Functions of Technology Management

Controlling

Chapter Overview

Steps in the Control Process

Three Types of Control

Characteristics of Effective Control Systems

Financial Controls

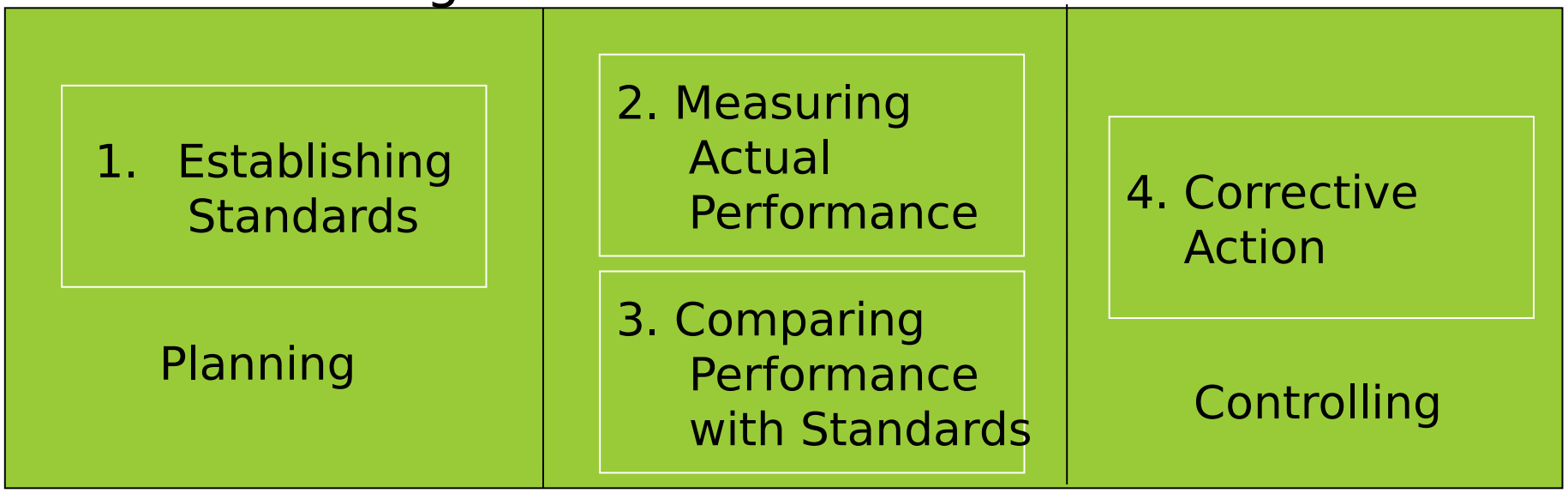
a. Financial Ratios used in Ratio Analysis
b. Financial and Operating Budgets
c. Nature of Budgeting Process

Non-Financial Controls

EXHIBIT 11-1 The Planning–Controlling Link

Controlling compelling events to conform to plans

Steps of Controlling



Establishing Standards of Performance

- Standards should be measurable, verifiable, and tangible.
  - a standard rate of production, a targeted value for product reliability, a desired room temperature, etc.
- Benchmarking - the systematic process of measuring one's performance against recognized leaders for the purpose of determining best practices that lead to superior performance when adapted and utilized.
  - Internal Benchmarking compares the results of one department, team or individual within an organization to another.
  - External Benchmarking compares statistical data with other organizations within the industry.

Measurement of the Actual Level of Performance

- Data collection and analysis
- Time study, work sampling, performance rating

Compare Performance with Standards

- Establish limits of tolerance
- Note variations (deviation within limits) and exceptions (deviation outside limits)
- Provide recognition and warning

Corrective Actions

- Short-term: Consultants, temporary workers
- Long-term: Training, modifying procedures and policies

Closed Loop Vs. Open Loop Control

Closed-Loop: Automatic control which monitors and manages
a process by means of a self-regulating system // strong feedback

Open-Loop: Requires an external monitoring system

In Engineering Management, last step in control usually requires human judgment.

Example:
Machining process fails to maintain a specific tolerance

The machining problem (fixing)

Operator is not skilled enough (training)

Tolerance cannot be achieved for that material

Three Perspectives on the Timing of Control

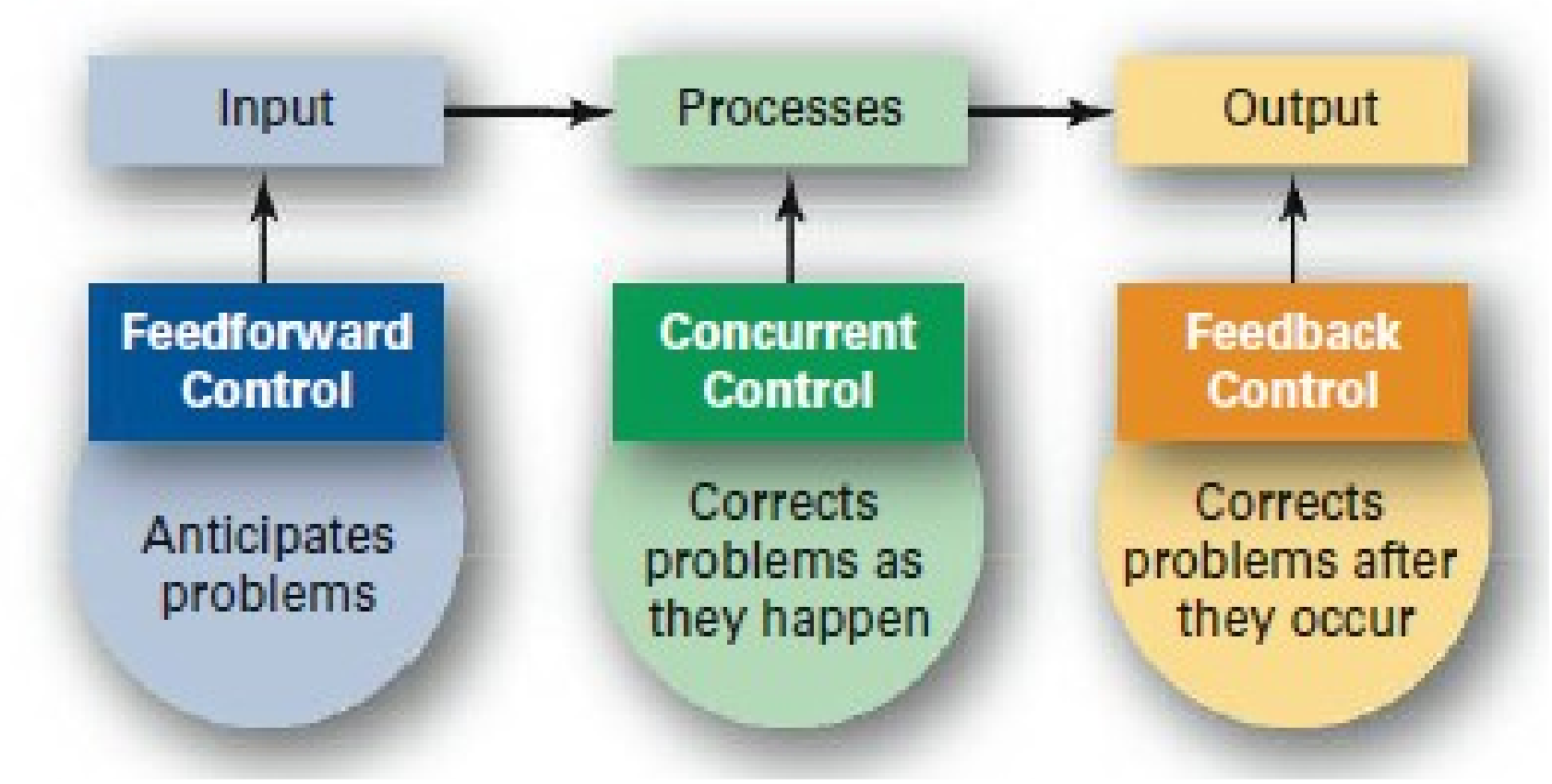
- Feedback Control: Example - thermostat.
- Screening or concurrent control: Step-by-step control
  - Management By Walking Around (MBWA)
- Feed forward (or preliminary or steering control): Predict the impact of current actions or events on future outcomes and adjust the current decisions to meet the future goals
  - Financial Statements

feedforward control
A type of control that focuses on preventing anticipated problems, since it takes place before the actual activity.

concurrent control
A type of control that takes place while an activity is in progress.

management by walking around
A term used to describe a manager who is out in the work area and interacting directly with employees.

feedback control
A type of control that takes place after a work activity is done.


Input
Processes
Output
Feedforward Control
Concurrent Control
Feedback Control
Anticipates problems
Corrects problems as they happen
Corrects problems after they occur

Characteristics of Effective Control Systems

Effective. Measure what needs to measured and controlled

Efficient. Economical and worth their cost

Timely. Enough time for corrective action

Flexible. Should be adjustable to changing conditions

Understandable. Should be easy to understand

Tailored. Deliver the information according to each level of manager

Highlight deviations. Flag parameters deviating from planned values

Lead to corrective action. Should incorporate means of corrective actions

Financial Controls

Financial Statements provide basic information for the control of cash and credit which are essential for company survival.

Three major types of financial statements:

- Balance Sheet shows the company's financial position at a particular instant in time
- Income Statement shows the financial performance or operating results of the firm over a period of time.
- Statement of Cash Flow shows where funds come from and what they are used for.

Sample Balance Sheet

Current Assets	ASSETS	
Cash	150000	
Securities	100000	250000
Accounts Receivable		400000
Inventories		
Raw Materials and Supplies	200000	
Work in Progress	200000	
Finished Goods	300000	700000
Prepaid Expenses		50000
TOTAL CURRENT ASSETS		1400000
Property, Plant and Equipment	5000000	
Less accumulated depreciation and depletion	2000000	3000000
TOTAL ASSETS		4400000
Liabilities and Stockholders' Equity		
Current Liabilities		
Accounts Payable	100000	
Installments due within 1 year on debt	50000	
Federal Income and Other Taxes	200000	
Other Accrued liabilities	100000	
TOTAL CURRENT LIABILITIES		450000
Long term Debt		1000000
TOTAL LIABILITIES		1450000
Stockholders Equity		
Capital Stock	500000	
Retained Earnings	1000000	1500000
TOTAL LIABILITIES AND EQUITY		2950000

What company *owns*

What company *owes*

Sample Income Statement

Gross Sales	4200000	
Less Returns and Allowances	200000	
Net Sales		4000000
Less Expenses and Costs of Goods Sold		
Cost Of Goods Sold	2000000	
Depreciation and Depletion	300000	
Selling Expenses	200000	
General and Administrative Expenses	200000	2700000
Operating Profit		1300000
Plus Interest and Other Income		100000
Gross Income		1400000
Less Interest Expense		50000
Income Before Taxes		1350000
Provision for Income Taxes		300000
Net Income		1050000
Retained Earnings January 1 ,2003		1500000
		2550000
Dividends Paid		300000
Retained Earnings December 31 ,2002		2250000

Sample Cash Flow Statement

Cash Flow from Operating Activities:		
Net Income	$ 15,283	
Increase in Accounts Receivable	(21,200)	
Increase in Inventory	(5,625)	
Increase in Prepaid Expenses	-	
Increase in Accounts Payable	8,925	
Total Cash Flow from Operations		$ (2,617)
Cash Flow from Investing Activities:		
Purchase of Automobile	(12,800)	
Purchase of Land	(20,000)	
Total Cash Flow from Investing Activities		$(32,800)
Cash Flow from Financing Activities:		
Mortgage	18,000	
Auto Loan	8,800	
Owner's Investment	50,000	
Total Cash Flow from Financing Activities		$ 76,800
Net Increase in Cash and Cash Equivalents		$ 41,383

Ratio Analysis

Financial ratios are ratios of two financial numbers taken from the balance sheet and/or the income statement.

- compared with average values for the industry the firm is in to evaluate relative financial health, and
- compared with earlier values from the same firm to evaluate trends.

EXHIBIT 11-10 Popular Financial Ratios

Objective	Ratio	Calculation	Meaning
Liquidity	Current ratio	$\frac{\text{Current assets}}{\text{Current liabilities}}$	Tests the organization's ability to meet short-term obligations
	Acid test	$\frac{\text{Current assets less inventories}}{\text{Current liabilities}}$	Tests liquidity more accurately when inventories turn over slowly or are difficult to sell
Leverage	Debt to assets	$\frac{\text{Total debt}}{\text{Total assets}}$	The higher the ratio, the more leveraged the organization
	Times interest earned	$\frac{\text{Profits before interest and taxes}}{\text{Total interest charges}}$	Measures how far profits can decline before the organization is unable to meet its interest expenses
Activity	Inventory turnover	$\frac{\text{Sales}}{\text{Inventories}}$	The higher the ratio, the more efficiently inventory assets are being used
	Total asset turnover	$\frac{\text{Sales}}{\text{Total assets}}$	The fewer assets used to achieve a given level of sales, the more efficiently management is using the organization's total assets
Profitability	Profit margin on sales	$\frac{\text{Net profit after taxes}}{\text{Total sales}}$	Identifies the profits that various products are generating
	Return on investment	$\frac{\text{Net profit after taxes}}{\text{Total assets}}$	Measures the efficiency of assets to generate profits

LIQUIDITY RATIOS: CURRENT RATIO

Current Assets	ASSETS	
Cash	150000	
Securities	100000	250000
Accounts Receivable		400000
Inventories		
Raw Materials and Supplies	200000	
Work in Progress	200000	
Finished Goods	300000	700000
Prepaid Expenses		50000
TOTAL CURRENT ASSETS		1400000
Property, Plant and Equipment	5000000	
Less accumulated depreciation and depletion	2000000	3000000
TOTAL ASSETS		4400000
	Liabilities and Stockholders' Equity	
Current Liabilities		
Accounts Payable	100000	
Installments due within 1 year on debt	50000	
Federal Income and Other Taxes	200000	
Other Accrued liabilities	100000	
TOTAL CURRENT LIABILITIES		450000
Long term Debt		1000000
TOTAL LIABILITIES		1450000
Stockholders Equity		
Capital Stock	500000	
Retained Earnings	1000000	1500000
TOTAL LIABILITIES AND EQUITY		2950000

Current Ratio =

$$\frac{\text{Current Assets}}{\text{Current Liabilities}}$$

$$\frac{1400000}{450000} = 3.11$$

Measure the ability to meet short-term obligations.

As minimum 2.0 is used but it varies. A current ratio of 10 shows assets are not using efficiently.

LIQUIDITY RATIOS: ACID TEST RATIO

Current Assets	ASSETS	
Cash	150000	
Securities	100000	250000
Accounts Receivable		400000
Inventories		
Raw Materials and Supplies	200000	
Work in Progress	200000	
Finished Goods	300000	700000
Prepaid Expenses		50000
TOTAL CURRENT ASSETS		1400000
Property, Plant and Equipment	5000000	
Less accumulated depreciation and depletion	2000000	3000000
TOTAL ASSETS		4400000
	Liabilities and Stockholders' Equity	
Current Liabilities		
Accounts Payable	100000	
Installments due within 1 year on debt	50000	
Federal Income and Other Taxes	200000	
Other Accrued liabilities	100000	
TOTAL CURRENT LIABILITIES		450000
Long term Debt		1000000
TOTAL LIABILITIES		1450000
Stockholders Equity		
Capital Stock	500000	
Retained Earnings	1000000	1500000
TOTAL LIABILITIES AND EQUITY		2950000

Acid Test Ratio =

$$\frac{\text{Current Assets-Inventory}}{\text{Current Liabilities}}$$

$$\frac{1400000-700000}{450000} = 1.56$$

For quickly converting to cash we calculate this ratio.

It is difficult to convert inventories to cash, Therefore, inventory is extracted.

Over 1.0 is OK.

LEVERAGE RATIO: DEBT TO ASSET RATIO

Current Assets	ASSETS	
Cash	150000	
Securities	100000	250000
Accounts Receivable		400000
Inventories		
Raw Materials and Supplies	200000	
Work in Progress	200000	
Finished Goods	300000	700000
Prepaid Expenses		50000
TOTAL CURRENT ASSETS		1400000
Property, Plant and Equipment	5000000	
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TOTAL ASSETS		4400000
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TOTAL LIABILITIES		1450000
Stockholders Equity		
Capital Stock	500000	
Retained Earnings	1000000	1500000
TOTAL LIABILITIES AND EQUITY		2950000

Debt-to-Asset Ratio =

$$\frac{\text{Total Debt}}{\text{Total Assets}}$$

$$\frac{1450000}{4400000} = 0.33$$

Relative importance of stockholders and outside creditors as a source of enterprise's capital.

Rate is dependent on the industry.

ACTIVITY RATIOS: INVENTORY TURNOVER

Current Assets	ASSETS	
Cash	150000	
Securities	100000	250000
Accounts Receivable		400000
Inventories		
Raw Materials and Supplies	200000	
Work in Progress	200000	
Finished Goods	300000	700000
Prepaid Expenses		50000
TOTAL CURRENT ASSETS		1400000
Property, Plant and Equipment	5000000	
Less accumulated depreciation and depletion	2000000	3000000
TOTAL ASSETS		4400000
Gross Sales	4200000	
Less Returns and Allowances	200000	
Net Sales		4000000
Less Expenses and Costs of Goods Sold		
Cost Of Goods Sold	2000000	
Depreciation and Depletion	300000	
Selling Expenses	200000	
General and Administrative Expenses	200000	2700000
Operating Profit		1300000
Plus Interest and Other Income		100000
Gross Income		1400000

Inventory Turnover Ratio =

$$\frac{\text{Cost of Goods Sold}}{\text{Inventory}}$$

$$\frac{2000000}{700000} = 2.86$$

ACTIVITY RATIOS: ACCOUNTS RECIEVABLE TURNOVER

Current Assets	ASSETS	
Cash	150000	
Securities	100000	250000
Accounts Receivable		400000
Inventories		
Raw Materials and Supplies	200000	
Work in Progress	200000	
Finished Goods	300000	700000
Prepaid Expenses		50000
TOTAL CURRENT ASSETS		1400000
Property, Plant and Equipment	5000000	
Less accumulated depreciation and depletion	2000000	3000000
TOTAL ASSETS		4400000
Gross Sales	4200000	
Less Returns and Allowances	200000	
Net Sales		4000000
Less Expenses and Costs of Goods Sold		
Cost Of Goods Sold	2000000	
Depreciation and Depletion	300000	
Selling Expenses	200000	
General and Administrative Expenses	200000	2700000
Operating Profit		1300000
Plus Interest and Other Income		100000
Gross Income		1400000

Accounts Receivable Turnover Ratio =

$$\frac{\text{Net Sales}}{\text{Accounts Receivable}}$$

$$\frac{4000000}{400000} = 10$$

ACTIVITY RATIOS: ASSET TURNOVER

Current Assets	ASSETS	
Cash	150000	
Securities	100000	250000
Accounts Receivable		400000
Inventories		
Raw Materials and Supplies	200000	
Work in Progress	200000	
Finished Goods	300000	700000
Prepaid Expenses		50000
TOTAL CURRENT ASSETS		1400000
Property, Plant and Equipment	5000000	
Less accumulated depreciation and depletion	2000000	3000000
TOTAL ASSETS		4400000
Gross Sales	4200000	
Less Returns and Allowances	200000	
Net Sales		4000000
Less Expenses and Costs of Goods Sold		
Cost Of Goods Sold	2000000	
Depreciation and Depletion	300000	
Selling Expenses	200000	
General and Administrative Expenses	200000	2700000
Operating Profit		1300000
Plus Interest and Other Income		100000
Gross Income		1400000

Assets Turnover Ratio =

$$\frac{\text{Net Sales}}{\text{Total Assets}}$$

$$\frac{4000000}{4400000} = 0.91$$

PROFITABILITY RATIOS: PROFIT MARGIN

Gross Sales	4200000	
Less Returns and Allowances	200000	
Net Sales		4000000
Less Expenses and Costs of Goods Sold		
Cost Of Goods Sold	2000000	
Depreciation and Depletion	300000	
Selling Expenses	200000	
General and Administrative Expenses	200000	2700000
Operating Profit		1300000
Plus Interest and Other Income		100000
Gross Income		1400000
Less Interest Expense		50000
Income Before Taxes		1350000
Provision for Income Taxes		300000
Net Income		1050000
Retained Earnings January 1 2003		1500000
		2550000
Dividends Paid		300000
Retained Earnings December 31 2002		2250000

Profit Margin Ratio =

$$\frac{\text{Net Income}}{\text{Net Sales}}$$

$$\frac{1050000}{4000000} = 26.3\%$$

Remember: Net Income should be Net Income After Tax or Net Operating

PROFITABILITY RATIOS: RETURN ON TOTAL ASSETS

Plus Interest and Other Income		100000
Gross Income		1400000
Less Interest Expense		50000
Income Before Taxes		1350000
Provision for Income Taxes		300000
Net Income		1050000
Retained Earnings January 1 2003		1500000
Current Assets	ASSETS	
Cash	150000	
Securities	100000	250000
Accounts Receivable		400000
Inventories		
Raw Materials and Supplies	200000	
Work in Progress	200000	
Finished Goods	300000	700000
Prepaid Expenses		50000
TOTAL CURRENT ASSETS		1400000
Property, Plant and Equipment	5000000	
Less accumulated depreciation and depletion	2000000	3000000
TOTAL ASSETS		4400000

Return on Total Asset =

$$\frac{\text{Net Income}}{\text{Total Assets}}$$

$$\frac{1050000}{4400000} = 23.8\%$$

Remember: Net Income should be Net Income After Tax or Net Operating

- Profit ratios
  - Measures of how efficiently managers convert resources into profits—return on investment (ROI).
- Liquidity ratios
  - Measures of how well managers protect resources to meet short term debt—current and quick ratios.
- Leverage ratios
  - Measures of how much debt is used to finance operations—debt-to-asset and times-covered ratios.

TABLE 4.1
Key Financial Ratios

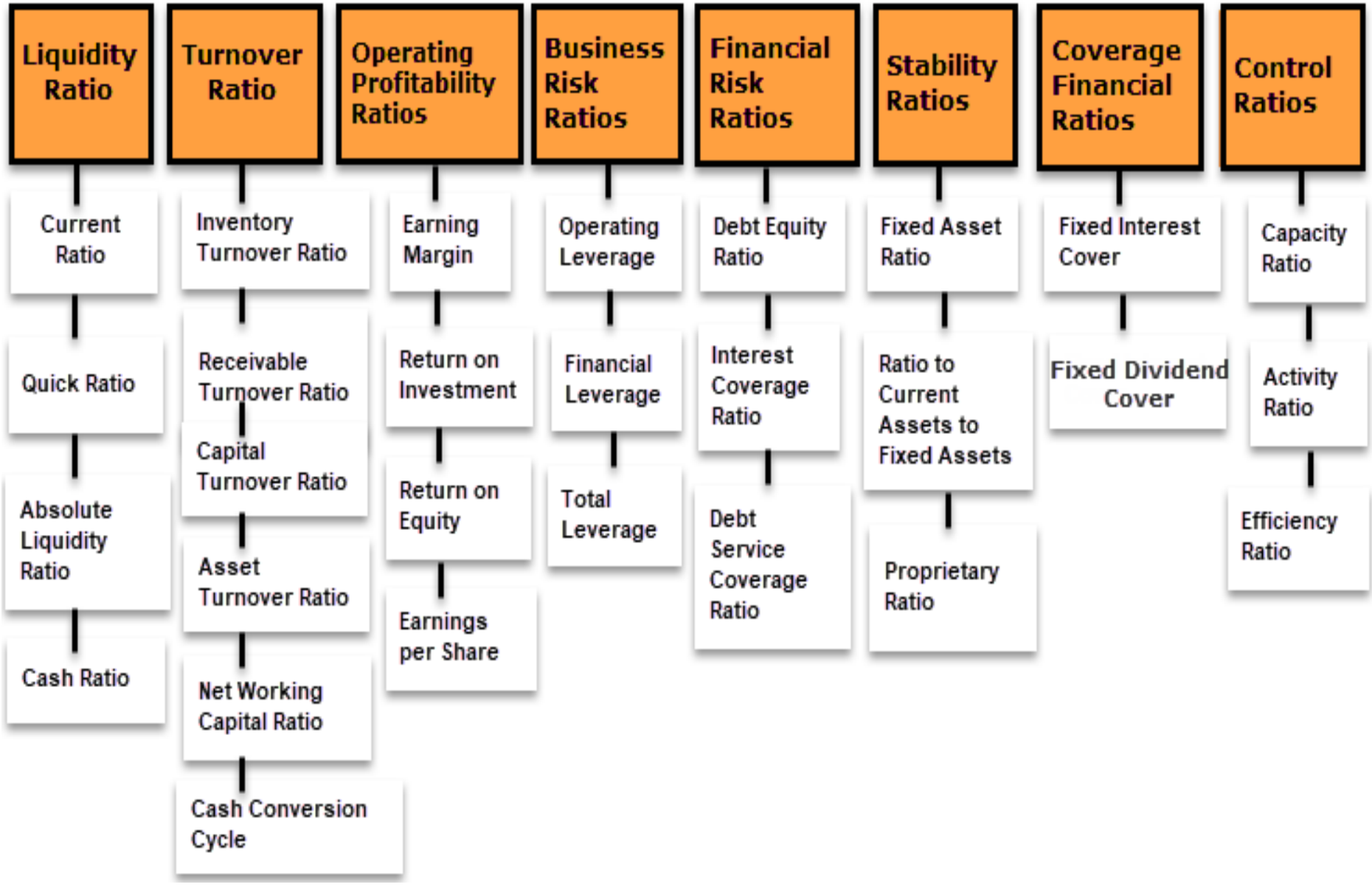
Liquidity Ratios	
1. Current ratio	$\frac{\text{Current assets}}{\text{Current liabilities}}$
2. Working capital	Current assets − Current liabilities
Leverage Ratios	
1. Total debt-to-assets ratio	$\frac{\text{Total debt}}{\text{Total assetss}}$
2. Long-term debt-to-capital ratio	$\frac{\text{Long-term debt}}{\text{Long-term debt + Total stockholders' equity}}$
3. Debt-to-equity ratio	$\frac{\text{Total debt}}{\text{Total stockholders' equity}}$
4. Long-term debt-to-equity ratio	$\frac{\text{Long-term debt}}{\text{Total stockholdres' equity}}$
5. Times-interest-earned (or coverage) ratio	$\frac{\text{Operating income}}{\text{Interest expenses}}$

TABLE 4.1
Key Financial Ratios

Profitability Ratios	
1. Gross profit margin	$\frac{\text{Sales revenues} - \text{Cost of goods sold}}{\text{Sales revenues}}$
2. Operating profit margin (or return on sales)	$\frac{\text{Sales revenues} - \text{Operating expenses}}{\text{Sales revenues}}$ or $\frac{\text{Operating income}}{\text{Sales revenues}}$
3. Net profit margin (or net return on sales)	$\frac{\text{Profits after taxes}}{\text{Sales revenues}}$
4. Total return on assets	$\frac{\text{Profits after taxes} + \text{Interest}}{\text{Total assets}}$
5. Net return on total assets (ROA)	$\frac{\text{Profits after taxes}}{\text{Total assets}}$
6. Return on stockholders' equity (ROE)	$\frac{\text{Profits after taxes}}{\text{Total stockholders' equity}}$
7. Return on invested capital (ROIC)—sometimes referred to as return on capital employed (ROCE)	$\frac{\text{Profits after taxes}}{\text{Long-term debt} + \text{Total stockholders' equity}}$

Ratio	Calculation	Question it helps to answer	Better as it gets...
Net income margin	Net income ÷ Total income	How much income is used up by expenses?	Bigger Will be <1
Return on assets	Net income ÷ Total assets	How big is the income supporting the assets?	Bigger
Return on net worth	Net income ÷ Net worth	How big is income relative to net worth?	Bigger
Debt to assets	Total debt ÷ Total assets	How much asset value is financed by debt? Or how much asset value is there to satisfy debt?	Smaller Should be <1
Total debt	Total debt ÷ Net worth	How large is debt relative to net worth?	Smaller Should be <1

Interest coverage	Income before interest ÷ Interest expense	How well does income cover interest expenses?	Bigger Should be >1
Cash flow to income	Net cash flow ÷ Net income	How much do payments for investments and financing take from income?	Bigger
Cash flow to assets	Net cash flow ÷ Total assets	How much cash flow supports assets?	Bigger
Free cash flow	Free cash flow ÷ Net cash flow	How much cash is left to invest after covering living expenses and debt repayments?	Bigger


Liquidity Ratio
Current Ratio
Quick Ratio
Absolute Liquidity Ratio
Cash Ratio
Turnover Ratio
Inventory Turnover Ratio
Receivable Turnover Ratio
Capital Turnover Ratio
Asset Turnover Ratio
Net Working Capital Ratio
Cash Conversion Cycle
Operating Profitability Ratios
Earning Margin
Return on Investment
Return on Equity
Earnings per Share
Business Risk Ratios
Operating Leverage
Financial Leverage
Total Leverage
Financial Risk Ratios
Debt Equity Ratio
Interest Coverage Ratio
Debt Service Coverage Ratio
Stability Ratios
Fixed Asset Ratio
Ratio to Current Assets to Fixed Assets
Proprietary Ratio
Coverage Financial Ratios
Fixed Interest Cover
Fixed Dividend Cover
Control Ratios
Capacity Ratio
Activity Ratio
Efficiency Ratio

Budgets are plans for the future allocation and use of resources over a fixed period of time.

The budgeting process forces managers to think through future operations in quantitative terms and obtain approval of the planned scope of operations.

Financial budgets describe where the firm intends to get its cash for the coming period and hot it intends to use it.

- Cash budgets estimate future revenues and expenditures and their timing during budgeting period.
- Capital expenditure budgets describe future investments in plant and equipment.
- Balance sheet budget uses the previous two estimates to predict what the balance sheet will look like at the end of the budgeting period.

For closer control, organizations are divided into **responsibility centers**

- Expense or Cost Center: Primary financial concern is control of costs
- Revenue Center (Sales or Marketing): The manager has revenue targets to meet
- Profit Centers: For manipulating costs to increase profit.

Operating budgets can be created for each of these responsibility centers.

- Expense budget
- Revenue budget
- Profit budget

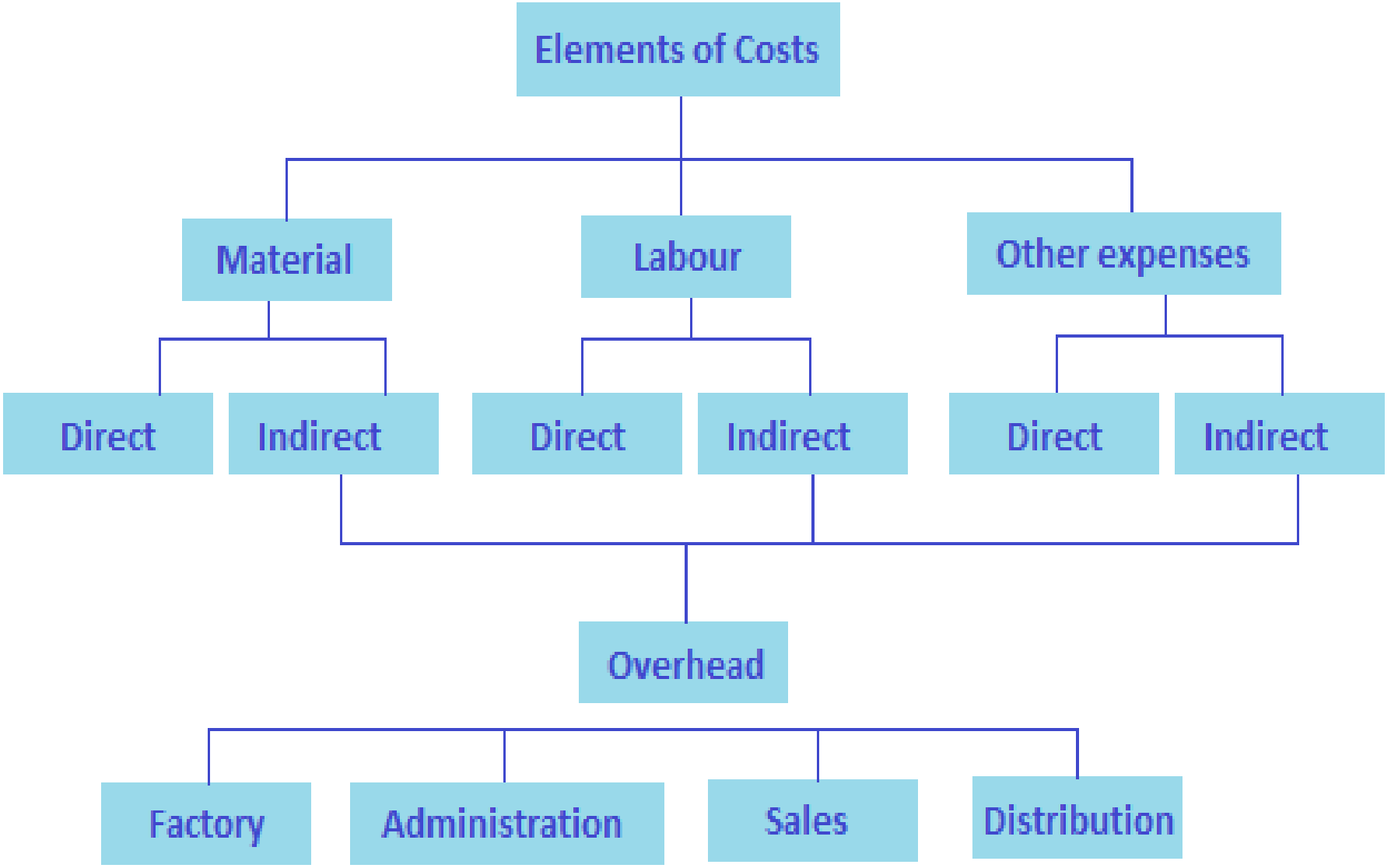
Cost Accounting

Allocating cost among products

	Product A	Product B	Total
Production	4,000	1,000	5,000
Direct Labor	$40,000	$10,000	$50,000
Overhead	$4,000	$1,000	$5,000
Set-up Cost	$4,000	$4,000	$8,000
Total Cost	$48,000	$15,000	$63,000
Unit Cost	$12	$15	

Overheads

- **Costs that cannot be traced & attributed to the physical units of a product**
- **A combination of all indirect costs which consists of indirect materials, indirect labour & indirect expenses**


Elements of Costs
Material
Labour
Other expenses
Direct
Indirect
Direct
Indirect
Direct
Indirect
Overhead
Factory
Administration
Sales
Distribution

Audits

Audits are investigations of an organization's activities to verify their correctness and identify any need for improvement.

External Audits: required at least once a year for publicly held organization by independent companies

Internal Auditing: carried out by company staffs in which auditing is performed in several subunits of the organization

Non-Financial Controls

Human Resource Controls

- assuring that human and organizational performance conform to expectations.
- Performance appraisal - management by Objective (MBO)
- Tools to evaluate collective human and organizational performance
  - Management audit
  - Human resource audit
- Social controls

Organizational Effectiveness Review Administrative Factors Worksheet		Administrative Factors Worksheet	
Factor	Rating	Current Strengths, Weaknesses, Needs	Future Objectives and Plans
Planning. *Does the organization:* –Develop realistic, time-phased plans for the long, medium, and short term? –Analyze risks and provide for contingencies? –Integrate plans and objectives with interfacing organizations? –Produce valid and timely proposals and accurate cost estimates? –Forecast funding and labor requirements accurately?	–High –Avg. –Low		
Organizing and staffing. *Does the organization:* –Establish clear definitions of function, authority, and accountability? –Select the most qualified personnel to fill its needs? –Assign personnel so as to best utilize their capabilities and potential? –Assess its strengths and weaknesses and promptly correct deficiencies?	–High –Avg. –Low		
Directing. *Does the organization:* –Maintain high performance standards? –Stress people-oriented leadership and the importance of personal example? –Delegate work effectively, encouraging maximum employee involvement and responsibility? –Recognize achievement and distribute rewards equitably? –Encourage employee development and growth?	–High –Avg. –Low		
Control. *Does the organization:* –Monitor operational progress and promptly correct deficiencies? –Control expenditures as required to assure achievement of profit objectives? –Adhere to schedules? –Assess its productivity and continually strive to improve it?	–High –Avg. –Low		
Communication. *Does the organization:* –Maintain good intra- and interorganizational communications? –Keep management informed of key operations and problems? –Keep employees informed and solicit their ideas and opinions? –Encourage the exchange of technical information?	–High –Avg. –Low		
Procurement/subcontracting. *Does the organization:* –Act promptly on procurement matters? –Establish effective time-phased plans for procurement? –Assume an active role in "make or buy" decisions? –Assist in developing subcontract sources? –Ensure an adequate definition of work on all subcontracted efforts? –Maintain an effective interface with subcontractors and monitor subcontractor progress?	–High –Avg. –Low		
Space and Facilities. *Does the organization:* –Accurately predict its space and facilities needs? –Make optimal use of available space and facilities? –Ensure proper maintenance and calibration of all instruments and equipment? –Maintain required accountability records of all property? –Maintain high standards of housekeeping?	–High –Avg. –Low		

Figure 8-2 Management audit worksheet for administrative activities. (From *R&D Productivity: Study Report*, 2nd ed., Hughes Aircraft Company, El Segundo, CA, 1978, pp. 26–27.)

Human Resource Audit

- Investments in acquiring outstanding people and in extensive training programs for them represent capital investments in the future as much as does the purchase of new machinery
- Number of approaches to quantify the value of human resource investment

Social Controls

- Building an organizational culture and controlling
- Self-control

The excellent companies live their commitment to people, as they do their preference for action— any action—over countless standing committees and endless 500-page studies, their fetish about quality and service standards that others, using optimization techniques, would consider pipe dreams, and their insistence on regular initiative (practical autonomy) from tens of thousands, not just 200 designated $75,000-a-year thinkers. ...

The excellent companies seem to have developed cultures that have incorporated the values and practices of the great leaders and thus those shared values can be seen to survive for decades after the passing of the original guru. Second, .. .it appears that the real role of the chief executive is to manage the values of the organization

The excellent companies

- Live their commitment to people,
- Fetish about quality and service standards that others,
- Uses optimization techniques
- Consider pipe dreams
- Develop cultures that have incorporated the values and practices of the great leaders and thus those shared values can be seen to survive for decades after the passing of the original guru.
- Second, .. .it appears that the real role of the chief executive is to manage the values of the organization

For values imbued in the corporate culture to be effective requires that employees in general exercise self-control over their actions. Like other control systems, self-control requires:

- The existence of standards (knowledge by the general worker of the organization's objectives and values)
- Comparison with actual outcomes (which implies feedback of performance to the individual, not just to management or a "quality control" group)
- Corrective action (which requires that the individual have the tools, the autonomy, and the motivation to make corrections)

Other Nonfinancial Controls

- Methods of evaluating the effectiveness of research activities
- Control systems for drawing release and for engineering design changes (configuration management)
- Effective production management
  - Inventory control
  - Quality control
- Project management – schedule, cost, and the performance of resulting product.