Chapter-06: Standard Costing

6.1: Introduction:

A *standard* is a benchmark or "norm" for measuring performance. Standards are found everywhere. Your doctor evaluates your weight using standards for individuals of your age, height, and gender. The food we eat in restaurants is prepared under specified standards of cleanliness. The buildings we live in conform to standards set in building codes. Standards are also widely used in managerial accounting where they relate to the *quantity* and *cost* (or acquisition price) of inputs used in manufacturing goods or providing services.

Quantity and cost standards are set for each major input such as raw materials and labor time. *Quantity standards* specify how much of an input should be used to make a product or provide a service. *Cost (price) standards* specify how much should be paid for each unit of the input. Actual quantities and actual costs of inputs are compared to these standards. If either the quantity or the cost of inputs departs significantly from the standards, managers investigate the discrepancy to find the cause of the problem and eliminate it. This process is called **management by exception.**

In our daily lives, we operate in a management by exception mode most of the time. Consider what happens when you sit down in the driver's seat of your car. You put the key in the ignition, you turn the key, and your car starts. Your expectation (standard) that the car will start is met; you do not have to open the car hood and check the battery, the connecting cables, the fuel lines, and so on. If you turn the key and the car does not start, then you have a discrepancy (variance). Your expectations are not met, and you need to investigate why. Note that even if the car starts after a second try, it still would be wise to investigate. The fact that the expectation was not met should be viewed as an opportunity to uncover the cause of the problem rather than as simply an annoyance. If the underlying cause is not discovered and corrected, the problem may recur and become much worse.

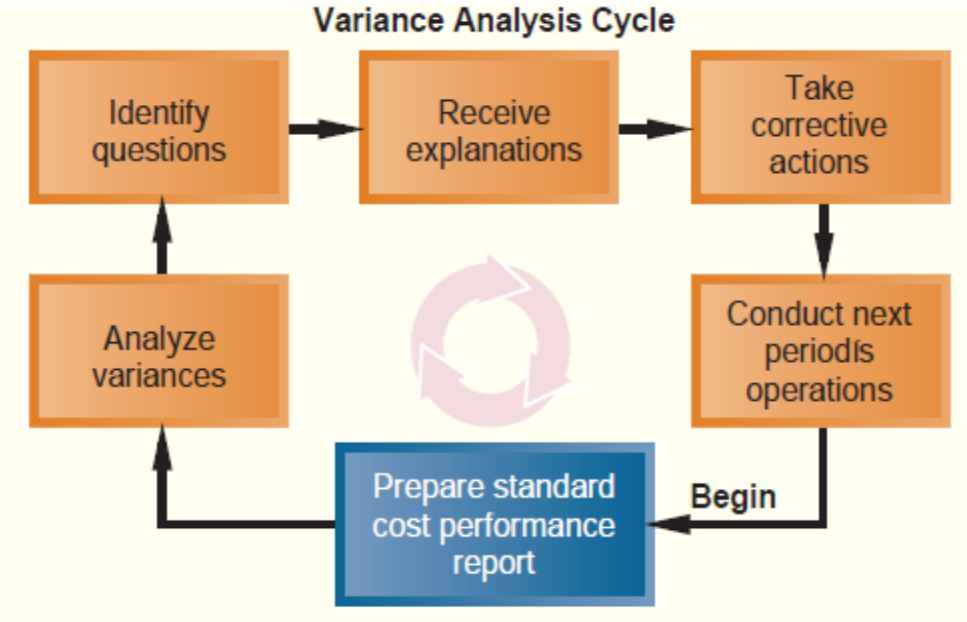

Figure: Variance Analysis Cycle

This basic approach to identifying and solving problems is the essence of the *variance analysis cycle*, which is illustrated in above. The cycle begins with the preparation of standard cost performance reports in the accounting department. These reports highlight the *variances*, which are the differences between actual results and what should have occurred according to the standards. The variances raise questions. Why did this variance occur? Why is this variance larger than it was last period? The significant variances are investigated to discover their root causes. Corrective actions are taken. And then next period's operations are carried out. The cycle begins again with the preparation of a new standard cost performance report for the latest period. The emphasis should be on highlighting problems, finding their root causes, and then taking corrective action. The goal is to improve operations-not to assign blame.

6.2: Who Uses Standard Costs?

Manufacturing, service, food, and not-for-profit organizations all make use of standards to some extent. Auto service centers like Firestone and Sears, for example, often set specific labor time standards for the completion of certain tasks, such as installing a carburetor or doing a valve job, and then measure actual performance against these standards. Fast-food outlets such as McDonald's have exacting standards for the quantity of meat going into a sandwich, as well as standards for the cost of the meat. Hospitals have standard costs for food, laundry, and other items, as well as standard time allowances for certain routine activities, such as laboratory tests. In short, you are likely to run into standard costs in virtually any line of business. Manufacturing companies often have highly developed standard costing systems in which standards for direct materials, direct labor, and overhead are created for each product. A **standard cost card** shows the standard quantities and costs of the inputs required to produce a unit of a specific product. In the following section, we provide a detailed example of setting standard costs and preparing a standard cost card.

6.3: Setting Standard Costs:

Setting price and quantity standards ideally combines the expertise of everyone who has responsibility for purchasing and using inputs. In a manufacturing setting, this might include accountants, purchasing managers, engineers, production supervisors, line managers, and production workers. Past records of purchase prices and input usage can be helpful in setting standards. However, the standards should be designed to encourage efficient *future* operations, not just a repetition of *past* operations that may or may not have been efficient.

Ideal versus Practical Standards

Should standards be attainable all of the time, part of the time, or almost none of the time? Opinions vary, but standards tend to fall into one of two categories-either ideal or practical. **Ideal standards** can be attained only under the best circumstances. They allow for no machine breakdowns or other work interruptions, and they call for a level of effort that can be attained only by the most skilled and efficient employees working at peak effort 100% of the time. Some managers feel that such standards spur continual improvement. These managers argue that even

though employees know they will rarely meet the standard, it is a constant reminder of the need for ever-increasing efficiency and effort. Few organizations use ideal standards. Most managers feel that ideal standards tend to discourage even the most diligent workers. Moreover, variances from ideal standards are difficult to interpret. Large variances from the ideal are normal and it is therefore difficult to "manage by exception."

Practical standards are standards that are "tight but attainable." They allow for normal machine downtime and employee rest periods, and they can be attained through reasonable, though highly efficient, efforts by the average worker. Variances from practical standards typically signal a need for management attention because they represent deviations that fall outside of normal operating conditions. Furthermore, practical standards can serve multiple purposes. In addition to signaling abnormal conditions, they can also be used in forecasting cash flows and in planning inventory. By contrast, ideal standards cannot be used for these purposes because they do not allow for normal inefficiencies and result in unrealistic forecasts.

6.4: Advantages of Standard Costs:

Standard cost systems have a number of advantages.

a) Standard costs are a key element in a management by exception approach. If costs conform to the standards, managers can focus on other issues. When costs are significantly outside the standards, managers are alerted that problems may exist that require attention. This approach helps managers focus on important issues.
b) Standards that are viewed as reasonable by employees can promote economy and efficiency. They provide benchmarks that individuals can use to judge their own performance.
c) Standard costs can greatly simplify bookkeeping. Instead of recording actual costs for each job, the standard costs for direct materials, direct labor, and overhead can be charged to jobs.
d) Standard costs fi t naturally in an integrated system of "responsibility accounting." The standards establish what costs should be, who should be responsible for them, and whether actual costs are under control.

6.5: Potential Problems with the Use of Standard Costs:

The improper use of standard costs can present a number of potential problems.

a) Standard cost variance reports are usually prepared on a monthly basis and often are released days or even weeks after the end of the month. As a consequence, the information in the reports may be so outdated that it is almost useless. Timely, frequent reports that are approximately correct are better than infrequent reports that are very precise but out of date by the time they are released. Some companies are now reporting variances and other key operating data daily or even more frequently.
b) If managers are insensitive and use variance reports as a club, morale will suffer. Employees should receive positive reinforcement for work well done. Management by

exception, by its nature, tends to focus on the negative. If variances are used as a club, subordinates may be tempted to cover up unfavorable variances or take actions that are not in the best interests of the company to make sure the variances are favorable. For example, workers may put on a crash effort to increase output at the end of the month to avoid an unfavorable labor efficiency variance. In the rush to produce more output, quality may suffer.

c) Labor quantity standards and efficiency variances make two important assumptions. First, they assume that the production process is labor-paced; if labor works faster, output will go up. However, output in many companies is not determined by how fast labor works; rather, it is determined by the processing speed of machines. Second, the computations assume that labor is a variable cost. However, direct labor may be essentially fixed. If labor is fixed, then an undue emphasis on labor efficiency variances creates pressure to build excess inventories.

d) In some cases, a "favorable" variance can be as bad or worse than an "unfavorable" variance. For example, McDonald's has a standard for the amount of hamburger meat that should be in a Big Mac. A "favorable" variance would mean that less meat was used than the standard specifies. The result is a substandard Big Mac and possibly a dissatisfied customer.

e) Too much emphasis on meeting the standards may overshadow other important objectives such as maintaining and improving quality, on-time delivery, and customer satisfaction. This tendency can be reduced by using supplemental performance measures that focus on these other objectives.

f) Just meeting standards may not be sufficient; continual improvement may be necessary to survive in a competitive environment. For this reason, some companies focus on the trends in the standard cost variances-aiming for continual improvement rather than just meeting the standards. In other companies, engineered standards are replaced either by a rolling average of actual costs, which is expected to decline, or by very challenging target costs.

6.6: Balanced Scorecard:

A **balanced scorecard** consists of an integrated set of performance measures that are derived from and support the company's strategy throughout the organization. A strategy is essentially a theory about how to achieve the organization's goals. For example, Southwest Airlines' strategy is to offer an operational excellence customer value proposition that has three key components-low ticket prices, convenience, and reliability. The company operates only one type of aircraft, the Boeing 737, to reduce maintenance and training costs and simplify scheduling. It further reduces costs by not offering meals, seat assignments, or baggage transfers and by booking a large portion of its passenger revenue over the Internet. Southwest also uses point-to-point flights rather than the hub-and-spoke approach of its larger competitors, thereby providing customers convenient, nonstop service to their final destination. Since Southwest serves many

less-congested airports such as Chicago Midway, Burbank, Manchester, Oakland, and Providence, it offers quicker passenger check-ins and reliable departures, while maintaining high asset utilization (i.e., the company's average gate turnaround time of 25 minutes enables it to function with fewer planes and gates). Overall, the company's strategy has worked. At a time when Southwest Airlines' larger competitors are struggling, it continues to earn substantial profits. Under the balanced scorecard approach, top management translates its strategy into performance measures that employees can understand and influence. For example, the amount of time passengers have to wait in line to have their baggage checked might be a performance measure for the supervisor in charge of the Southwest Airlines check-in counter at the Burbank airport. This performance measure is easily understood by the supervisor, and can be improved by the supervisor's actions.

6.7: Are Standards the Same as Budgets?

Standards and budgets are very similar. The major distinction between the two terms is that a standard is a *unit* amount, whereas a budget is a *total* amount. The standard cost for direct materials at Colonial Pewter is $12 per pair of bookends. If 1,000 pairs of bookends are to be made, then the budgeted cost of direct materials would be $12,000. In effect, a standard can be viewed as the budgeted cost for one unit of product.

6.8: Variances:

The differences between standard prices and actual prices and between standard quantities and actual quantities is called variances.

6.9: Management by exception:

A management system in which standards are set for various activities, with actual results compared to these standards. Significant deviations from standards are flagged as exceptions.

6.10: Different Variances:

Materials price variance measures the difference between what is paid for a given quantity of materials and what should have been paid according to the standard. The formula can be expressed as follows:

$$\text{Materials price variance} = AQ\ (AP \times SP)$$

Materials quantity variance measures the difference between the quantity of materials used in production and the quantity that should have been used according to the standard. The formula can be expressed as follows:

$$\text{Materials quantity variance} = SP\ (AQ \times SQ)$$

The price variance for direct labor is commonly termed a **labor rate variance.** This variance measures any deviation from standard in the average hourly rate paid to direct labor workers. The formula can be expressed as follows:

$$\text{Labor rate variance} = AH\ (AR \times SR)$$

Labor efficiency variance attempts to measure the productivity of direct labor. No variance is more closely watched by management, since it is widely believed that increasing direct labor productivity is vital to reducing costs. The formula can be expressed as follows:

Labor efficiency variance = SR ($AH \times SH$)

Variable overhead efficiency variance is the difference between the actual level of activity (direct labor-hours, machine-hours, or some other base) and the standard activity allowed, multiplied by the variable part of the predetermined overhead rate. The formula can be expressed as follows:

Variable overhead spending variance = AH ($AR \times SR$)

Variable overhead spending variance is the difference between the actual variable overhead cost incurred during a period and the standard cost that should have been incurred based on the actual activity of the period. The formula can be expressed as follows:

Variable overhead efficiency variance = SR ($AH \times SH$)

6.11: Manufacturing Cycle Efficiency (MCE):

Through concerted efforts to eliminate the *non-value-added* activities of inspecting, moving, and queuing, some companies have reduced their throughput time to only a fraction of previous levels. In turn, this has helped to reduce the delivery cycle time from months to only weeks or hours. Throughput time, which is considered to be a key measure in delivery performance, can be put into better perspective by computing the **manufacturing cycle efficiency (MCE).** The MCE is computed by relating the value-added time to the throughput time. The formula is:

MCE = Value-added time (Process time) ÷ Throughput (manufacturing cycle) time

Any non-value-added time results in an MCE of less than 1. An MCE of 0.5, for example, would mean that half of the total production time consists of inspection, moving, and similar non-value-added activities. In many manufacturing companies, the MCE is less than 0.1 (10%), which means that 90% of the time a unit is in process is spent on activities that do not add value to the product. Monitoring the MCE helps companies to reduce non-value-added activities and thus get products into the hands of customers more quickly and at a lower cost.

Exercise

Exc-1:

To provide an example of these measures, consider the following data for Novex Company: Novex Company keeps careful track of the time to complete customer orders. During the most recent quarter, the following average times were recorded for each unit or order:

	Days
Wait time	17.0
Inspection time	0.4
Process time	2.0
Move time	0.6
Queue time	5.0

Goods are shipped as soon as production is completed.

Required:

a) Compute the throughput time.
b) Compute the manufacturing cycle efficiency (MCE).
c) What percentage of the production time is spent in non-value-added activities?
d) Compute the delivery cycle time.

Solution:

a) Throughput time = Process time + Inspection time + Move time + Queue time
= 2.0 days + 0.4 days + 0.6 days + 5.0 days
= 8.0 days

b) Only process time represents value-added time; therefore, the computation of the MCE would be as follows:

MCE = Value-added time ÷ Throughput time
= 2.0 days ÷ 8.0 days
= 0.25

Thus, once put into production, a typical unit is actually being worked on only 25% of the time.

c) Since the MCE is 25%; 75% (100% − 25%) of total production time is spent in non-value-added activities.

d) Delivery cycle time = Wait time + Throughput time
= 17.0 days + 8.0 days
= 25.0 days

Exc-2:

Xavier Company produces a single product. Variable manufacturing overhead is applied to products on the basis of direct labor-hours. The standard costs for one unit of product are as follows:

Direct material: 6 ounces at $0.50 per ounce…… $ 3
Direct labor: 1.8 hours at $10 per hour……. 18
Variable manufacturing overhead: 1.8 hours at $5 per hour…… 9
Total standard variable cost per unit……. $30
During June, 2,000 units were produced. The costs associated with June's operations were as follows:
Material purchased: 18,000 ounces at $0.60 per ounce…… $10,800
Material used in production: 14,000 ounces……. —
Direct labor: 4,000 hours at $9.75 per hour……. $39,000
Variable manufacturing overhead costs incurred……. $20,800

Required:
Compute the direct materials, direct labor, and variable manufacturing overhead variances.

Solution:
Direct Material Variances

Materials price variance = *AQ* (*AP* - *SP*)
= 18,000 ounces ($0.60 per ounce - $0.50 per ounce)
= $1,800 UF

Materials quantity variance = *SP* (*AQ* - *SQ*)
= $0.50 per ounce (14,000 ounces - 12,000 ounces*)
= $1,000 UF

[*2,000 units × 6 ounces per unit = 12,000 ounces.]

Direct Labor Variances

Labor rate variance = *AH* (*AR* - *SR*)
= 4,000 hours ($9.75 per hour - $10.00 per hour)
= $1,000 F

Labor efficiency variance = *SR* (*AH* - *SH*)
= $10.00 per hour (4,000 hours - 3,600 hours*)
= $4,000 UF

[*2,000 units × 1.8 hours per unit = 3,600 hours.]

Variable Manufacturing Overhead Variances

Variable overhead spending variance = *AH* (*AR* - *SR*)
= 4,000 hours ($5.20 per hour * - $5.00 per hour)
= $800 UF

[*$20,800 ÷ 4,000 hours = $5.20 per hour.]

Variable overhead efficiency variance = *SR* (*AH* - *SH*)
= $5.00 per hour (4,000 hours - 3,600 hours*)
= $2,000 UF

[*2,000 units × 1.8 hours per unit = 3,600 hours.]

Here,
AQ= Actual Quantity; SQ= Standard Quantity; AP= Actual Price; SP= Standard Price; AH= Actual Hour; SH= Standard Hour; AR= Actual Rate; SR= Standard Rate.

Exc-3:

Lipex, Ltd. , of Birmingham, England, is interested in cutting the amount of time between when a customer places an order and when the order is completed. For the first quarter of the year, the following data were reported:

Inspection time…….	0.5 days
Process time……..	2.8 days
Wait time……	16.0 days
Queue time…….....	4.0 days
Move time…….	0.7 days

Required:

a) Compute the throughput time.
b) Compute the manufacturing cycle efficiency (MCE) for the quarter.
c) What percentage of the throughput time was spent in non-value-added activities?
d) Compute the delivery cycle time.
e) If by using Lean Production all queue time can be eliminated in production, what will be the new MCE?