards associated with each input.

Historical costs often prove misleading if operating conditions have changes, if material prices or wages have changed, or if these factors are expected to change. Standard costs are used in a wide variety of decision-making contexts, and are part of the internal repetitive contracting process within the firm. The estimated cost at the beginning of the year is the standard cost. They often serve as transfer prices for intrafirm transfers of goods and services.

Standard costs also provide benchmark information for decision control. The large difference between actual and standard costs signal that a process has gone differently than what was expected. Therefore, variances can be used as a measure of performance. These deviations are often caused by random variation. Over the long term, it should be expected that the positive and negative variations cancel each other out. So, the aggregated variance should be about zero if the process is in control.

A standard cost is the product of a standard quantity or usage and a standard price. **Standard quantities** are usually defined by the technical characteristics of the production. **Standard prices** are usually forecast at the beginning of the year and are part of the key planning assumptions in the firm's budgeting process. Standard costs are estimated in manufacturing by taking the bill of materials and forecasting how much of each material is required for the product and the expected price for each material.  $\text{Standard quantity} \times \text{standard price} = \text{standard material cost}$  of the product. Routing sheets contain information about how much labor time is required in each department to produce each product.  $\text{Expected labor time} \times \text{expected wages} = \text{standard labor cost}$  for the product.

Usually managers with specialized knowledge for updating the standard will be evaluated, at least in part, on the difference between their actual performance and the standard. Standards that accurately capture opportunity costs are the most useful in conveying information within the firm about alternative resource utilization. However, the accuracy is often compromised for decision control reasons. On one hand, one would bias the standard cost downward (below expected actual costs) in order to exert more pressure on managers to eliminate waste and other operating inefficiencies. On the other hand, one would bias the standard upward in order to prevent setting selling prices too low.



The **choice of tight versus loose standards** often involves the trade-off of decision control (tight) and decision making (loose). Decision management requires assembling the specialized knowledge that often resides only with the person or unit of the firm that later will be judged by the standard (decision control). One solution is to separate decision management (setting standard) from decision control (ratifying and monitoring standard).

The individuals responsible for the standard cost variance have some decision ratification rights over the standards. Standards should be reviewed and revised each year. One problem is that most firms are **reluctant to change standards** during the year. If standards are revised frequently, operating managers have less incentive to control costs, therefore frequent revisions of standards would improve decision management but would harm decision control.

**Target costing** is a top-down approach conducted during new product planning. It starts with the long-run price required to achieve a desired market share. From this price, the required return on investment (profit) is subtracted to derive a total target product cost.

$$\text{Total target cost} = \text{target price} - \text{target profit}$$

This total target cost is then broken down into subcomponent costs, which become the targets or standards to be achieved if the firm is to meet its goals for market penetration and return on capital. The target cost becomes part of the performance evaluation system.

## B. Direct Labor and Materials Variances

How direct labor and materials cost variances are calculated;

**Direct Labor Variances** (pp. 546 – 550). Large variances, either favorable or unfavorable, can mean that the system is out of control. An unfavorable variance does not necessarily mean that the person responsible is performing below expectations. It could also mean that the standard is set at an unrealistic unattainable level. It could also mean the presence of random causes. Large favorable variances are not necessarily good news because they could mean that quality is being reduced, for example, by using too few labor hours and producing lower-quality products. Favorable labor wage variances might mean that less-skilled, lower paid employees are used more than expected, which can compromise product quality. The extent to which wage and efficiency variances are used to measure performance and the weight they receive in a performance evaluation depend on: (1) the reliability of the underlying standards, (2) the inherent variability of the wages and hours due to random fluctuations, and (3) how much of the variance is potentially controllable by the manager.

**Direct Materials Variances** (pp. 550 – 553).

Standard cost systems provide a mechanism inside the firm to **reduce certain risks managers bear** because their compensation is linked to accounting-based performance measures. Recording labor and materials at standard cost strips out price and quantity (efficiency) deviations and places them into variance accounts, which reduces the risk borne by downstream ‘purchasers’ of the product, as they do not bear the risk of these deviations. Thus, standards costs remove some uncontrollable factors from the performance measures of downstream users. Because they bear less risk, these managers do not have to be paid higher salaries to compensate them, and hence total compensation can be lower.

## C. Incentive Effects of Direct Labor and Materials Variances

**Build inventories.** When evaluating purchasing managers based on direct materials price variances, they have an incentive to build inventories, because price discounts are often granted for volume purchases. Furthermore, purchasing large quantities lowers material costs, which are included in accounting earnings. One way to reduce the incentive to build up inventories is to charge the purchasing department for inventory holding costs. Therefore, the performance report should include the sum of all favorable and unfavorable price variances generated during the period plus the inventory costs. Another way to reduce inventory buildup is to adopt JIT purchasing rules.



**Externalities.** On one hand, purchasing managers can impose negative externalities on production managers by purchasing lower-quality materials. To offset this incentive, purchases are inspected when received, engineering specifications are set for each product, and purchasing is not allowed to buy materials that deviate from these standards. What could also be done is that purchasing's performance evaluation could be tied to the amount of rework generated in production due to low-quality materials. This way, they bear some of the costs they impose. On the other hand, production managers impose negative externalities on purchasing by requesting that materials be purchased on short lead times and in small lot sizes to reduce the quantity of material in storage. By making frequent design changes, engineering can increase the actual price of the purchases.

**Discouraging cooperation.** Evaluating individuals within an organization based on variances can discourage cooperative effort. For example, rewards based on labor efficiency variance can cause employees to be reluctant to support others if their evaluation reflects only when they produce as individual. On the other hand, measuring variances for a team or department could encourage cooperative effort, but can lead to shirking (free rider problem). That is why many organizations measure performance and calculate variances at multiple levels: to encourage cooperative effort and reduce shirking.

**Mutual monitoring.** Mutual monitoring occurs when managers or employees at the same level monitor each other. In this case, this incentive encourages managers to acquire and use their specialized knowledge to improve the performance of other managers. For example, basing the purchasing manager's performance evaluation on both the price and quantity variances encourages him to devise ways the production manager can economize on materials.

**Satisficing.** When the reward system is tied to achieving the standard, what usually could happen is that the managers would have incentive to achieve the standard, but little incentive to go further. Compensation schemes should motivate managers to continuously improve beyond the standard, with higher payments for greater improvements.

#### D. Disposition of Standard Cost Variances

Three ways of disposing over/underabsorbed overhead:

1. Writing it off to cost of goods sold
2. Allocating it among work-in-process, finished goods, and cost of sales
3. Recalculating cost of each job.

#### E. The Costs of Standard Costs

Standard cost systems are **costly** to implement and operate, regarding that detailed standards must be maintained and timely revisions implemented. Rapid technological change and continuous improvement efforts cause standards to be obsolete. Furthermore, the opportunity cost of the manager's time to investigate cost variances makes it more expensive. Therefore, managers usually choose to only manage the larger variances rather than the smaller ones. However, some value to investigating the small variances caused by random or temporary fluctuations, such as creating specialized knowledge, which in turn would result in higher firm value. There are a several reasons why firms chose to **abandon standard cost system**.

1. As factories become more automated, the benefits of a standard cost system are smaller in more highly automated factories. This is so, because automation reduces a fraction of direct labor in product cost, which was the main aim of standard cost systems to control.
2. Highly automated factories are no longer stable production processes. Frequent changes in products or processes require frequent revisions of cost standards, which increase the cost of the system and, hence, lowers the firm's value.

## Chapter 13: Overhead and Marketing Variances

### A. Budgeted, Standard, and Actual Volume

There are three different ways to quantify volume:

**Budgeted Volume (BV).** It is set at the beginning of the year and is used as the denominator to calculate the overhead rate. There are two ways to estimate budgeted volume: expected volume (based on projected units to be produced next year) and normal volume (based on the long-run average production).

**Standard Volume (SV).** This is the amount the plant would have generated if each unit of product manufactured used precisely the standard units of volume allowed. In other words, it measures how much input should have been used.

**Actual Volume (AV).** This is the amount of the volume measured actually occurred. While SV focuses on the relation between output and input, AV focusses just on the input.

Budgeted volume is estimated just before the year begins, and both standard and actual volume are computed during the year. (see example pp. 577 – 578)

### B. Overhead Variances

At the beginning of the year, a firm estimates its **flexible overhead budget** for the year:

$$\text{Flexible OH budget} = \text{FOH} + (\text{VOH} \times V) \quad \text{where FOH} = \text{fixed OH and } V = \text{volume measured}$$

Before the year begins, management also estimates the total budgeted volume, BV, for the year. Given the BV, the **budget overhead** can be estimated:

$$\text{BOH} = \text{FOH} + (\text{VOH} \times \text{BV}) \quad \text{where VOH} = \text{variable OH}$$

Budgeted OH is converted into an overhead absorption rate, which is used to apply overhead to jobs. The **overhead rate** is calculated as follows:

$$\text{OHR} = \frac{\text{BOH}}{\text{BV}} = \frac{\text{FOH} + (\text{VOH} \times \text{BV})}{\text{BV}} = \frac{\text{FOH}}{\text{BV}} + \text{VOH}$$

By chance, if the plant ends the year having produced the BV and actual overhead incurred equals BOH, then overhead absorbed will coincide with (BOH), and overhead absorbed will just equal total overhead incurred, leaving no over- or underabsorbed amount in the overhead account. Overhead is absorbed using SV. Most firms use SV to apply over head to products, because it produces job costs and product costs based on standard costs. Using SV prevents cost variations from being passed downstream because of the inefficient use of the input used to measure volume.

At the end of the accounting period, the **total OH variance** is

$$\text{Total OH variance} = \text{actual OH costs incurred} - \text{OH absorbed}$$

This total OH variance is the same as the over/underabsorbed OH.

$$\begin{aligned} \text{Over/Underabsorbed OH} &= \text{actual OH cost incurred} - \text{OH absorbed} \\ &= \text{AOH} - (\text{OHR} \times \text{SV}) \end{aligned}$$

The total OH variance can be disaggregated into three variances:

**Overhead spending variance.** This measure the difference between how much OH was actually incurred versus how much OH should have been incurred for the actual volume worked. The difference captures the accuracy of the flexible budget and/or the extent to which more or less OH was incurred given actual volume.

$$\text{OHSV} = \text{actual OH cost incurred} - \text{Flexible budget at AV} = \text{AOH} - [\text{FOH} + (\text{VOH} \times \text{AV})]$$

**Overhead efficiency variance.** This is the difference in flexible budgets using AV and SV.

$$\text{OHEV} = \text{flexible budget at AV} - \text{flexible budget at SV} = \text{VOH} \times (\text{AV} - \text{SV})$$

**Overhead volume variance.** This captures the difference between the flexible budget at SV and overhead absorbed. It is an estimate of unused or overused capacity of the facility. If BV = SV, then the plant produced work equal to expectations. If SV < BV, then it produced less work, and if SV > BV, then it overproduced. The volume variance does not measure the opportunity cost of the unused capacity. The opportunity cost is the contribution margin from units that could have been produced and sold, but were not. Measuring and rewarding performance using the volume variance induces managers to build inventories.

$$\begin{aligned}\text{OHVV} &= \text{flexible budget at SV} - \text{overhead absorbed} = [\text{FOH} + (\text{VOH} \times \text{SV})] - (\text{OHR} \times \text{SV}) \\ &= \text{FOH} - [(\text{BV} - \text{SV})/\text{BV}]\end{aligned}$$

*See graphical analysis p. 585*

The ability of the standard cost system to accomplish its goals depends on the accuracy of the flexible budget. If total OH costs do not vary as captured by the linear flexible budget, then using the flexible budget to disaggregate the under- or overabsorbed OH into three variances produces misleading numbers.

## Chapter 14: Management Accounting in a Changing Environment

### A. Balanced Scorecard

The strategy of an organization provides a direction for the organization. A strategy, however, is seldom specific enough to describe the steps necessary to achieve the goals. A more detailed plan identifying the inputs necessary to implement the strategy is required. A balanced scorecard translates the strategy into a plan of action that identifies specific objectives and performance drivers to help determine if the organization is moving in the right direction. It links the firm's strategy to performance drivers and relates the key performance indicators to those actions required to successfully achieve the firm's strategy and hence maximize firm value. Furthermore, balanced scorecards tend to include both short- and long-term performance.

Most balanced scorecards combine both decision management and decision control. **Decision management** is provided by identifying the sequence of objectives and the key performance indicators that allow the organization to achieve its goals. **Decision control** is provided by establishing performance measures and targets for each objective.

Balanced scorecard proponents contend that the organization's objectives should reflect the interests of these stakeholders. Objectives related to the stakeholders are captured in the balanced scorecard through four perspectives:

**Innovation and learning perspective.** This focuses on the infrastructure of the organization, with the aim that the organization is able to adapt to a dynamic environment. To adapt, it must continually retain its employees, improve its technology and information systems, and adapt to evolving customer demands. Performance indicators: employee training efforts, information system implementations, equipment and facility purchases.

**Customer perspective.** This is concerned with adding customer value. Performance indicators: customer satisfaction surveys, market share, on-time delivery, reduced defects.

**Financial perspective.** This represents the shareholders/owners of the organization and is oriented on providing shareholders a return on their investment. Performance indicators: profit, sales growth, measures of risk.

**Internal business process perspective.** This deals with issues of efficiency and quality. Activities should be analyzed to determine whether they add value and how they can be most efficiently performed. Performance indicators: number of defects, throughput time, on-time delivery.

The balance scorecard links the firm's strategy with the cause-and-effect relationships among the various performance indicators. It helps communicate to managers how to implement value-maximizing strategies, however, problems arise when they are used as performance measures. They can produce several dysfunctional behaviors, and can create incentives for managers to reduce firm value. Because a balance scorecard can only maximize one variable at a time, the managers are given no guidance as to the relative trade-off among the indicators. If managers receive compensation based on numerous balanced scorecard performance measures, they will choose those measures easiest to achieve and ignore more difficult tasks. The balanced scorecard gives managers multiple criteria for measuring their success and thus reduces their accountability for destroying shareholder value.