Chapter 10 Study Guide
Standard costs and variance analysis

Chapter theme: This chapter extends our study of management control by explaining how standard costs are used by managers to control costs.

I. Standard costs – management by exception

A. Basic definitions/concepts

i. A standard is a benchmark or “norm” for measuring performance. In managerial accounting, two types of standards are commonly used by manufacturing, service, food, and not-for-profit organizations:

1. Quantity standards specify how much of an input should be used to make a product or provide a service. For example:
   a. Auto service centers like Firestone and Sears set labor time standards for the completion of work tasks.
   b. Fast-food outlets such as McDonald’s have exacting standards for the quantity of meat going into a sandwich.

2. Price standards specify how much should be paid for each unit of the input. For example:
   a. Hospitals have standard costs for food, laundry, and other items.
   b. Home construction companies have standard labor costs that they apply to sub-contractors such as framers, roofers, and electricians.
   c. Manufacturing companies often have highly developed standard costing systems that establish quantity and Price standards for each separate product’s material, labor and overhead inputs. These standards are listed on a standard cost card.

ii. Management by exception is a system of management in which standards are set for various operating activities, with actual results compared to these standards. Any deviations that are deemed significant are brought to the attention of management as “exceptions.”
1. This chapter applies the management by exception principle to quantity and price standards with an emphasis on manufacturing applications.

iii. The variance analysis cycle is a continuous process used to identify and solve problems:

1. The cycle begins with the preparation of standard cost performance reports in the accounting department.
2. These reports highlight variances which are differences between actual results and what should have occurred according to the standards.
3. The variances raise questions such as:
   a. Why did this variance occur?
   b. Why is this variance larger than it was last period?
4. The significant variances are investigated to discover their root causes.
5. Corrective actions are taken.
6. Next period’s operations are carried out and the process is repeated.

II. Setting standard costs

A. General concepts

i. Setting price and quantity standards requires the combined expertise of everyone who has responsibility for purchasing and using inputs.

1. In a manufacturing setting this might include accountants, engineers, purchasing managers, production supervisors, line managers, and production workers.

ii. Standards should be designed to encourage efficient future operations, not just a repetition of past inefficient operations.

iii. Standards tend to fall into one of two categories:

1. Ideal standards can only be attained under the best of circumstances. They allow for no work interruptions and they require employees to work at 100% peak efficiency all of the time.
2. **Practical standards** are tight but attainable. They allow for normal machine downtime and employee rest periods and can be attained through reasonable, highly efficient efforts by the average worker.
   a. Practical standards can also be used for forecasting cash flows and in planning inventory.

B. **Setting direct materials standards**

   i. The **standard price per unit** for direct materials should reflect the final, delivered cost of the materials, net of any discounts taken.

   ii. The **standard quantity per unit** for direct materials should reflect the amount of material required for each unit of finished product, as well as an allowance for unavoidable waste, spoilage, and other normal inefficiencies.

      1. A **bill of materials** is a list that shows the quantity of each type of material in a unit of finished product.
      2. **Six Sigma**, a quality standard methodology, suggests that waste and spoilage should not be tolerated. If allowances for waste and spoilage are built into the standard quantity, the level of those allowances should be reduced over time.

C. **Setting direct labor standards**

   i. The **standard rate per hour** for direct labor includes not only wages earned but also fringe benefits and other labor costs.

      1. Many companies prepare a **single rate** for all employees within a department that reflects the “mix” of wage rates earned.

   ii. The **standard hours per unit** reflects the labor hours required to complete one unit of product.

      1. Standards can be determined by using available references that estimate the time needed to perform a given task, or by relying on **time and motion studies**.
D. Setting variable manufacturing overhead standards
   i. The **price standard** for variable manufacturing overhead comes from the **variable portion of the predetermined overhead rate**.

   ii. The **quantity standard** for variable manufacturing overhead is expressed in either direct labor hours or machine hours depending on which is used as the **allocation base** in the predetermined overhead rate.

E. The standard cost card
   i. The standard cost card is a detailed listing of the standard amounts of **direct materials, direct labor, and variable overhead** inputs that should go into a unit of product, multiplied by the standard price or rate that has been set for each input.

III. A general model for variance analysis
A. Price and quantity standards
   i. Price and quantity standards are determined separately for **two reasons**:

      1. **Different managers are usually responsible for buying and for using inputs.** For example:
         a. The purchasing manager is responsible for raw material purchase prices and the production manager is responsible for the quantity of raw material used.

      2. **The buying and using activities occur at different points in time.** For example:
         a. Raw material purchases may be held in inventory for a period of time before being used in production.

B. Price and quantity variances
   i. Differences between **standard** prices and **actual** prices and **standard** quantities and **actual** quantities are called **variances**.

      1. The act of computing and interpreting variances is called **variance analysis**.
ii. Price and quantity variances can be computed for all three variable cost elements—direct materials, direct labor, and variable manufacturing overhead—even though the variances have different names.

iii. Although price and quantity variances are known by different names, they are computed exactly the same for direct materials, direct labor, and variable manufacturing overhead.

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### A General Model for Variance Analysis

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\begin{align*}
\text{Actual Quantity} & \times \text{Actual Price} & \text{Actual Quantity} & \times \text{Standard Price} & \text{Standard Quantity} & \times \text{Standard Price} \\
\text{Rate/Price Variance} & \quad \text{Usage/Quantity Variance} \\
\text{PV} = \text{AQ} \times (\text{AP} - \text{SP}) & \quad \text{QV} = \text{SP} \times (\text{AQ} - \text{SQ}) \\
\end{align*}
\]

\[
\begin{align*}
\text{AQ} & = \text{Actual Quantity} \\
\text{AP} & = \text{Actual Price} \\
\text{SP} & = \text{Standard Price} \\
\text{SQ} & = \text{Standard Quantity} \\
\end{align*}
\]

1. The **actual quantity** represents the actual amount of direct materials, direct labor, and variable manufacturing overhead used.

2. The **standard quantity** represents the **standard quantity allowed** for the actual output of the period.

3. The **actual price** represents the actual amount paid for the input used.

4. The **standard price** represents the amount that should have been paid for the input used.

5. In **equation form**, price and quantity variances are calculated as shown.

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IV. Using **standard costs**—direct materials variances
i. The materials price variance, defined as the difference between what is paid for a quantity of materials and what should have been paid according to the standard.

ii. The materials quantity variance, defined as the difference between the quantity of materials used in production and the quantity that should have been used according to the standard.

B. Direct materials variances—points of clarification:

i. Most companies compute the materials price variance when materials are purchased. They calculate the materials quantity variance after materials are used in production.

ii. The materials price variance is computed using the entire amount of material purchased during the period. The materials quantity variance is computed using only the portion of materials that was used in production during the period.

1. The purchasing manager and production manager are usually held responsible for the materials price variance, and materials quantity variance, respectively.

2. The standard price is used to compute the quantity variance so that the production manager is not held responsible for the performance of the purchasing manager.

iii. The materials variances are not always entirely controllable by one person or department. For example:

1. The production manager may schedule production in such a way that it requires express delivery of raw materials resulting in an unfavorable materials price variance.

2. The purchasing manager may purchase lower quality raw materials resulting in an unfavorable materials quantity variance for the production manager.

V. Using standard costs—direct labor variances
i. **The labor rate variance**, defined as the difference between the actual average hourly wage paid and the standard hourly wage

ii. The **labor efficiency variance**, defined as the difference between the actual quantity of labor hours and the quantity allowed according to the standard

A. Direct labor variances—points of clarification:

i. Labor variances are **partially controllable** by employees within the Production Department. For example, production managers/supervisors can influence:

   1. The deployment of highly skilled workers and less skilled workers on tasks consistent with their skill levels.
   2. The level of employee motivation within the department.
   3. The quality of production supervision.
   4. The quality of the training provided to the employees.

ii. However, labor variances are not entirely **controllable** by one person or department. For example:

   1. The Maintenance Department may do a **poor job of maintaining production equipment**. This may increase the processing time required per unit, thereby causing an unfavorable labor efficiency variance.
   2. The purchasing manager may purchase **lower quality raw materials** resulting in an unfavorable labor efficiency variance for the production manager.

VI. Using standard costs—variable manufacturing overhead variances

1. The **variable overhead rate variance**, defined as the difference between the actual variable overhead costs incurred during the period and the standard cost that should have been incurred based on the actual activity of the period,
ii. The **variable overhead efficiency variance**, defined as the difference between the actual activity of a period and the standard activity allowed, multiplied by the variable part of the predetermined overhead rate.

VII. **Variance analysis and management by exception**

A. **All variances are not worth investigating.** Methods for highlighting a subset of variances as exceptions include:

   i. Looking at the **size** of the variance.

   ii. Looking at the size of the variance **relative to** the amount of spending.

   iii. Plotting variance analysis data on a **statistical control chart**. Variances are investigated if:

      1. They are **unusual** relative to the normal level of random fluctuation.
      2. An unusual **pattern** emerges in the data.

VIII. **Evaluation of controls based on standard costs**

A. Research has shown that a substantial portion of companies in the United Kingdom, Canada, Japan, and the United States use standard cost systems. This is because standard cost systems offer many **advantages** including:

   i. Standard costs are a key element of the **management by exception** approach which helps managers focus their attention on the most important issues.

   ii. Standards that are viewed as reasonable by employees can serve as **benchmarks** that promote economy and efficiency.

   iii. Standard costs can greatly **simplify bookkeeping**.

   iv. Standard costs fit naturally into a **responsibility accounting system**.

B. The use of standard costs can also present a number of **problems**. For example:
i. Standard cost variance reports are usually prepared on a **monthly basis** and are often released days or weeks after the end of the month; hence, the information can be **outdated**.

ii. If variances are **misused** as a club to negatively reinforce employees, **morale may suffer** and employees may make **dysfunctional decisions**.

iii. Labor variances make **two important assumptions**. First, they assume that the production process is labor-paced; if labor works faster, output will go up. Second, the computations assume that labor is a variable cost. These assumptions are often invalid in today’s automated manufacturing environment where employees are essentially a fixed cost.

iv. In some cases, a **“favorable” variance can be as bad as or worse than an “unfavorable” variance**.

v. **Excessive emphasis on meeting the standards** may overshadow other important objectives such as maintaining and improving quality, on-time delivery, and customer satisfaction.
vi. Just meeting standards may not be sufficient; **continual improvement** using techniques such as Six Sigma may be necessary to survive in a competitive environment.

IX. Operating performance measures

A. Key definitions/concepts

i. **Delivery cycle time** is the elapsed time from when a customer order is received to when the completed order is shipped.

ii. **Throughput (manufacturing cycle) time** is the amount of time required to turn raw materials into completed products.

   1. This includes process time, inspection time, move time, and queue time. Process time is the only value-added activity of the four mentioned.

iii. **Manufacturing cycle efficiency (MCE)** is computed by dividing value-added time (Process time) by throughput time.

A. Fixed manufacturing overhead variances

i. **Budget variance**

   1. The equation for computing the budget variance is shown on this slide. It is simply the **difference** between the actual fixed manufacturing overhead and the **budgeted fixed manufacturing overhead** for the period.

ii. **Volume variance**

   1. The equation for computing the volume variance is shown on this slide. It is the difference between the budgeted fixed overhead and the fixed overhead applied to work in process.