Managerial Accounting

COURSE OVERVIEW

Session	Topic	Hilton / Platt
1	The Changing Role of Managerial Accounting	Chapter 1
	Basic Cost Management Concepts	Chapter 2
2	Product / Job Costing	Chapter 3
	Transfer Pricing	Chapter 13
3	Cost-Volume-Profit Analysis	Chapter 7
	Inventory Costing (Absorption vs. Variable Costing)	Chapter 8
4	Decision-Making: Relevant Costs and Benefits	Chapter 14
	Responsibility Center, Performance Measures & Controls	(Chapter 12/13)
5	Activity-Based Costing	Chapter 5
6	Activity Analysis, Cost Behavior, and Cost Estimation	Chapter 6
	Budgets – Financial Planning and Analysis	Chapter 9
7	Standard Costing and Direct Cost Variances	Chapter 10
8	Signaling Effects of Incentives	
	Sustainability and Controlling	

CHAPTER 6
ACTIVITY ANALYSIS, COST BEHAVIOR, AND COST ESTIMATION

COST BEHAVIOR ETC.

OUTLINE

TYPES OF COSTS – VARIABLE, FIXED, STEP FIXED OR STEP VARIABLE, ETC.

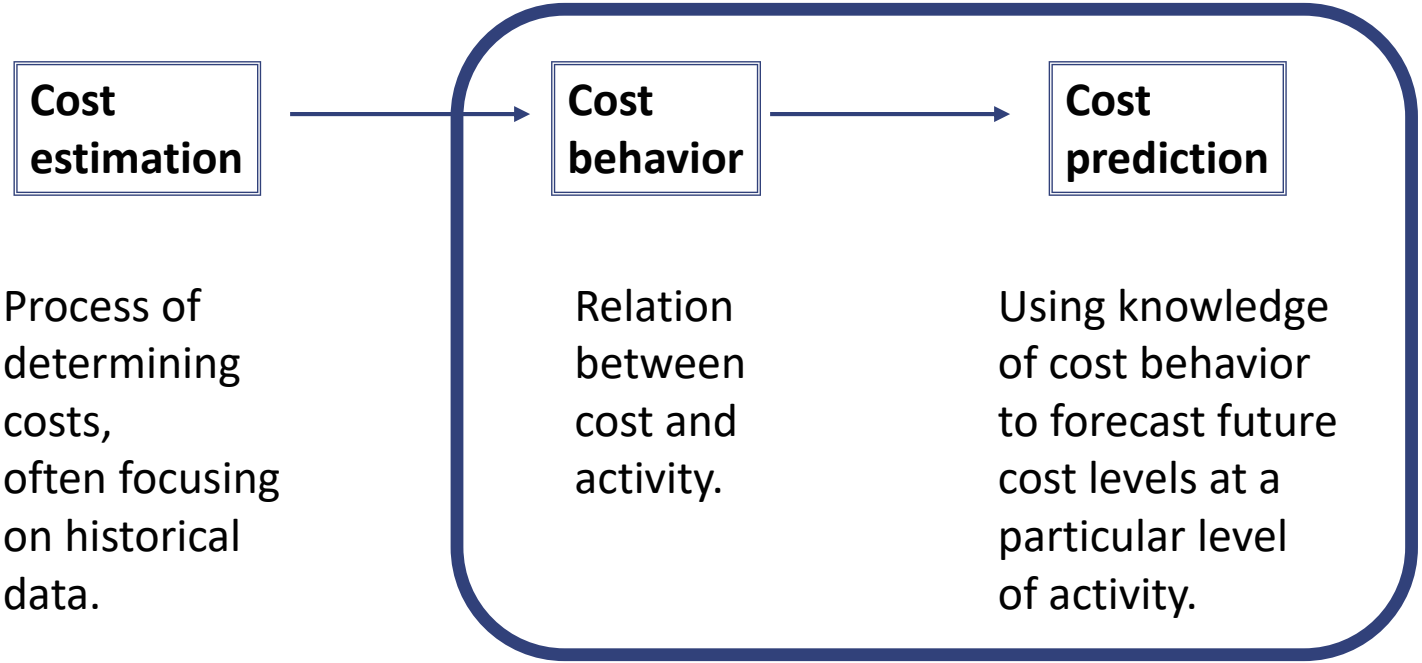
COST BEHAVIOR PATTERNS

COST ESTIMATION METHODS

DATA PROBLEMS

COST BEHAVIOR ETC.

STEPS IN COST ANALYSIS & ESTIMATION

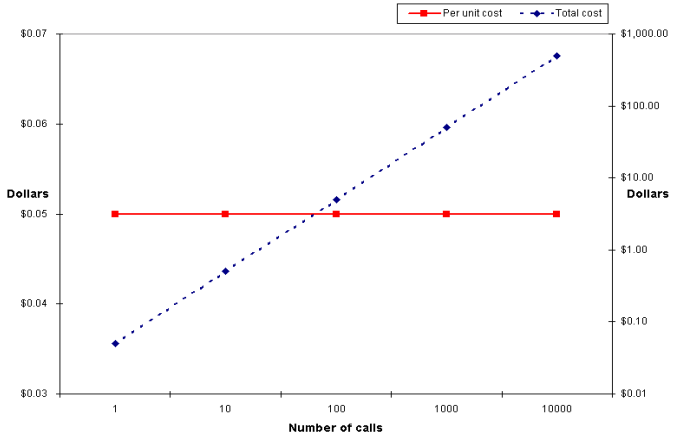


COST BEHAVIOR ETC.

VARIABLE AND FIXED COSTS

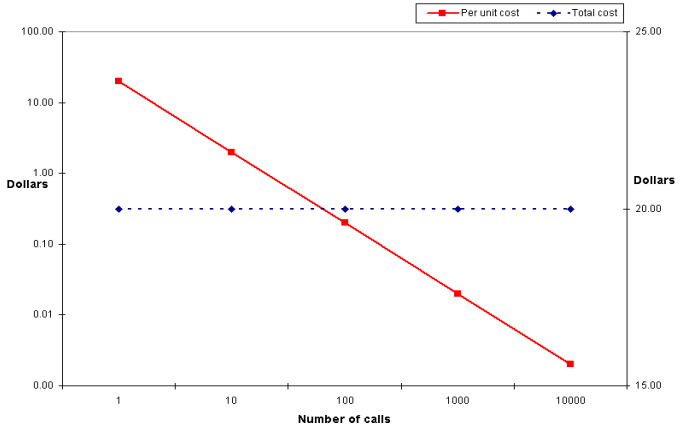
VARIABLE COST

- A cost that is constant per unit
  but changes in total as volume changes
- Materials (parts), fuel costs for a trucking company



FIXED COST

- A cost which does not change in total
  but changes on a per-unit basis as volume changes
- Straight-line depreciation, insurance



COST BEHAVIOR ETC.

VARIABLE AND FIXED COSTS

- Recall the summary of our discussion on cost behaviour from Chapter 2.

Cost	in total	per unit
Variable	Total variable cost changes as activity level changes.	Variable cost per unit remains the same over wide ranges of activity.
Fixed	Total fixed cost remains constant when the activity level changes.	Fixed cost per unit decreases as activity level increases.

COST BEHAVIOR ETC.

STEP-VARIABLE COSTS

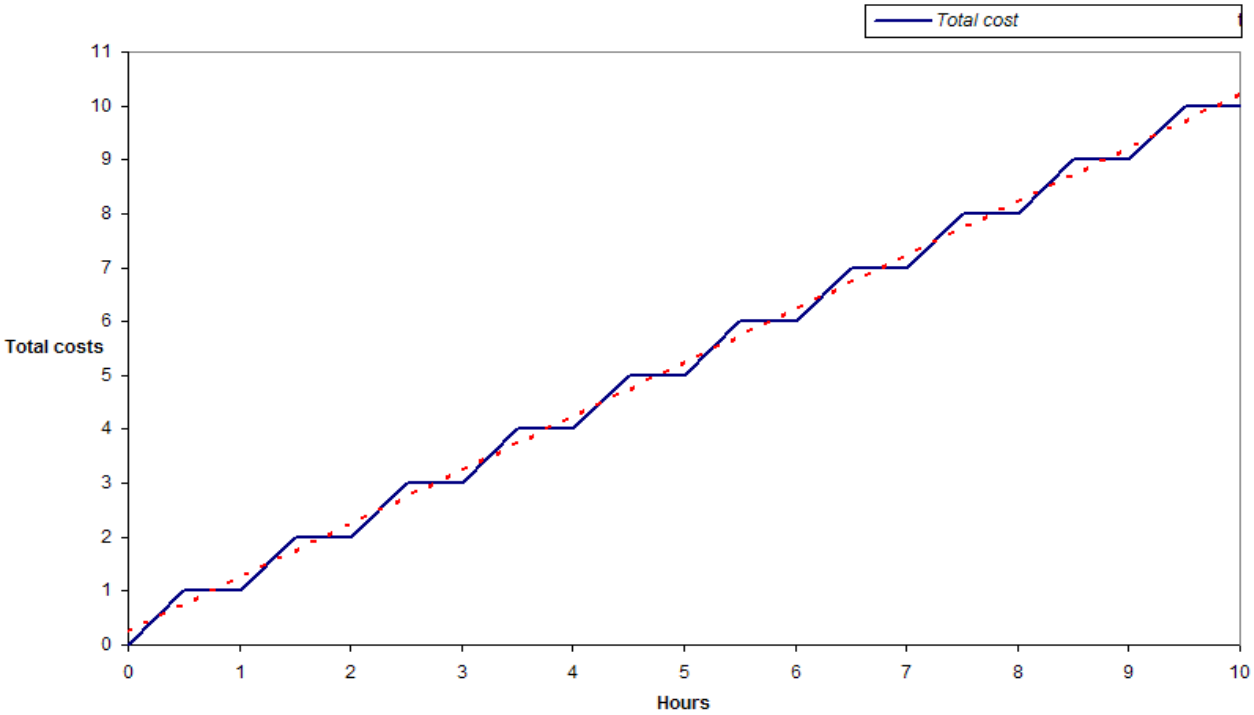
- Costs increase in small steps instead of continuously
- Nearly variable costs, some fixed costs
- As volume increases, the need for additional resources increases, but not one by one

EXAMPLE

- Wages for a salesperson: temporary/additional personnel as demand increases

COST BEHAVIOR ETC.

STEP-VARIABLE COSTS



COST BEHAVIOR ETC.

STEP-FIXED COSTS

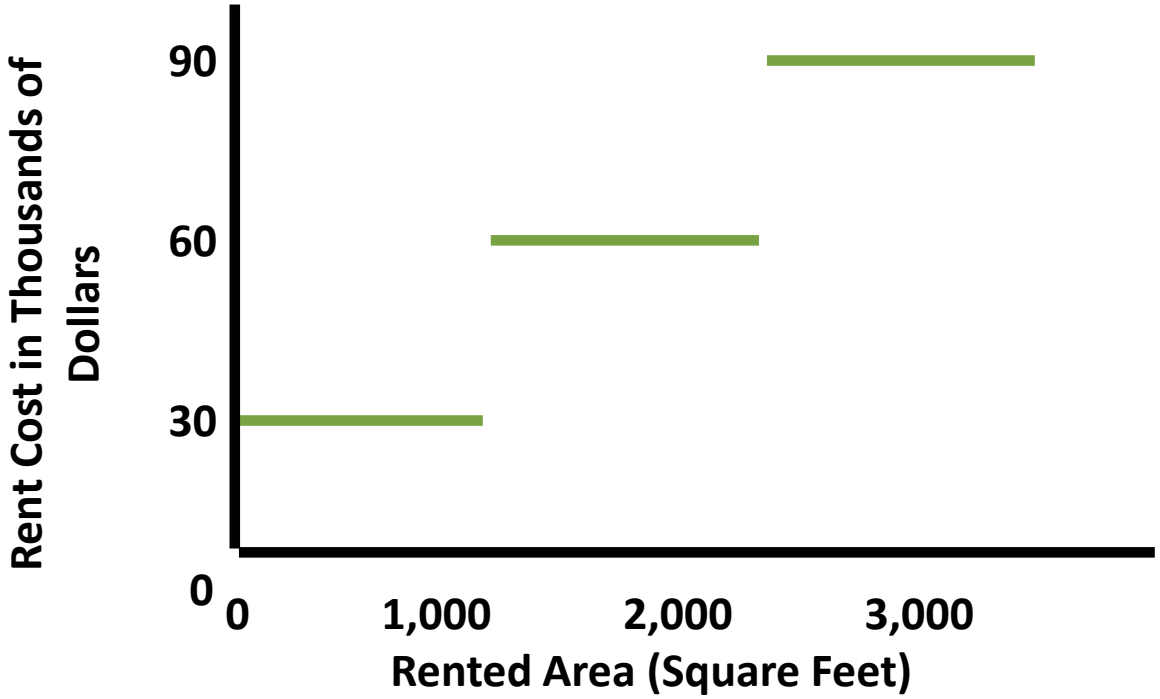
- Total costs remain unchanged for a wide range of activity
- Costs then jump to a new higher level for the next range of activity

EXAMPLE

- Office space is available at a rental rate of $30,000 per year in increments of 1,000 square feet. As the business grows more space is rented, increasing total rent.

COST BEHAVIOR ETC.

STEP-FIXED COSTS



COST BEHAVIOR ETC.

STEP-VARIABLE AND STEP-FIXED

SPEED OF ADJUSTMENT

- Step-variable costs can be adjusted quickly
- Step-fixed costs cannot be adjusted quickly

RANGE OF ACTIVITY

- Step-variable costs are constant over a very narrow range of activity (sales person)
- Step-fixed costs are constant over a wide range of activity (new factory)

- By understanding these impacts you can better estimate future costs and plan for various outcomes!

COST BEHAVIOR ETC.

SEMI-VARIABLE (MIXED) COSTS

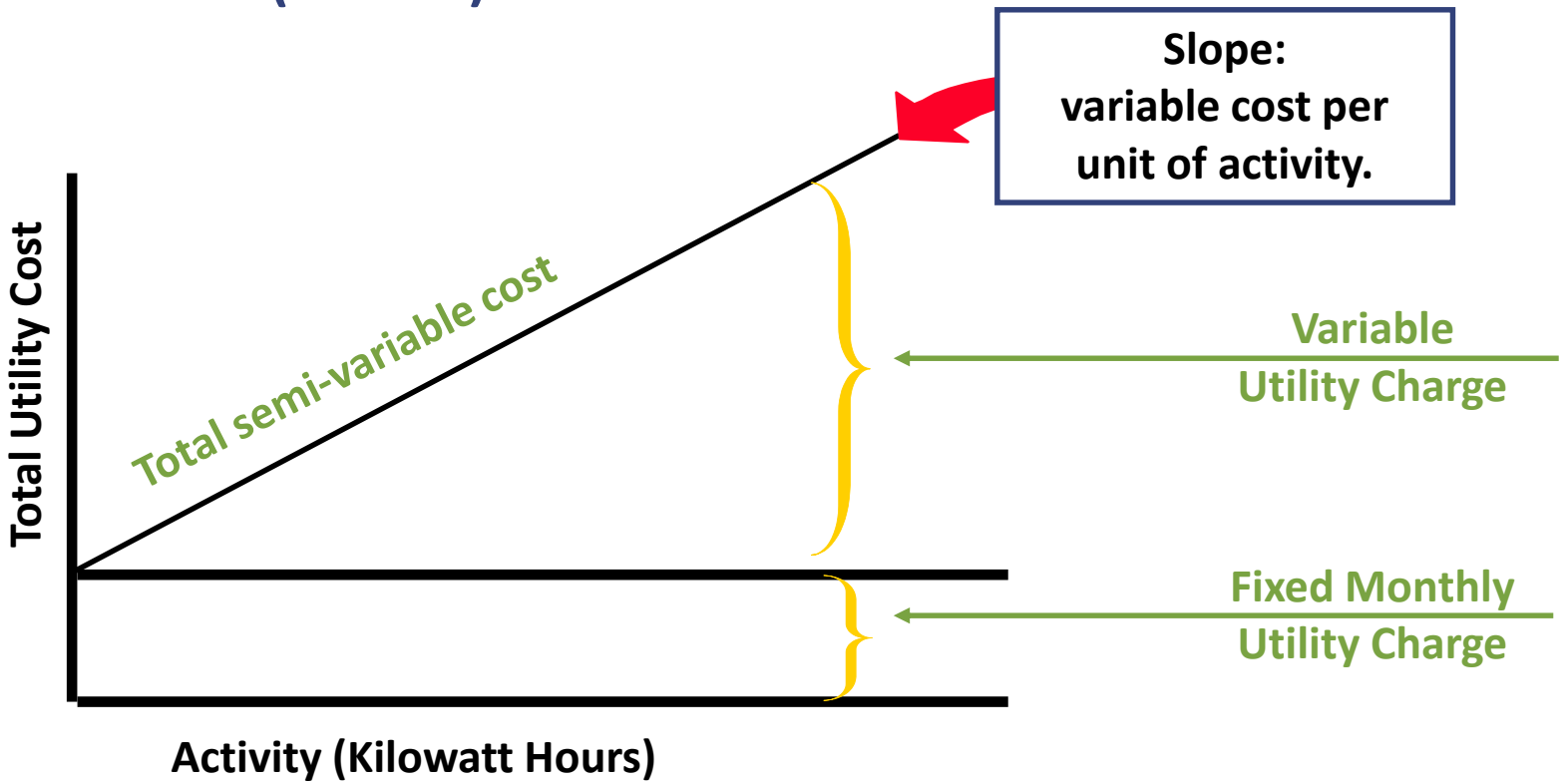
- Have a fixed as well as a variable component
- Total cost = Fixed costs + Variable costs

EXAMPLE

- Assembly line workers are paid minimum wage plus $2 per unit produced. Charges associated with hiring these workers amounted to $30,000.
- Cost of a delivery truck – lease payment/depreciation is fixed, but gasoline is variable
- Phone bill – flat rate: fixed, international calls: variable

COST BEHAVIOR ETC.

SEMI-VARIABLE (MIXED) COSTS



COST BEHAVIOR ETC.

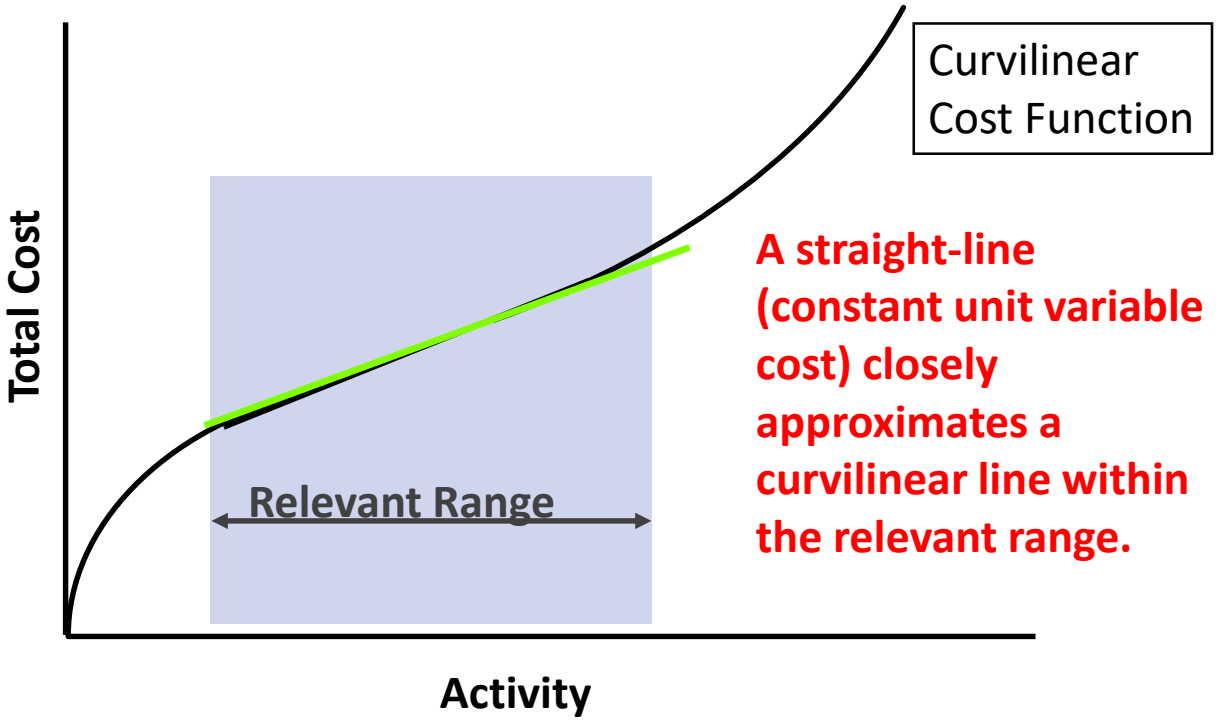
CURVILINEAR COST

- In theory every cost pattern would consist of straight lines – assuming we are only looking at very narrow costs.
- In reality, most costs are a combination of factors – new/efficient equipment and old/less efficient equipment, combination of electric and gas heating in a plant, etc.

- Many costs have a **curvilinear** cost pattern.

COST BEHAVIOR ETC.

CURVILINEAR COST

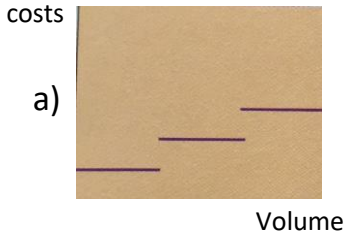


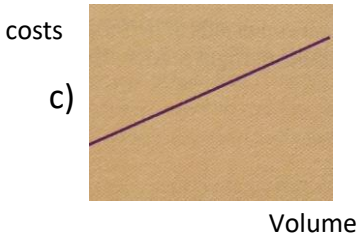
A straight-line (constant unit variable cost) closely approximates a curvilinear line within the relevant range.

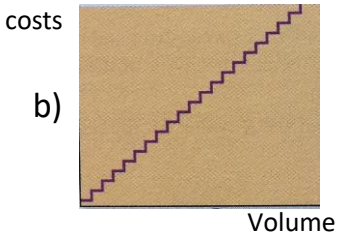
COST BEHAVIOR ETC.

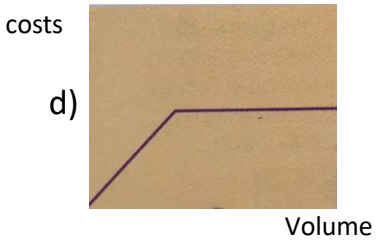
P6-35: WHICH GRAPH REPRESENTS THESE COSTS?

- The cost of online back-up storage at a rate of $2.50 per gigabyte, up to 50 gigabyte, beyond which storage is unlimited









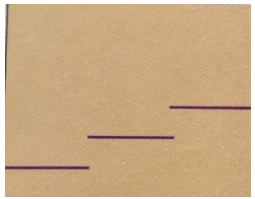
COST BEHAVIOR ETC.

P6-35: WHICH GRAPH REPRESENTS THESE COSTS?

- The cost of outsourcing diagnostic blood testing by a hospital. The hospital pays an independent lab a fee of $ 1,000 per month plus $3 for each test done.

costs

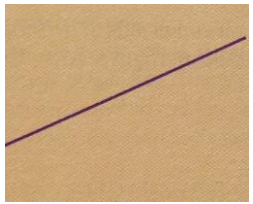
a)



Volume

costs

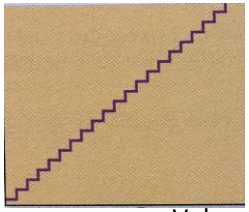
c)



Volume

costs

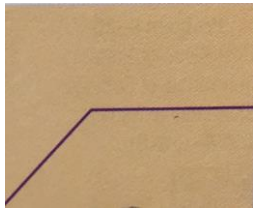
b)



Volume

costs

d)



Volume

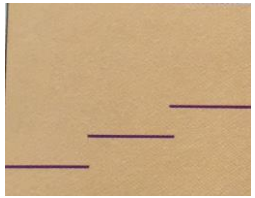
COST BEHAVIOR ETC.

P6-35: WHICH GRAPH REPRESENTS THESE COSTS?

- The salary costs of the shift supervisors at a truck depot. Each shift is eight hours. The depot operates with 1, 2, or 3 shifts at various times of the year.

costs

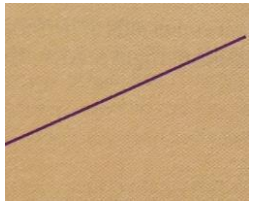
a)



Volume

costs

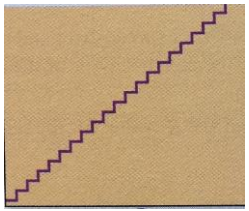
c)



Volume

costs

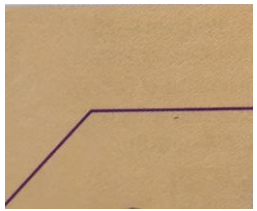
b)



Volume

costs

d)

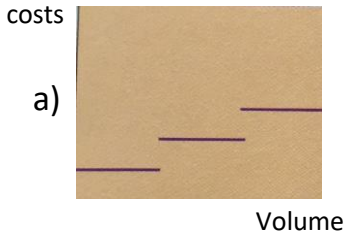


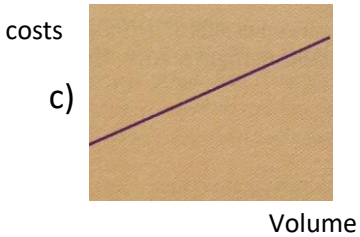
Volume

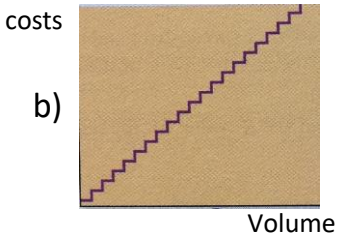
COST BEHAVIOR ETC.

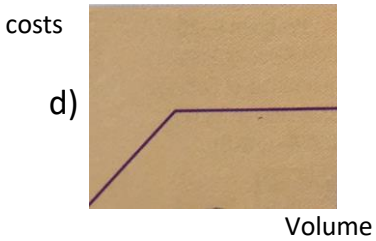
P6-35: WHICH GRAPH REPRESENTS THESE COSTS?

- The wages of table-service personnel in a restaurant. The employees are part-time workers, who can be called upon for as little as 2 hours at a time.



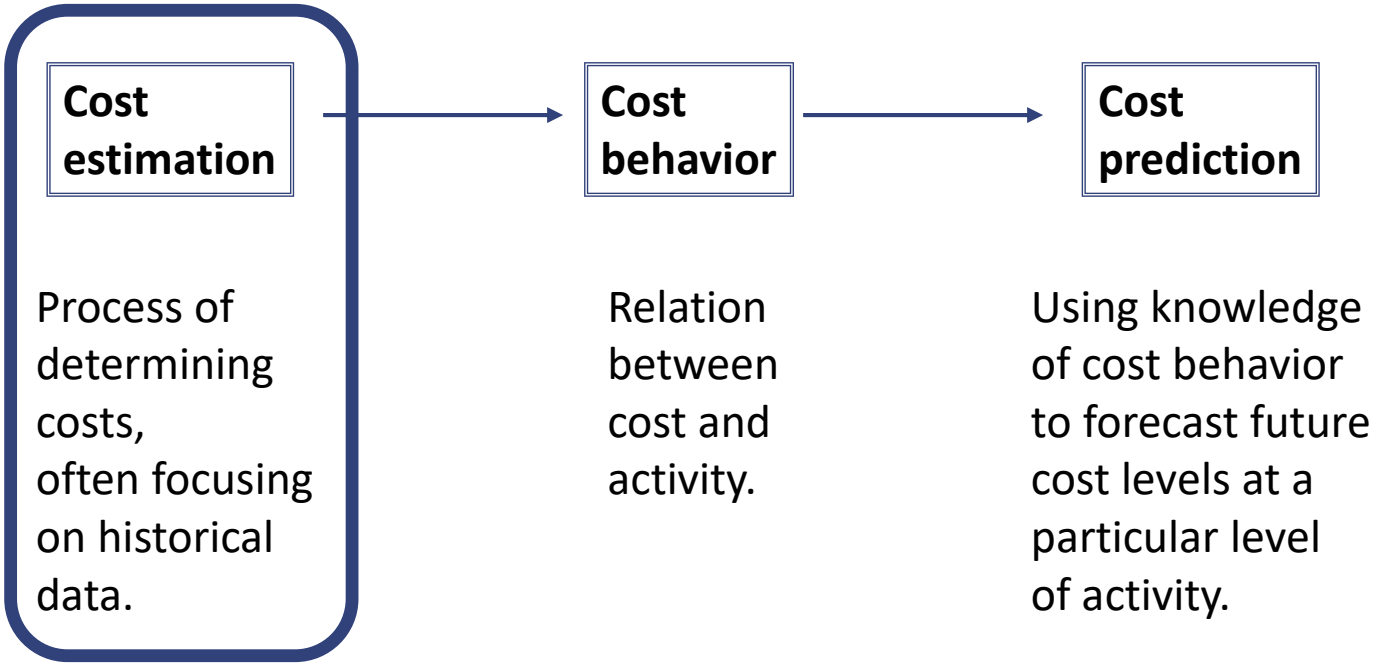






COST BEHAVIOR ETC.

STEPS IN COST ANALYSIS & ESTIMATION



COST BEHAVIOR ETC.

COST ESTIMATION

ACCOUNT CLASSIFICATION METHOD

- Detailed review of each account in the cost item

VISUAL-FIT METHOD

- Fit line to a scatter plot

HIGH-LOW METHOD

- Uses highest and lowest data points

LEAST-SQUARES REGRESSION METHOD

- Statistical approach to establish relations

COST BEHAVIOR ETC.

ACCOUNT-CLASSIFICATION METHOD

- Careful examination of ledger accounts
- Classify items as variable, fixed, or semi-variable
  - Building depreciation expense – fixed, facility
  - Raw materials – rolled steel – variable, unit level
  - Machine retooling expense – variable, batch level

- Estimates future costs under various scenarios; Use historical information as starting point

COST BEHAVIOR ETC.

VISUAL-FIT METHOD

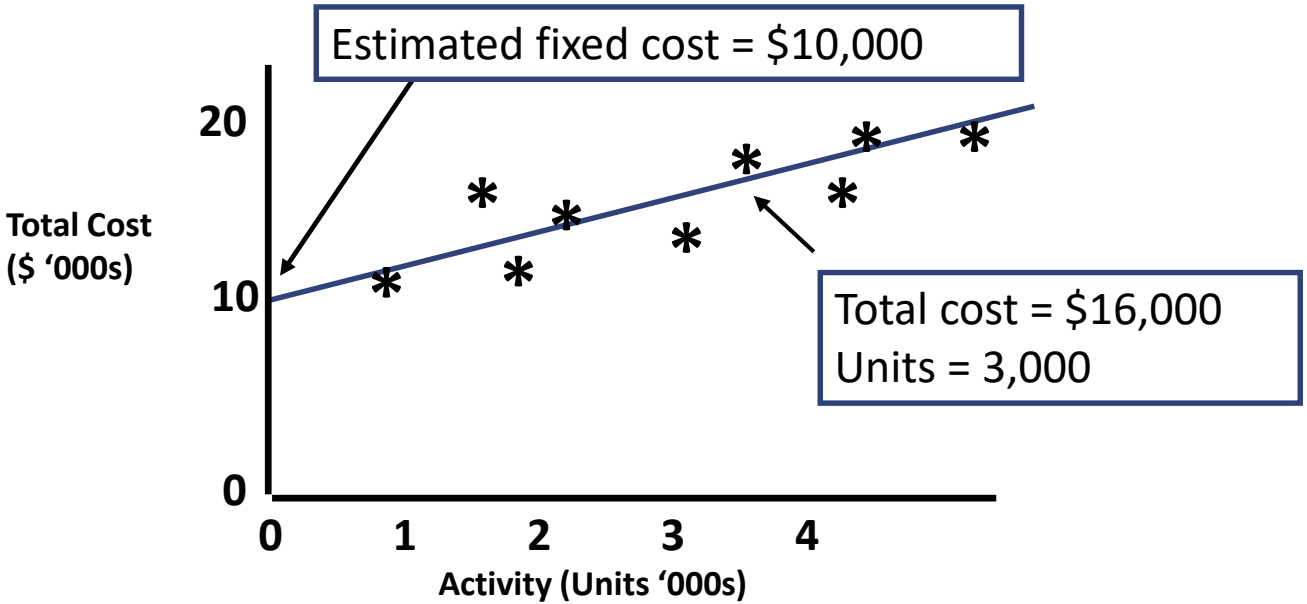
- Examine costs by plotting points on a graph (called a scatter diagram) and place a line through the points to yield a cost function.

- Use with semi-variable costs
- Use when you have no idea about cost behavior patterns

- Easy, identifying outliers, BUT lack of “objectivity”

COST BEHAVIOR ETC.

VISUAL-FIT METHOD



Total variable cost = Total cost – Total fixed cost
Total variable cost = $16,000 – $10,000 = $6,000
Unit variable cost = $ 6,000 ÷ 3,000 units = $2

COST BEHAVIOR ETC.

HIGH-LOW METHOD

- Uses two data points only – the highest and lowest, for an activity within the relevant range.
- Variable Cost per Unit = $\frac{\text{highest – lowest costs}}{\text{highest – lowest activity levels}}$
- Fixed Costs = Total Cost – unit variable cost * units

- Use this information to estimate future cost patterns
- “Objective”, but other data points are ignored!

COST BEHAVIOR ETC.

HIGH-LOW METHOD

EXAMPLE

- Total costs incurred are $35,000 when 10,000 units are produced and $115,000 when 50,000 units are produced.
- What are fixed costs and variable cost per unit?
  - Change in units : 40,000
  - Change in costs: 80,000
  - Variable cost per unit: $2 (80,000/40,000)
  - Fixed costs: $15,000 [(35,000-(10,000*2) or 115,000-(50,000*2)]

COST BEHAVIOR ETC.

LEAST-SQUARES REGRESSION METHOD

- Statistical approach that is both objective and considers all data points.
- Univariate regression: $Y = a + bX$
  - Y: Dependent variable (total cost)
  - X: Independent variable (activity)
  - a: Intercept (fixed costs)
  - b: Slope coefficient (variable costs)
- TC = FC + VC*A
  - TC = Total cost; FC = Fixed cost
  - VC = Variable cost per unit; A = Activity

COST BEHAVIOR ETC.

LEAST-SQUARES REGRESSION METHOD

- Multivariate (multiple) regression:

$$Y = a + bX + cZ$$

- X and Z are independent variables (different activities)
- e.g., electricity used to run machines and for light in the facility. Total electricity costs are hence a function of machine hours and sqm of the facility
- More accurate cost predictions

COST BEHAVIOR ETC.

LEAST-SQUARES REGRESSION METHOD

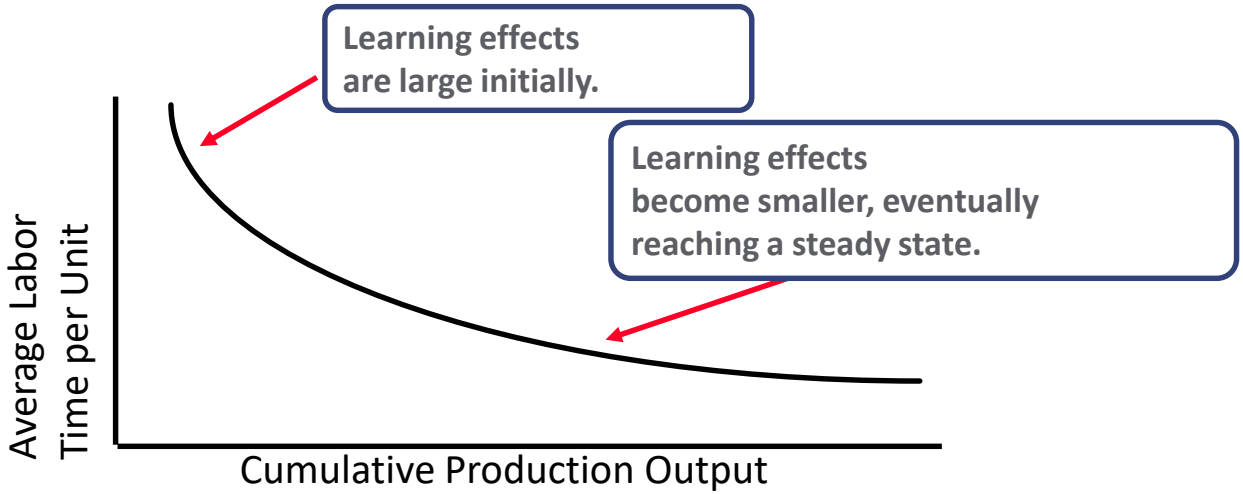
DATA COLLECTION PROBLEMS

- Missing data
- Outliers
- Mismatched time periods – production activity on daily basis, while costs are recorded monthly
- Allocated costs – appear as variable, although they are fixed
- Inflation

COST BEHAVIOR ETC.

LEARNING CURVES

- In many production processes, production efficiency increases with experience.
- Labor time/cost required per unit declines.



COST BEHAVIOR ETC.

LEARNING CURVES

EXAMPLE

- Airplane development and production planning and pricing
- Cost of first units produced vs. cost of 500th unit produced

COST BEHAVIOR ETC.

E6-24

- Lancaster Meat Company's controller used the account classification method to compile the following information:
  - Depreciation on buildings and eqpt. of $21,000 per month
  - Meat costs $1.20 per pound of sausage
  - Compensation costs are $0.85 per pound of sausage produced
  - Supervisor salaries are $11,000 per month
  - Utility bills are $5,000 per month plus $0.25 per pound of sausage produced

1. Which costs are variable, fixed or semi-variable?
2. Write a cost formula to express the cost behavior of the firm's production costs.

COST BEHAVIOR ETC.

E6-25

- Brazilia Bus Tours incurred the following maintenance costs during the recent tourism season.

Month	Miles Traveled by Buses	Maintenance Cost
November	12,750	17,100
December	15,900	17,400
January	19,050	17,550
February	22,500	18,000
March	30,000	18,750
April	12,000	16,500

1. Using High-Low method, estimate VC per mile and FC per month
2. Develop a formula to express the cost behavior of maintenance costs
3. What would maintenance costs be if 34,000 miles were traveled in one month?

CHAPTER 9
FINANCIAL PLANNING AND ANALYSIS
- THE BUDGET -

THE BUDGET

OUTLINE

BUDGETING

TYPES OF BUDGETS AND SUPPORTING BUDGETS

- Sales
- Production
- etc.

BEHAVIORAL IMPACTS OF BUDGETS

THE BUDGET

BUDGETING SYSTEMS

BUDGET FUNCTIONS

- Planning
- Facilitating Communication and Coordination
- Allocating Resources
- Controlling Profit and Operations
- Evaluating Performance and Providing Incentives

Budget:
a detailed plan, expressed in quantitative terms, that specifies how resources will be acquired and used during a specified period of time.

THE BUDGET

TYPES OF BUDGETS

- Master Budget
- Budgeted financial statements

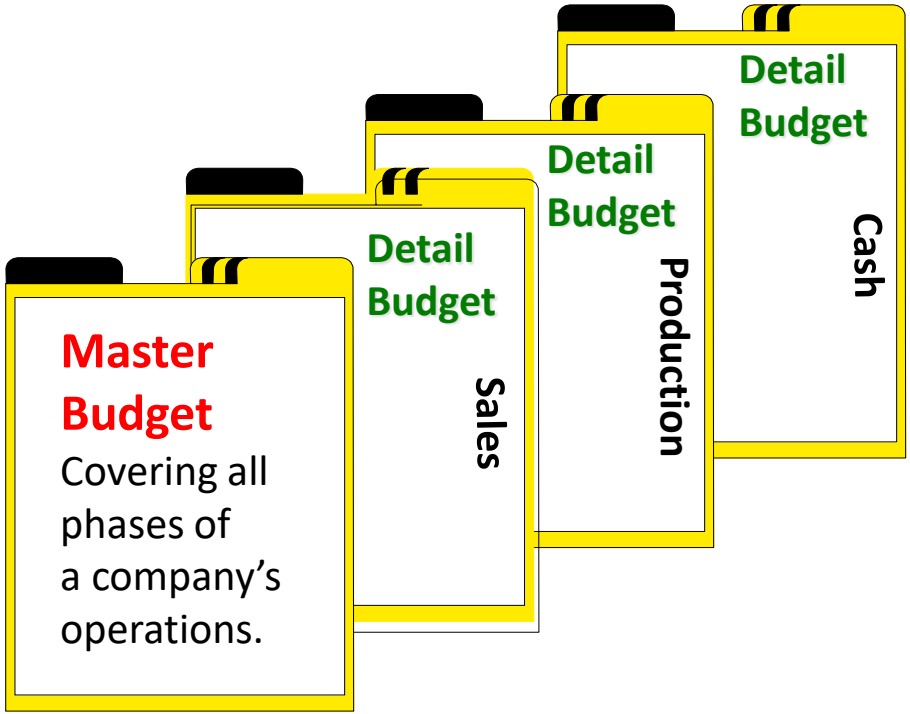
SHORT-RANGE BUDGETS

- Capital Budget
- Financial Budget

LONG-RANGE BUDGETS

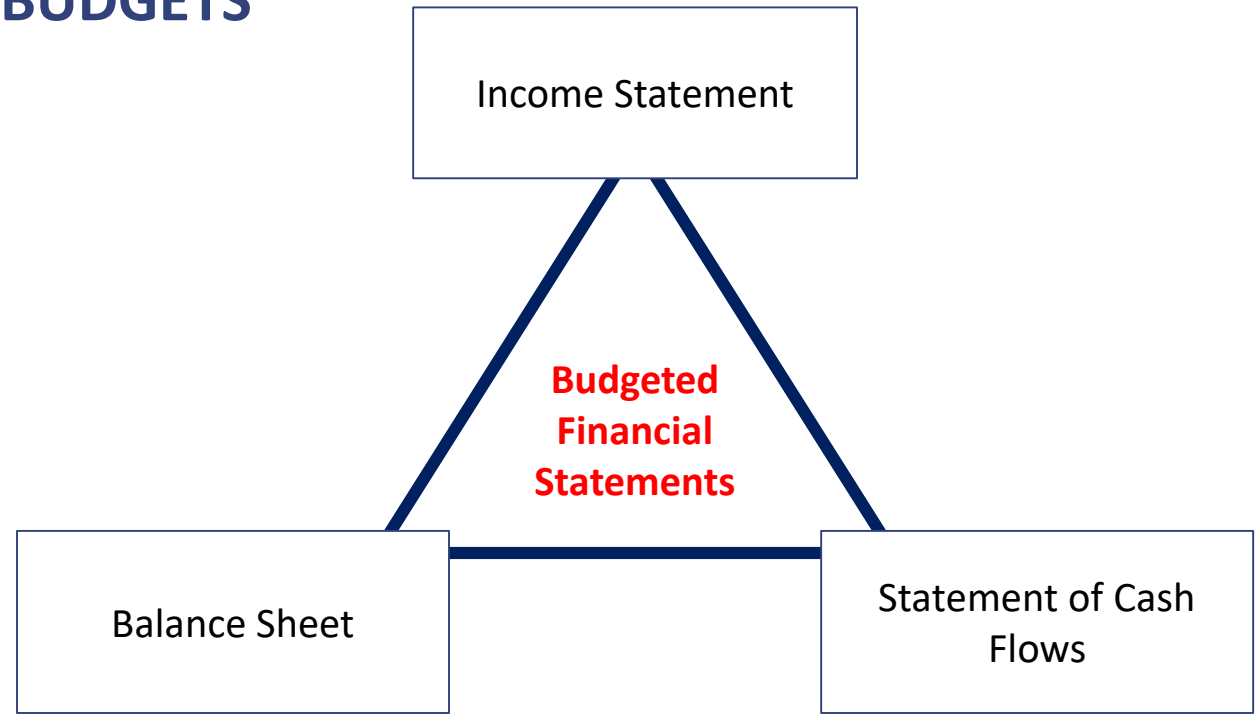
THE BUDGET

TYPES OF BUDGETS



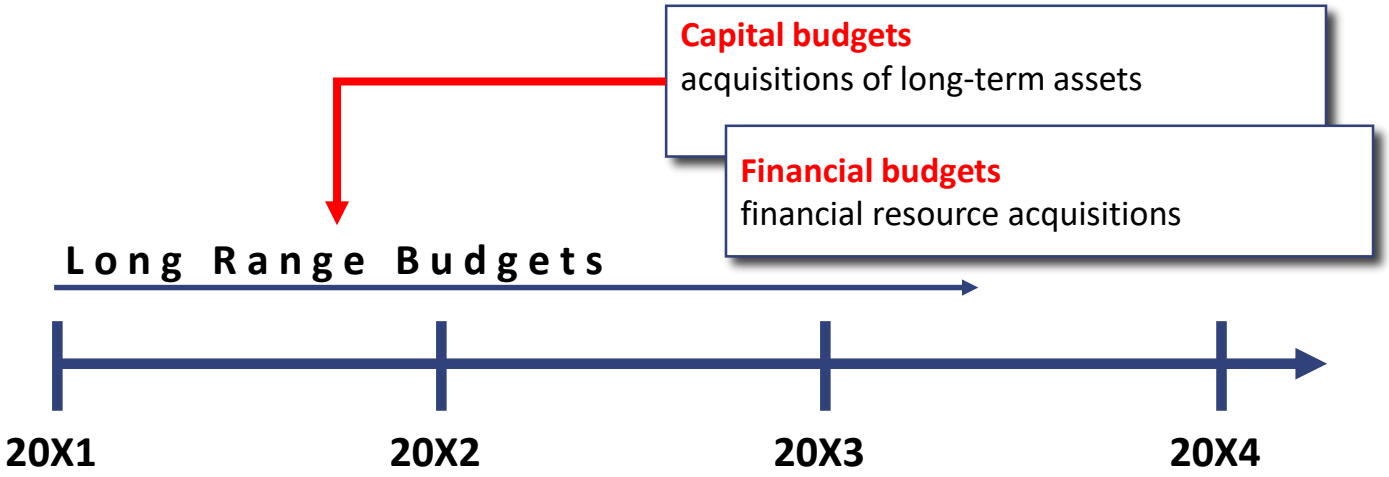
THE BUDGET

TYPES OF BUDGETS



THE BUDGET

TYPES OF BUDGETS

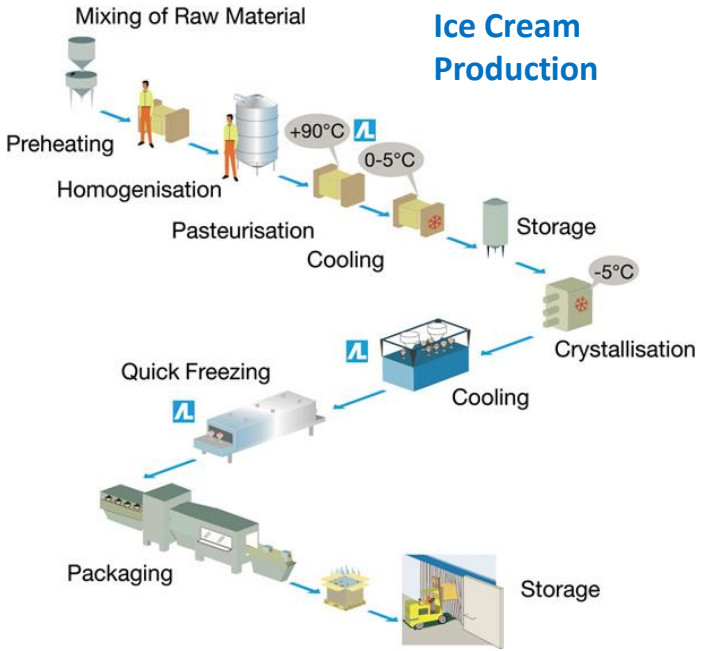


THE BUDGET

STEPS IN PREPARING A MASTER BUDGET

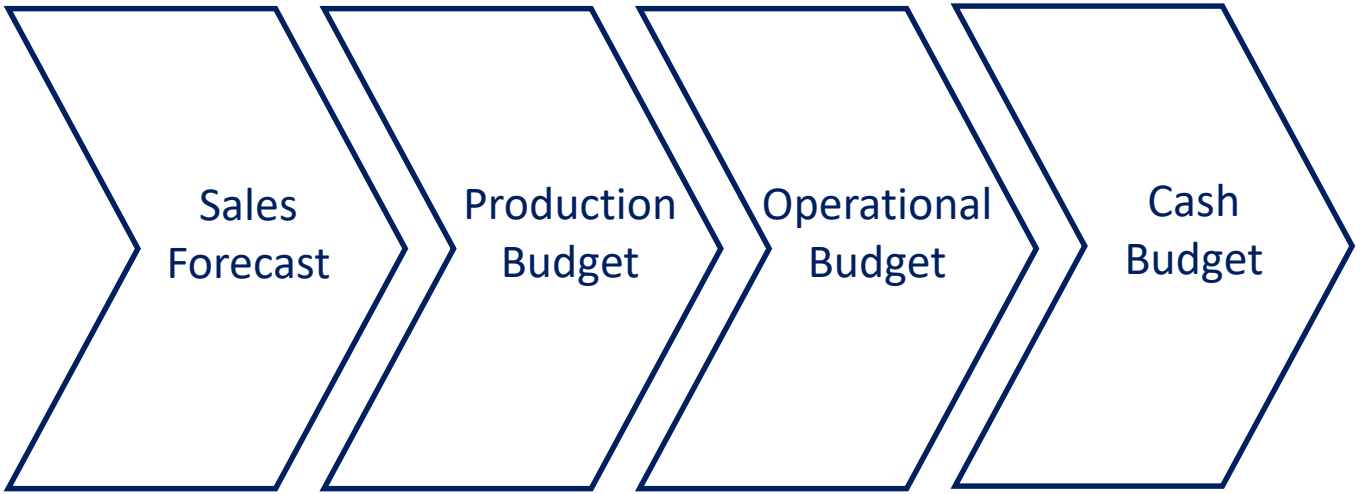
HOW WOULD YOU PROCEED?

1. Sales
2. Production
3. Cash



THE BUDGET

STEPS IN PREPARING A MASTER BUDGET



THE BUDGET

1. SALES BUDGET

FACTORS TO CONSIDER:

- Company's recent sales level/growth rate
- Industry trends
- Price changes/competitor price changes
- Tax changes/regulatory changes
- Planned advertising/competitors advertising
- Macro-economic factors
- Market research/customer satisfaction
- New product introductions (own or competitor)
- …

THE BUDGET

2. PRODUCTION BUDGET

- Inventory = sales – production
- Might need to retain inventory for next quarter's sales
- Optimal inventory levels will depend on:
  - Lost contribution margin from foregone sale
  - Cost of holding inventory (spoilage/holding costs)
  - Probability sales will deviate from budgeted levels
- Services firm: no inventory

THE BUDGET

3. OPERATIONAL BUDGET

- To achieve the sales budget and desired inventory levels, how much do we need to produce?
- Use knowledge of cost behavior to budget:
  - Direct materials / labor cost
  - Overhead cost
  - Selling and administrative costs

Next Session: Examine difference between budget and actual to learn about performance

THE BUDGET

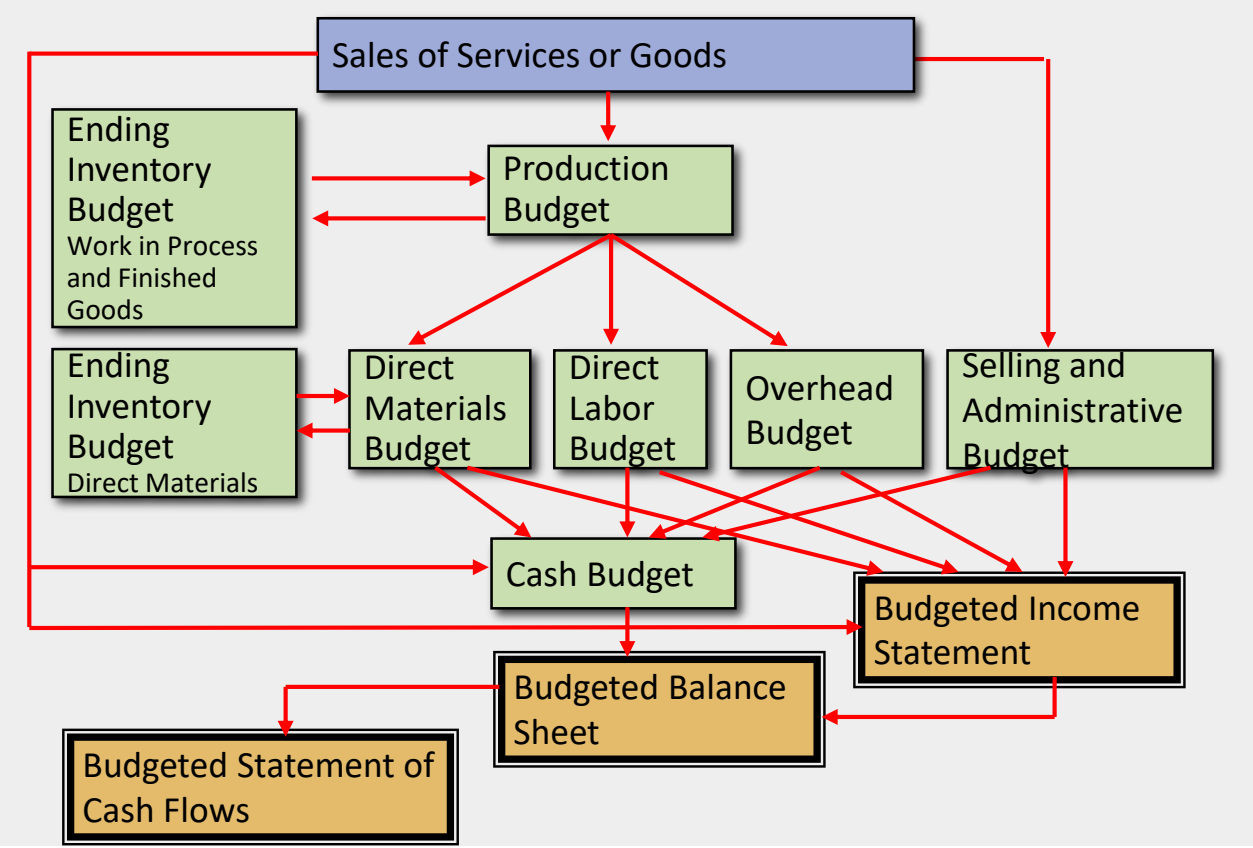
4. CASH BUDGET

- After developing the sales & operational budget: think about effect of transactions on cash
- Example: Payment terms
  - When do I expect to collect cash from customers?
  - When do I expect to pay cash to suppliers?
  - Might need to borrow from a bank or sell stock

- Budgeting will help plan for meeting cash needs throughout the peaks and valleys of business
  - Needs to be on a frequent basis to avoid surprises!

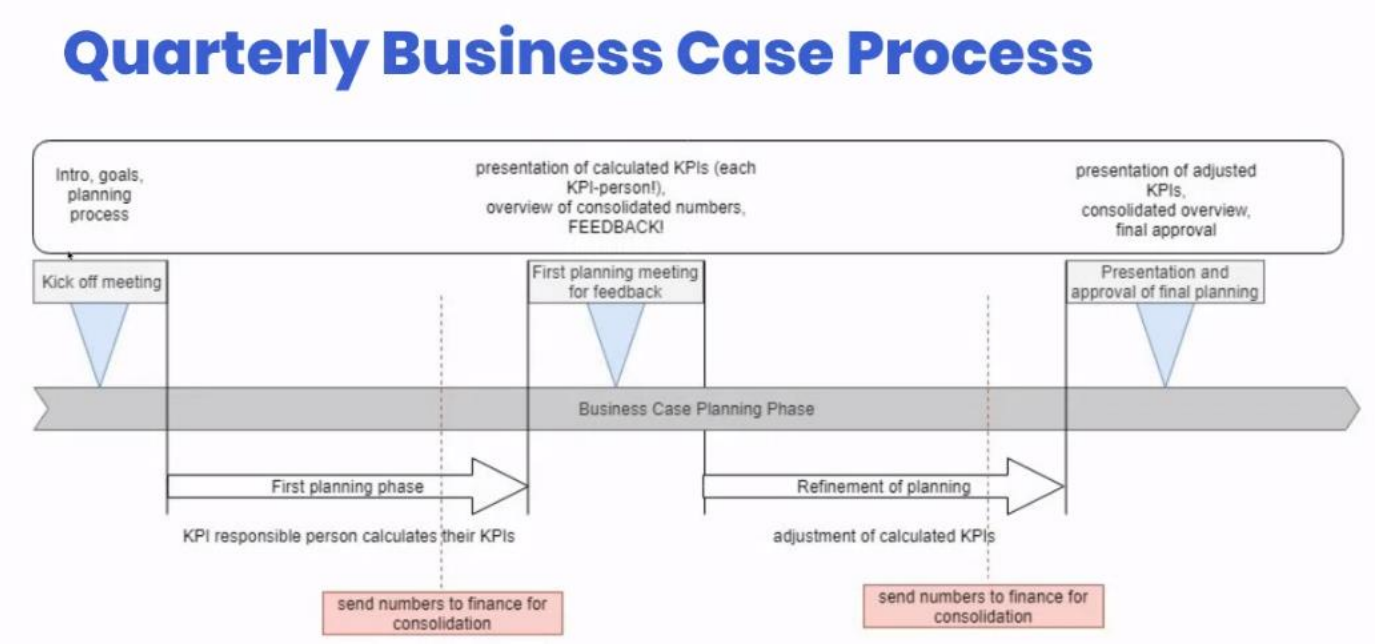
THE BUDGET

MASTER BUDGET



THE BUDGET

EXAMPLE – PLANNING PROCESS OF AN ONLINE DATING PLATFORM



THE BUDGET

BEHAVIORAL IMPACT OF BUDGETS

BUDGETARY SLACK: PADDING THE BUDGET

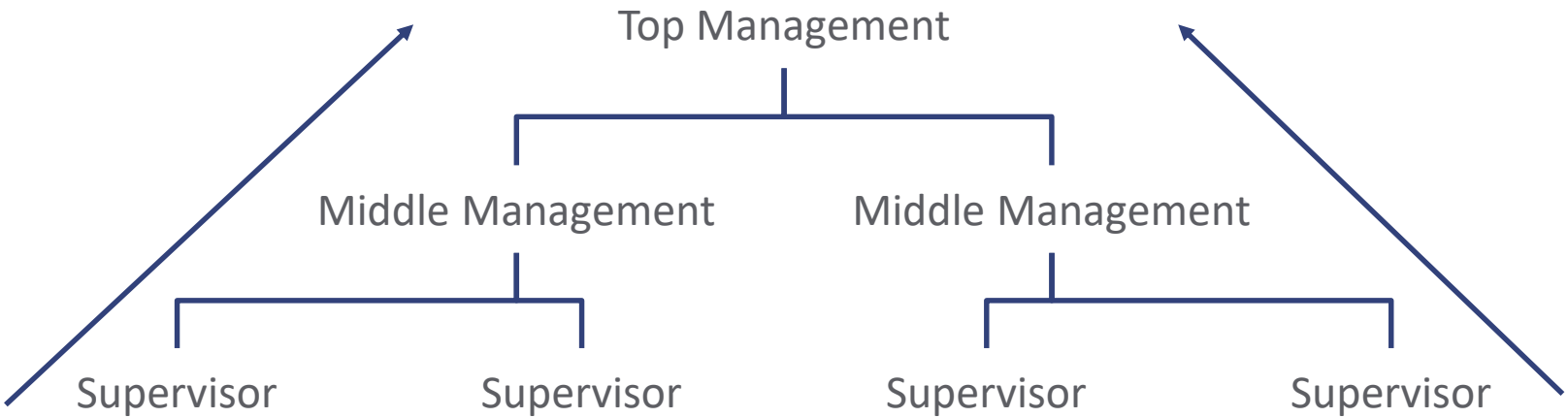
- People often perceive that performance looks better in their superiors' eyes if they can "beat the budget."
- Cope with uncertainty
- Budgeted costs are often cut during resource allocation

RECOMMENDATIONS

- Avoid to use budgets as negative evaluation tool
- Reward meeting the budget & to provide accurate budgets

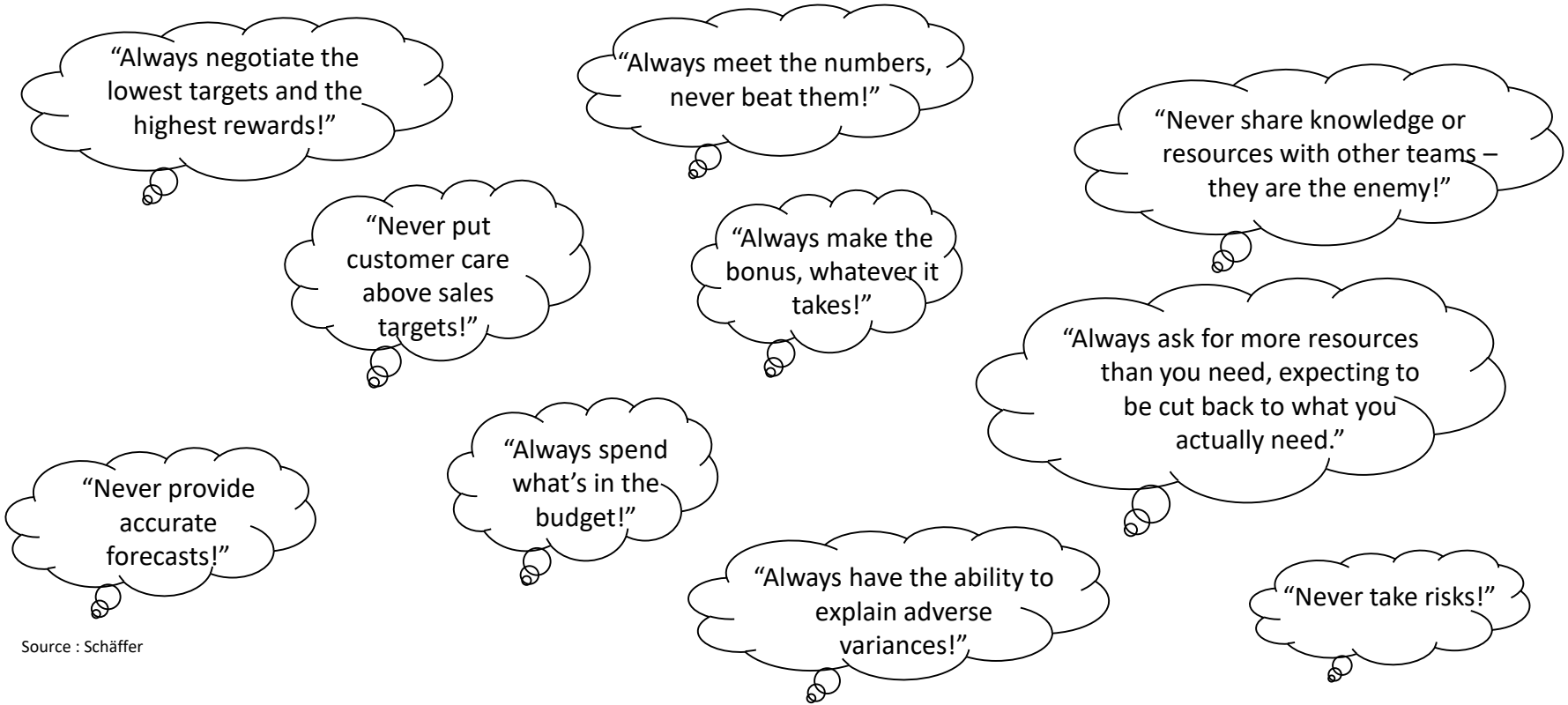
BEHAVIORAL IMPACT OF BUDGETS

PARTICIPATIVE BUDGETING



FLOW OF BUDGET DATA

COMMENTS ON BUDGETING

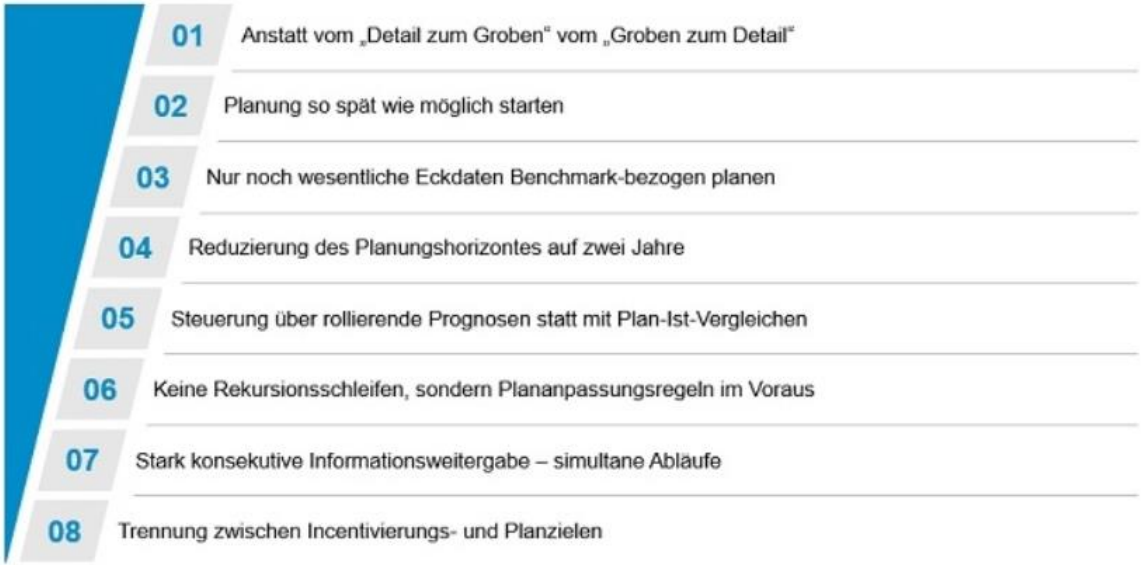


Source : Schäffer

BUDGETING

TIME IS CHANGING…

Planungsgrundsätze bei BOSCH



Quelle: Stoi/Assenkerschbaumer/Bley, Controlling & Management Review, Sonderheft 1/2015, S. 16-23.

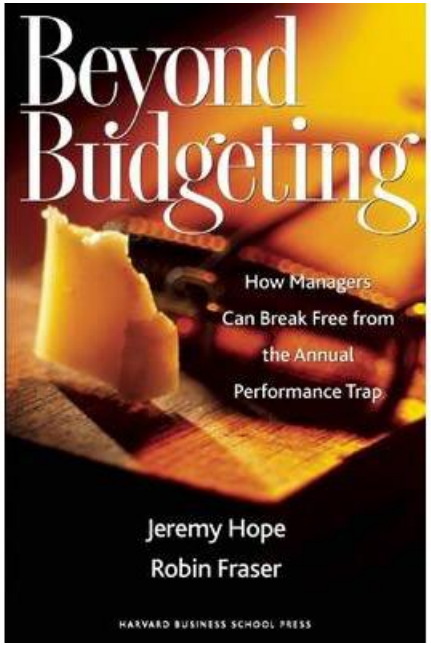
COMMENTS ON BUDGETING

Can you imagine a company without budgeting?

Source : Schäffer / Petrikowski

BEYOND BUDGETING

HOPE/FRASER (1998)

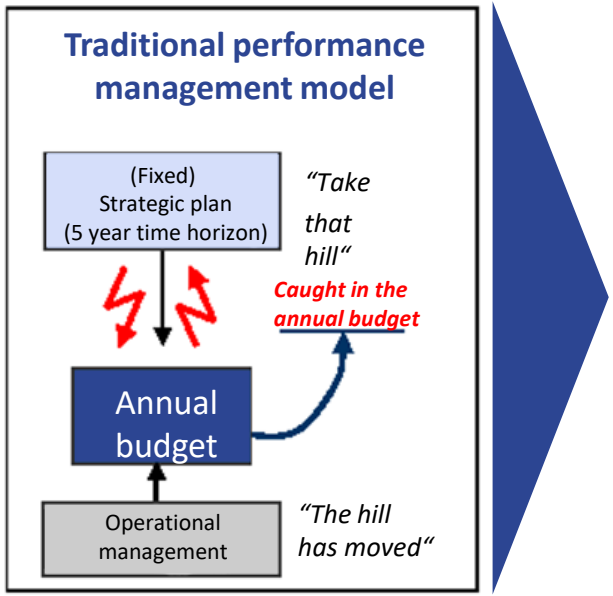


Source : Schäffer / Petrikowski

BEYOND BUDGETING

BEYOND BUDGETING

BASIC IDEA (1): MANAGEMENT PROCESSES



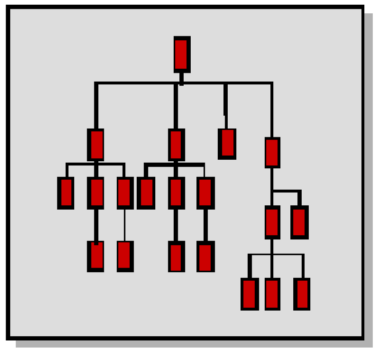
Source : Hope/Fraser (2001); Morlidge (2017)

1. Rhythm: Organise management processes dynamically around business rhythms and events; not around the calendar year only.
2. Targets: Set directional, ambitious and relative goals; avoid fixed and cascaded targets
3. Plans and forecasts: Make planning and forecasting lean and unbiased processes
4. Resource allocation: Foster a cost conscious mind-set and make resources available as needed; not through detailed annual budget allocations
5. Performance evaluation: Evaluate performance holistically and with peer feedback for learning and development; not based on measurement only and not for rewards only
6. Rewards: Rewards shared success against competition; not against fixed performance contracts

BEYOND BUDGETING

BASIC IDEA (2): LEADERSHIP PRINCIPLES

Traditional model ("hierarchy")



"Order and obey"

Source : Hope/Fraser (2001); Morlidge (2017)

7. Purpose: Engage and inspire people around bold and noble causes; not around short-term financial targets
8. Values: Govern through shared values and sound judgement; not through detailed rules and regulations
9. Transparency: Make information open for self-regulation, innovation, learning and control; don't restrict it
10. Organisation: Cultivate a strong sense of belonging and organise around accountable teams; avoid hierarchical control and bureaucracy
11. Autonomy: Trust people with freedom to act; don't punish everyone if someone should abuse it
12. Customers: Connect everyone's work with customer needs; avoid conflicts of interest

BEYOND BUDGETING

EXAMPLE: SVENSKA HANDELSBANKEN

No budgeting process anymore at Svenska Handelsbanken:

Performance culture

- Top-down challenge and local stretch targets
- Culture of constant questioning and elimination of costs
- Internal promotion of managers

Decentralization

- Roughly 600 branches make mostly autonomous decisions, e.g., credit decisions are fundamentally made on site
- Focus on customers, not on products
- Lean head office: 300 employees in 2000, i.e. 0.5 employees per branch
- Service centers have to sell their services internally

Coordination

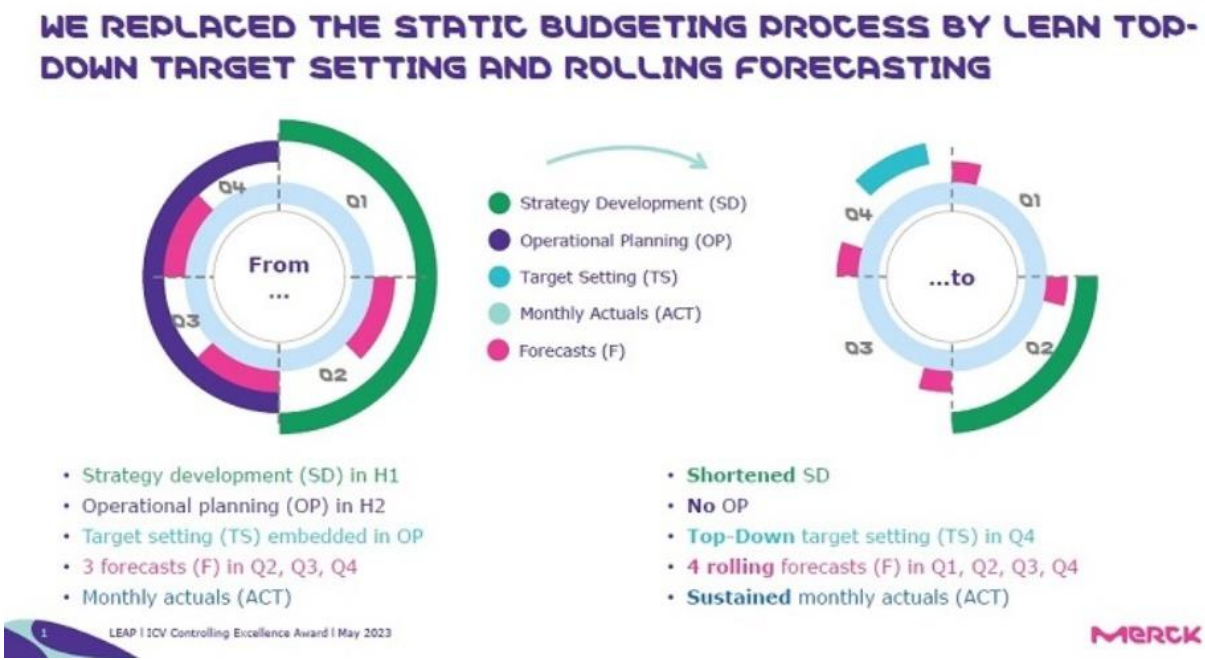
- Informal monthly meetings between top managers instead of formal planning process: Discussion based on results, exchange of information and ideas
- Transparent, continuous MIS
- All managers receive information simultaneously; KPIs are accessible to everyone

Performance management

- Success is defined in relation to competition and internal groups
- Few head office performance indicators: ROE (group), ROE + cost/income (region) cost/income + profit/loss per employee (branch)
- Annual identification of the “winner” on the regional level
- Ongoing performance monitoring in branches, employees are involved
- Bonuses not individual but rather group related

BEYOND BUDGETING

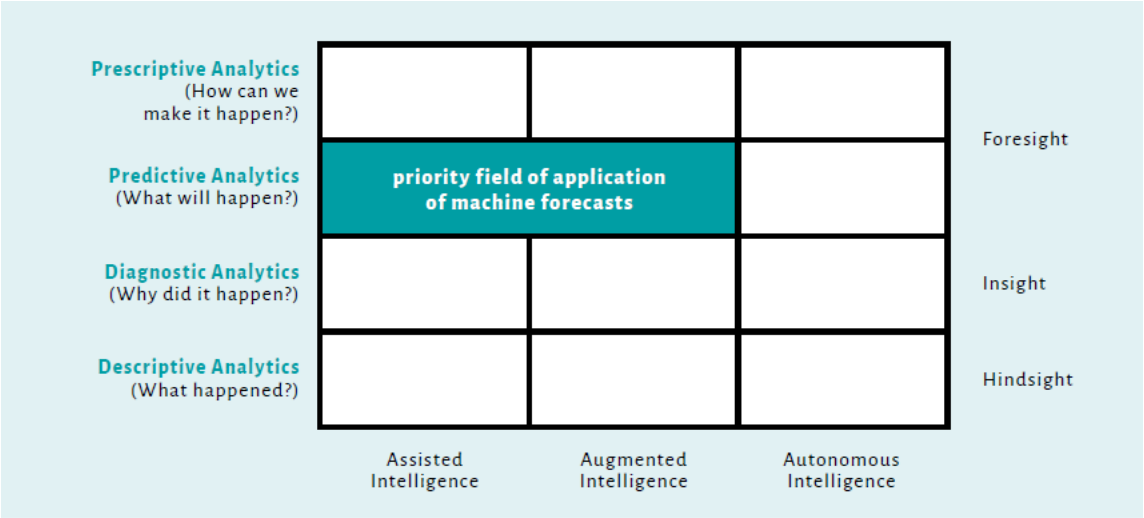
MERCK ALSO GOES IN THIS DIRECTION



NEW TREND IN BUDGETING?

ARTIFICIAL INTELLIGENCE

- But why do companies hesitate to use AI in their budgeting processes?



PROF. DR. HEIMO LOSBICHLER: Artificial Intelligence in Controlling (2020)

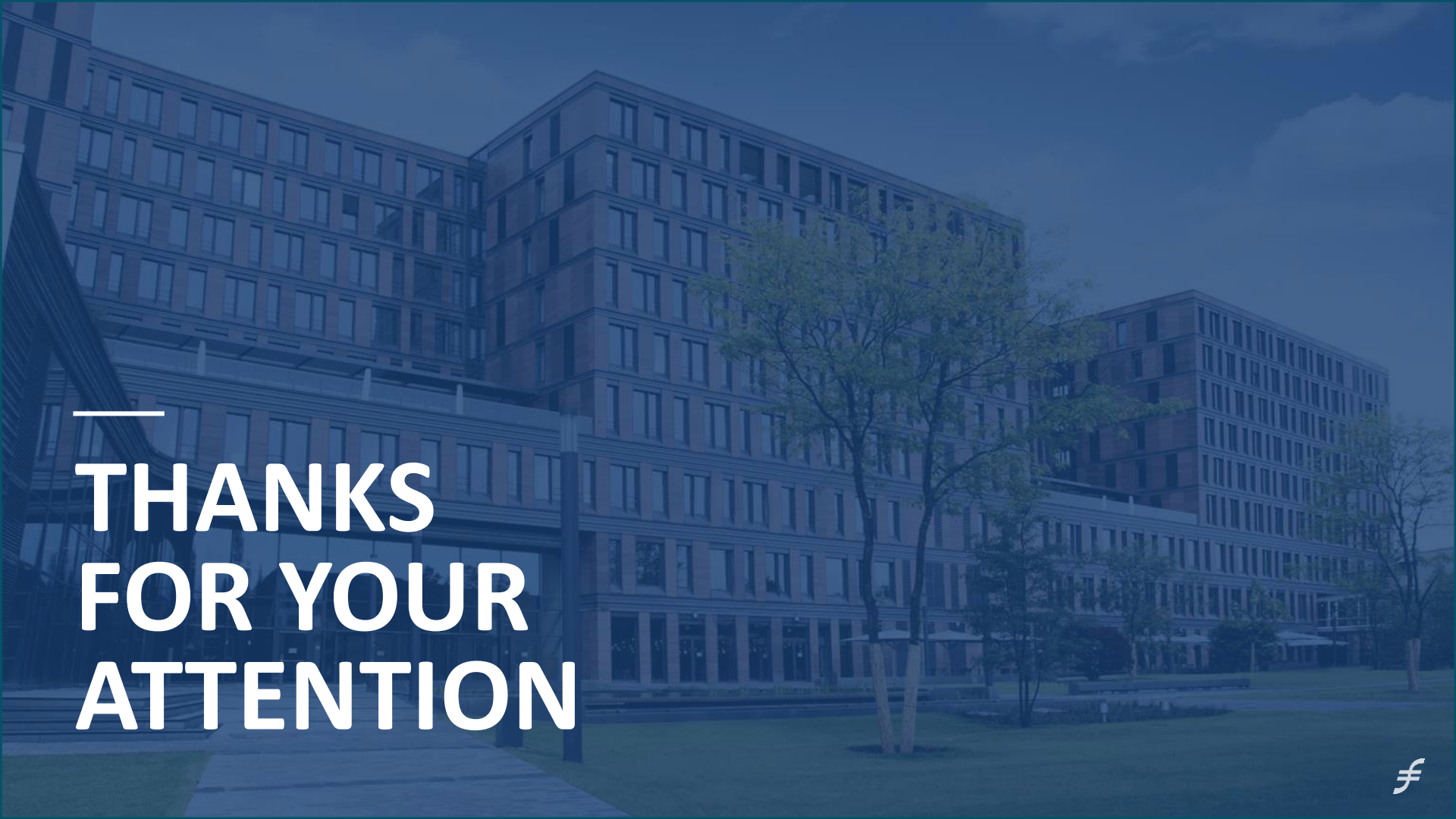
THE BUDGET

E9-21

San Fernando Fertilizer Company plans to sell 40,000 units of finished product in July and anticipates a growth rate in sales of 5 percent per month. The desired monthly ending inventory in units of finished product is 80 percent of the next month's estimated sales. There are 32,000 finished units in inventory on June 30. Each unit of finished product requires four pounds of raw material at a cost of $1.40 per pound. There are 140,000 pounds of raw material in inventory on June 30.

1. Compute the company's total required production in units of finished product for the entire threemonth period ending September 30.

2. Independent of your answer to requirement (1), assume the company plans to produce 120,000 units of finished product in the three-month period ending September 30, and to have raw-material inventory on hand at the end of the three-month period equal to 25 percent of the use in that period. Compute the total estimated cost of raw-material purchases for the entire three-month period ending September 30.


THANKS
FOR YOUR
ATTENTION

Frankfurt School of Finance and Management gGmbH
Adickesallee 32-34
60322 Frankfurt am Main

Timo Vogelsang
Associate Professor
Telefon: +49 69 154008-0
Fax: +49 69 154008-650
E-Mail: t.vogelsang@fs.de
www.frankfurt-school.de

Frankfurt School

@frankfurtschool
facebook.com/FrankfurtSchool
youtube.com/FrankfurtSchoolLive
linkedin.com/company/frankfurtschool
instagram.com/frankfurtschool

AACSB ACCREDITED
EFMD EQUIS ACCREDITED
ASSOCIATION OF MBAS ACCREDITED