

COST ACCOUNTING

TUM SS19

Based on WI001057_E

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Summary

1: Introduction

1.1 - Definitons

Cost Accounting

Measures, analyzes and reports financial & nonfinancial information related to the cost of acquiring or using resources in an organization (considered to be part of management accounting).

Differences Management & Financial Accounting

	Management Accounting	Financial Accounting
Purpose of Information	Support decision making to fulfill organizations goals	Communicate organizations financial positions to outside parties
Primary users	Managers of Organization	External users (e.g. bank, investor, etc.)
Focus & Emphasis	Future-oriented	Past-oriented
Rules of Measurement and Reporting	Internal measures and reports based on cost-benefit analysis	FA in accordance with GAAP, requires certification by external auditor
Time span & type of reports	Varies from hourly to 20 years, financial & nonfinancial reports on products, departments, strategies, etc.	Annual/quarterly financial reports on the whole organization
Behavioral implications	Designed to influence the behaviour of managers and other employees	Primarily reports economic situation

1.2 - Strategic Decissions

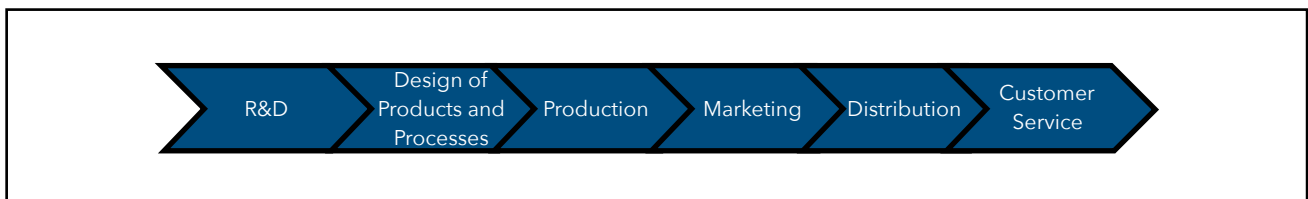
Company Strategies

Strategies are source of competetive advantage.

- Cost leadership (e.g. Aldi, Lidl)
- Products differentiation (e.g. Apple, BMW)

Value-Chain

The Value Chain is a sequence of business functions making a product progressively more useful to customers.



Supply-Chain Analysis

Production and Distribution are the party of the Value-Chain known as Supply-Chain.

- Supply-Chains describe the flow of goods/services/information regardless of whether the activities occur in one organization or in multiple organizations.

Key Success Factors

Key Success Factors are: Cost & Efficiency, Quality, Time, Innovation, Sustainability

1.3 – Decision-Making, Planning and Control**Five-Step Decision-Making-Process in Planning and Control**

1. Identify the problem and uncertainties
 2. Obtain Information
 3. Make predictions about the future
 4. Make decisions by choosing between alternatives
 5. Implement the decision, evaluate performance, and learn
- Planning (step 1-4): select goals & strategies, predicting results, deciding how to attain goals and communicate to the organization
 - Budget: most important planning tool (quantitative expression of a plan)
 - Control: takes actions to implement the planning decision, evaluates performance and provides feedback and learning

1.4 – Management Accounting Guidelines & Organizational Structure**Guidelines for valuable decision-making**

1. Cost-benefit approach: Benefits of an action/purchase must exceed its cost.
2. Behavioral and technical considerations: people are involved in decisions (irrationality)
3. Different Costs for Different Purposes: usage of alternative ways to compute costs in different situation

1.5 – Cost Terms**Basic Cost Terminology**

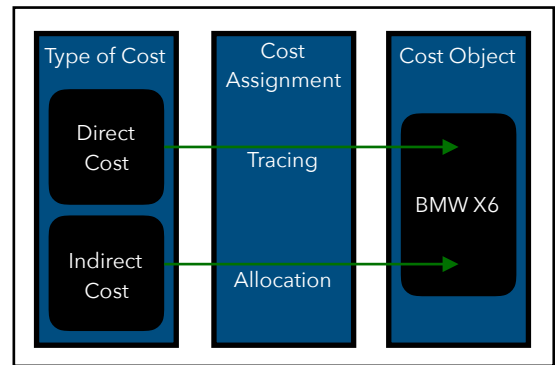
- Cost: sacrifices/foregone resource to achieve a specific objective (usually measure in monetary units)
- Actual Costs: a cost that has occurred (can be calculated afterwards)
- Budgeted Cost: a predicted cost (can be calculated before, used for planning)
- Cost Object: Object, for which a cost measurement is desired (e.g. Product, Service, Project, ...)

Two Stages of Determining Costs of Cost Objects

1. Cost Accumulation: collecting cost data in organized way (usually in accounting system)
2. Cost Assignment: gathering of accumulated costs to cost objects
 - > tracing accumulated costs with a direct relationship to cost object > direct costs
 - > allocating accumulated cost with an indirect relationship to cost object > indirect costs

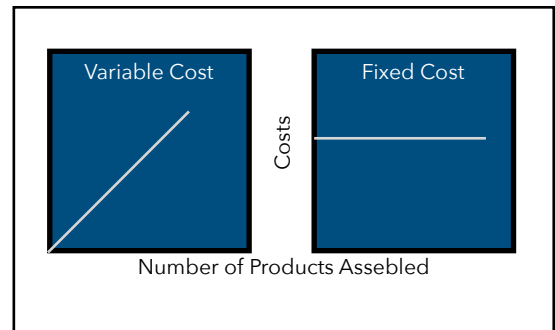
Direct Costs vs. Indirect Costs

- Direct costs: can be conveniently and economically traced (tracked) to an cost object
 - > e.g. parts of a product, assembly line wages
- Indirect costs: cannot be conveniently or economically traced (tracked) to an cost object. Costs are allocated to a cost object in a rational and systematic manner
 - > e.g. electricity, rent, plant administration expenses



Variable Costs vs. Fixed Costs

- Variable costs: change in total in proportion to changes in the related level of activity volume of output produced
 - > constant on per-unit basis
- Fixed costs: remain unchange in total, for a given period, despite changes in the related level of activity volume of output produced
 - > constant



Cost Drivers and Relevant Range

- Cost driver: a variable (such as level of activity, volume) that causally affects cost over a given time span
- Relevant range: range of normal activity level/volume in which there is a specific relationship between level of activity/volume and the cost

Unit Costs vs. Total Costs

Unit costs, also called average cost, is calculated by dividing total cost by the related number of units produced. They must be used with caution, as different output levels/volume can change them strongly.

1.6 – Inventoriable Cost and Period Cost

Types of Firms

- Manufacturing-sector companies
- Merchandising-sector companies
- Service-sector companies

Types of Inventories

- Manufacturing-sector companies: direct materials, work-in-process, finished goods
- Merchandising-sector companies: merchandise inventory

Inventoriable Costs vs. Period Costs

- Inventoriable costs: costs, that are considered assets in the companies balance sheet, cost occur, when product is sold
- Period costs: costs, that are treated as expenses of the current accounting period (occur int the income statement)

2: Job Costing

2.1 – Concepts of Costing Systems

Cost Pool

A cost pool is a grouping of individual indirect cost items.

Cost-Allocation Base

The cost-allocation base is a systematic way of linking indirect cost items/cost pools to cost objects.

> Choosing cost-allocation base: cause-and-effect relationship, benefits received, ability to bear

Job-Costing vs. Process-Costing Systems

- Job-costing systems are used for units of distinct products/services consuming different amounts of resources
- Process-costing systems are used for mass-production of similar units of products/services
- Decision may vary on different levels
 - > juice producer using job-costing for different juices, but process-costing within each job

2.2 – Costing Approaches: Actual vs. Normal Costing

Actual Costing, indirect

- Actual costing allocates indirect costs based on the *actual* indirect-cost rates times the actual activity consumption of the cost-allocation base.
- Can only be calculated at the end of fiscal year

$$\text{Actual indirect cost rate} = \frac{\text{Actual annual indirect costs}}{\text{Actual annual quantity of the cost-allocation base}}$$

Normal Costing, indirect

- Normal Costing allocates indirect costs based on the *budgeted* indirect-cost rates times the actual activity consumption of the cost-allocation base.
- Can be calculated at the beginning of a fiscal year.

$$\text{Budgeted indirect cost rate} = \frac{\text{Budgeted annual indirect costs}}{\text{Budgeted annual quantity of the cost-allocation base}}$$

Direct Costs

Both methods allocate direct costs to the cost objects using the actual direct-cost rates times actual consumption.

Longer Time Periods for Indirect-Cost Rates

- Numerator reason: shorter periods are influenced by seasonal patterns stronger
- Denominator reason: longer periods avoid spreading monthly fixed costs over fluctuating levels of monthly output & fluctuating cost-allocation base

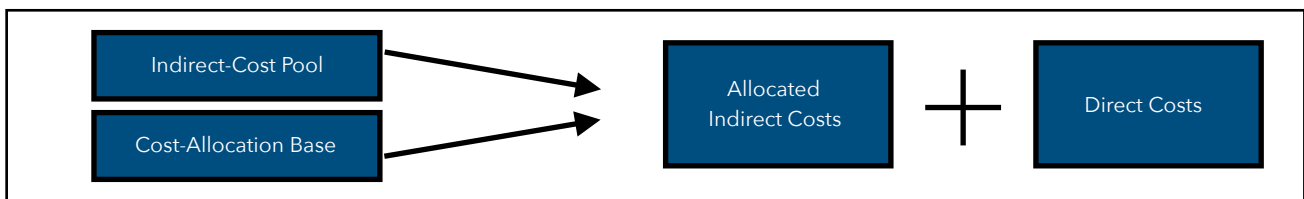
2.3 – Job Costing using Normal Costing

General Approach

1. Identify job that is the chosen cost object.
2. Identify the direct costs of the job.
3. Select the cost-allocation base(s) to use for allocating indirect costs to the job.
4. Identify the indirect costs associated with each cost-allocation base.
5. Compute the rate per unit of each cost-allocation base used to allocate indirect costs to job.

$$\text{Budgeted manufacturing overhead rate} = \frac{\text{Budgeted manufacturing overhead costs}}{\text{Budgeted total quantity of cost-allocation base}}$$

6. Compute indirect costs allocated to the job.
7. Compute the total costs of the job by adding all direct and indirect costs assigned to the job.



2.4 – Job Costing using Actual Costing

General Approach

1. Identify job that is the chosen cost object.
2. Identify the direct costs of the job.
3. Select the cost-allocation base(s) to use for allocating indirect costs to the job.
4. Identify the indirect costs associated with each cost-allocation base.
5. Compute the rate per unit of each cost-allocation base used to allocate indirect costs to job.

$$\text{Actual manufacturing overhead rate} = \frac{\text{Actual annual manufacturing overhead costs}}{\text{Actual annual quantity of cost-allocation base}}$$

6. Compute the actual indirect costs allocated to the job.
7. Compute the total costs of the job by adding all direct and indirect costs assigned to the job.

2.5 – Underallocation & Overallocation

Underallocation

Allocated amount of indirect costs in the accounting period is lower than actual incurred amount.

Overallocation

Allocated amount of indirect costs in the accounting period is higher than actual incurred amount.

Adjustment

- Adjusted allocation-rate approach: recalculation with actual amounts
- Proration approach: allocated to COGS, WIP & FG inventories based on relative sizes
- Writeoff approach: simply written of to COGS (cost of goods sold)

3: Activity-Based Costing

3.1 – Broad Averaging

Plantwide & Department Overhead Calculations

Due to the limited variety of goods produced by companies in the past, they used broad averaging. They used just one cost allocation-base for each department/the whole company.

$$\text{Plantwide indirect-cost rate} = \frac{\text{Total plantwide indirect costs}}{\text{Total plantwide quantity of the cost-allocation base}}$$

Problem

Nowadays the variety of produced goods is bigger. Therefore products using fewer resources are overcosted, those using more resources are undercosted. That results in product-cost cross-subsidization > wrong-pricing > wrong profitabilities

- Overcosting: product consumes low level of resources but is allocated high costs per unit.
- Undercosting: product consumes high level of resources but is allocated low costs per unit.

3.2 – Activity-Based Costing

Refining a Costing System

- Reduce usage of broad averages
- Reasons: increase in product diversity, increase in indirect costs, competition
- Guidelines
 - > direct-cost tracing: identify as many direct costs as is economically feasible
 - > indirect-cost pools: expand number of cost pools to make them more homogeneous
 - > cost-allocation bases: use cost drivers as cost-allocation bases

Activity-Based Costing Systems

1. Identifying individual activities (task, etc. with specified purpose) as fundamental cost objects.
2. Calculate costs of individual activities.
3. Assign costs to cost objects (products/services) on the basis of the mix of activities needed to produce each product or service.



Cost Hierarchies

Cost Hierarchies categorizes various activity cost pools on the basis of different types of cost driver, cost-allocation bases or different degrees of difficulty in determining cause-effect relations.

1. Output unit-level costs: costs of activities performed on each unit of product/service
2. Batch-level costs: costs of activities related to a group of units of product/service
3. Product-sustaining costs: costs of activities to support individual products regardless of the number of units produced

4. Facility-sustaining costs: costs of activities that cannot be traced to individual products
-

3.3 - Implementing ABC

When to use ABC?

- Significant amounts of indirect costs are allocated using only one or two cost pools
- All/most indirect costs are identified as output unit-level costs
- Products make diverse demands on resources
- Products that a company is well-suited to make show small profits whereas products that a company is less well-suited to make show large profits
- Operations staff have substantial disagreement with reported costs

Activity-Based Management

Activity-Based Management (ABM) is a method of management decision making that uses ABC information to improve customer satisfaction & profitability

- > pricing & product-mix decisions, cost reduction & process improvement decisions, design decisions, planning & management activities

4: Process Costing

4.1 – Process Costing

Process Costing

Process Costing is a system where the unit cost of a product/service is obtained by assigning total costs to many identical or similar units of output.

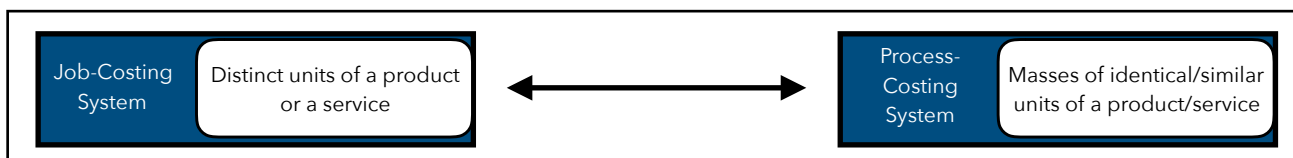
$$\text{Unit cost} = \frac{\text{Total costs}}{\text{number of units of output}}$$

Process-Costing Cost Categories

Process-costing systems separate costs into categories according to when costs are introduced into the process:

- Direct materials: usually added at the beginning of production process
- Conversion costs: generally added equally along the production process

Job Costing vs. Process Costing



Equivalent Units

Convert the work-in-process goods to the amount of finished goods, which could be produced with the same quantity of input.

4.2 – Process Costing without Beginning WIP Inventory

General Approach

1. Calculate direct materials & conversion costs in equivalent units
2. Calculate costs per equivalent unit for direct materials and conversion costs
3. Assign calculated costs to FG & WIP inventories

Effect of Incorrect Estimates

Overestimating the degree of completion decreases the costs assigned to goods transferred out and eventually to cost of goods sold and increases operating income in the current period.

4.3 – Process Costing with Beginning WIP Inventory

Different inventory-valuation methods

- Weighted-average
- FIFO

Weighted-Average Method

- Calculates cost per equivalent unit of all work done to date (regardless of period) & assigns this cost to equivalent units completed and transferred out and to equivalent units in ending work-in-process inventory
- The beginning balance of the WIP account (work done in prior period) is blended in with costs of the current period

$$\text{weighted average cost} = \frac{\text{Total costs entering WIP}}{\text{total equivalent units of work done}}$$

First-In, First-Out Method

- FIFO
 - > assigns the cost of the previous accounting period's equivalent units in beginning WIP inventory to the first units completed and transferred out of the process
 - > assigns the cost of equivalent units worked on during the current period first to complete Beginning inventory, next to started and completed new units and finally to ending WIP
- Distinctive feature: work done on beginning inventory is kept separate from work done in current period
- There is no blending of costs

Differences

- Falling prices: FIFO income < Weighted average. income
- Rising prices: FIFO income > Weighted average income

4.4 - Transferred-In Costs**Transferred-In Costs**

Transferred-In Costs (also called previous department costs) are costs incurred in previous departments that are carried forwards as the product's cost when it moves to a subsequent process in the production cycle.

- They are treated like a separate type of direct material added at the beginning of the process.

4.5 - Hybrid Costing Systems**Hybrid Costing Systems**

- Hybrid-costing systems blends characteristics from job-costing and process-costings systems.
 - > e.g. Operation-Costing Systems

Operation-Costing Systems

- Operation-Costing systems use process-costing for conversion costs and job-costing for material and customizable components.
- An operation is a standardized method/technique that is performed repetitively resulting in different finishes goods.
- An operation-costing system is a hybrid-costing system applied to batches of similar, but not identical, products.
- In each operation, all product units are treated exactly alike, using identical amounts of the operation's resources.

5: Allocation of Support-Department Costs

5.1 – Single-Rate and Dual-Rate Methods

Operating and Supporting Departments

- Operation (production) department: directly adds value to a product or service.
- Support (service) department: provides the services that assist other internal departments.

Methods to Allocate Support-Department Costs

Allocation of support-departments costs is usually based on budgeted cost rates.

- Single-rate method
 - > does not distinguish between fixed and variable costs
 - > allocates costs in each cost pool to cost objects using the same rate per unit of a single allocation base
- Dual-rate method
 - > partitions the cost of each support department into two pools (variable and fixed costs)
 - > allocates each pool using a different cost-allocation base

General Approach Single-Rate Method, Demand based

1. Calculate allocation rate using budgeted costs

$$\text{budgeted allocation rate} = \frac{\text{fixed costs} + \text{variable costs}}{\text{quantity of cost allocation base (demanded)}}$$
2. Charge the budgeted rate for each actual time of use of the support-departments service

General Approach Dual-Rate Method, Demand based

1. Calculate allocation rate for variable and fixed-cost pools using budgeted costs

$$\text{fixed cost allocation base} = \frac{\text{budgeted fixed costs}}{\text{budgeted quantity of cost allocation base (demanded)}}$$

$$\text{variable cost per unit} = \text{budgeted variable cost per unit}$$
2. Charge fixed costs based on the budgeted use, charge variable costs based on the actual use

General Approach Single-Rate Method, Supply based

1. Calculate allocation rate

$$\text{budgeted allocation rate} = \frac{\text{fixed costs} + \text{variable costs}}{\text{quantity of cost allocation base (supplied)}}$$
2. Charge the budgeted rate for each actual time of use of the support-departments service
3. Calculate Fixed costs of unused materials-handling capacity (would be charges in demand based method)

General Approach Dual-Rate Method, Supply based

1. Calculate allocation rate for variable and fixed-cost pools using budgeted costs

$$\text{fixed cost allocation base} = \frac{\text{budgeted fixed costs}}{\text{budgeted quantity of cost allocation base (supplied)}}$$

$$\text{variable cost per unit} = \text{budgeted variable cost per unit}$$
2. Charge fixed costs based on the budgeted use, charge variable costs based on the actual use
3. Calculate Fixed costs of unused materials-handling capacity (would be charged in demand based method)

5.2 – Evaluation of Methods

Single-Rate vs. Dual-Rate

	Single-Rate	Dual-Rate
+	Less costly (no classification needed), offers user departments some operational control over the charges they bear	Guides managers to make decisions in their and in the organizations interest, allocating fixed costs in advance (based on budget) eases planning
-	May lead operating department managers to make sub-optimal decision that are in their own rather than in the organizations interest	Requires classification (costly), hides the cost if fixed support department resources used (because fixed cost are allocated based on budgeted rather than actual usage), may tempt some managers to under-estimate their usage (results in lower allocated fixed costs for their department)

Budgeted-Rate vs. Actual-Rate

	Budgeted-Rate	Actual-Rate
+	Rates are known with certainty > easy planning, incentive support department to improve efficiency and increase the revenue of profitcenter as increasing costs cannot be shifted to users	Way fairer.
-	Occurance of unused materials-handling capacity, unfair?	User departments are not informed on their charges until the end of the budget period > planning difficult

5.3 – Allocating Costs of Multiple Support Departments

Direct Method •

Direct Method allocates each support department's costs to operating departments only.

- Advantage: easy to use
- Disadvantage: ignores information about reciprocal services (inaccurate estimate)

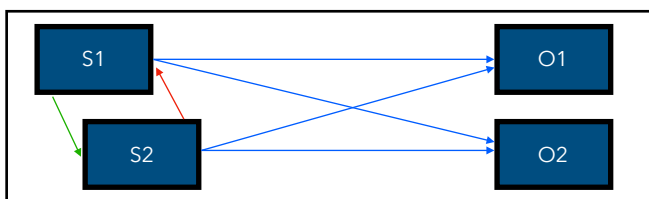
Step-Down Method •

Rank Support departments and charge only those departments on a lower level.

Reciprocal Method •

Allocates support department costs to operating departments by fully recognizing services provided and received by other support departments (therefore most precise).

- Repeated Iterations: calculate the amounts charged multiple times until reaching 0.
- Linear Equations: create set of linear equations and solve them using substitution.



6: Inventory Costing

6.1 – Inventory Costing

Inventoriable Costs vs. Period Costs

- Inventoriable costs are all costs of a product that are considered assets in a balance sheet when cost incurred and that are expensed as COGS only when product is sold.
 - > For manufacturing companies all manufacturing costs are inventoriable (direct & indirect)
- Period costs are all costs in the income statement other than COGS. They are treated as an expense in the period they occurred

Variable and Absorption Costing

- Variable Costing: all variable manufacturing costs are included as inventoriable costs, fixed manufacturing costs are treated as costs of the period in which they incurred
 - > Extreme form: throughput costing - only direct material costs are included as inventoriable
- Absorption Costing: all manufacturing costs are considered inventoriable
 - > Production-volume variance (producing less than budgeted for fixed cost allocation) is written off to COGS

Variable Costing vs. Absorption Costing

- Variable costing income statement uses contribution-margin format

$$\text{Contribution Margin} = \text{Revenues} - \text{Variable Cost}$$

$$\text{Operating Income} = \text{Contribution Margin} - \text{Fixed Cost}$$

$$\text{Production-volume variance} = \text{Budgeted fixed manufacturing costs} - \text{Fixed manufacturing overhead allocated}$$

- If inventory levels change, operating income will differ between the two methods
 - > inventory increases: income (absorption costing) > income (variable costing)
 - > inventory decreases: income (absorption costing) < income (variable costing)
 - > inventory unchanged: income (absorption costing) = income (variable costing)

7: Determining How Costs Behave

7.1 – Cost Functions and Cost Drivers

Cost Functions

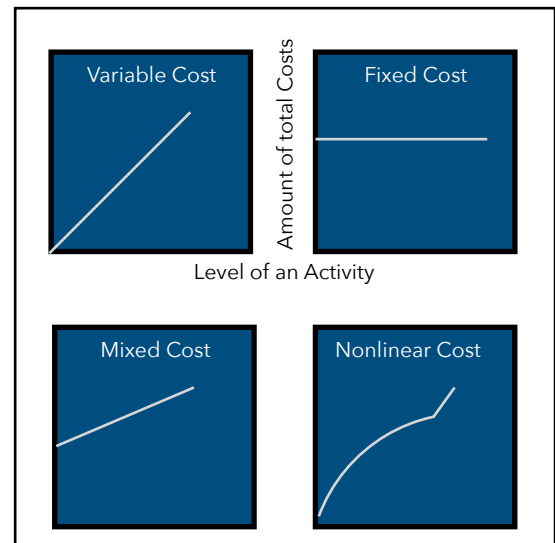
Cost Functions are mathematical functions describing the dependency of costs and their related activity

- > vary with a single activity (cost driver)
- > often approximated by a linear function

Linear Cost Functions

- Variable Costs: costs that change in total in relation to some chosen activity/output
- Fixed Costs: costs that do not change in total in relation to some chosen activity/output
- Mixed Costs: costs that have both, fixed & variable components (semivariable costs)

$$y = a + b \cdot X$$



Variable or Fixed Costs?

- Choice of cost objects (higher level - variable)
- Time horizon (greater time horizon - variable)

Nonlinear Cost Functions

Not all costs are linear, resp. only linear in a relevant range (e.g. discounts for higher purchase volume, badge production, learning effects for low production levels, capacity limits for high production levels)

- > step variable-cost function: cost remains the same over narrow ranges of activity level
- > step fixed-costs function: cost remains the same over wide ranges of the activity level

Identifying Cost Drivers

Cause-and-effect relationship between level of activity and costs related to that activity.

- > physical relationship (e.g. direct materials costs)
- > contractual agreement (e.g. phone contract)
- > knowledge of operations (e.g. ordering costs and number of parts used)

A high correlation (connection) between activities and costs does not necessarily mean causality.

Evaluate by:

- > economic plausability
- > goodness of fit
- > significance of the independent variable

Wrong cost driver lead to incorrect and costly decisions in management

7.2 – Cost Estimation Methods

Industrial Engineering Method

- Estimates cost functions by analyzing relationship between inputs and outputs (physically).
 - > use time-and-motion studies
- Evaluation: +detailed, -costs, - time-consuming

Conference Method

- Estimates cost functions based on analysis & opinions gathered from the various departments.
 - > conference with supervisors/production engineers
- Evaluation: +interdepartmental cooperation, +expert knowledge, +quick, +cheap, -subjective, -depends on people involved

Account Analysis Method

- Estimates cost functions by classifying various cost accounts with respect to level of activities.
- Evaluation: +reasonable accurate, +cheap, +easy, -subjective

Quantitative Analysis Method

- Uses formal mathematical method to fit cost functions to past data observations.
 - > high-low method (linear function between highest & lowest) (inaccurate!)
 - > regression analysis (create function based on all available data)

Differences

- Price of implementation
- Assumptions made
- Information provided about the accuracy of estimated cost function

Methods are not mutually exclusive - they are used in a combined way often.

7.3 – Quantitative Analysis

General Approach

1. Choose the dependent variable (cost to be predicted & managed).
2. Identify the independent variable (level of activity, cost driver).
3. Collect data on dependent and independent variable.
4. Plot the data to observe the general relationship.
5. Estimate the cost functions using quantitative analysis
 - > high-low method: uses highest and lowest observed values to create linear function
 - > regression analysis: statistical method measuring average amount of change in data

8: Cost-Volume-Profit Analysis

8.1 – Essentials of Cost-Volume-Profit Analysis

Cost-Volume-Profit Analysis (CVP)

CVP analysis studies the behaviour and relationships of total revenues, total costs & income as changes occur in number of units sold, selling price, variable cost per unit, fixed costs of product.

The following assumption are made:

- > Total costs = Variable costs + Fixed costs
- > Sales is the only cost/revenue driver
- > Revenue and Costs can be graphed as a linear function in relation to units sold (relevant range)
- > Selling price, variable costs per unit and fixed costs are known and constant
- > Analyzing single product/fixed ratios of multiple products
- > Time value of money is ignored

Contribution Margin

Contribution margin = Total revenues – Total variable costs

Contribution margin percentage = $\frac{\text{Contribution Margin}}{\text{Revenues}}$

Operating income = Contribution margin – Fixed costs

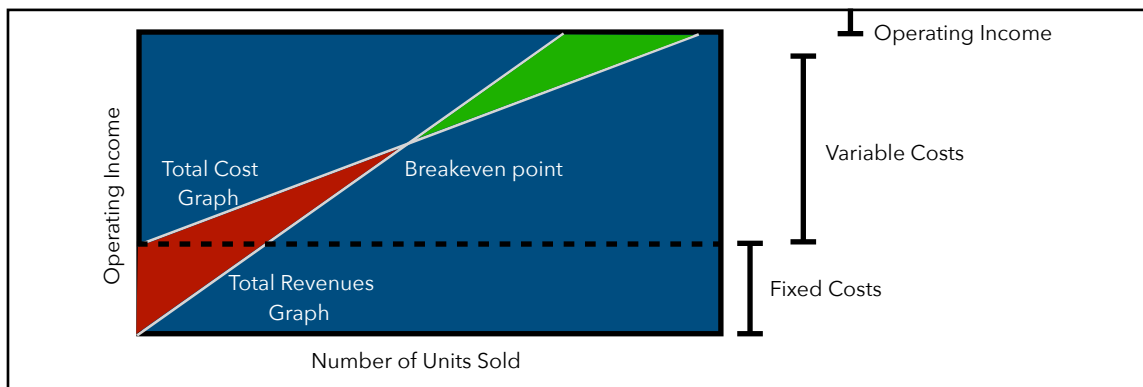
Expressing CVP Relationships

- Equation method

Revenues – Variable costs – Fixed costs = Operating income

Contribution margin – Fixed costs = Operating income

- Graph method



Cost Planning & Cost-Volume-Profit Analysis

Managers often have the opportunity to choose the levels of fixed and variable costs in their costs structure - this is a strategic decision.

- > Example: fixed fee, fixed fee & % of revenues, % of revenues

8.2 – Breakeven Point and Target Income

Breakeven Point

The breakeven point (BEP) is the quantity of output sold at which total revenues equal total costs resulting in an operating income of 0.

$$\text{Breakeven number of units} = \frac{\text{Fixed costs}}{\text{Contribution margin per unit}}$$

Target Operating Income

Setting an target operating income allows calculating the required amount of units sold.

$$\text{Quantity of units required to be sold} = \frac{\text{Fixed costs} + \text{Target operating income}}{\text{Contribution margin per unit}}$$

Target Prices

Knowledge on number of units sold, and occurring costs allows the calculation of a price for a targetted income.

$$\text{Quantity of units required to be sold} = \frac{\text{Fixed costs} + \text{Target operating income}}{\text{Contribution margin per unit}}$$

8.3 – Sensitivity Analysis & Margin of Safety

Sensitivity Analysis

Sensitivity Analysis is a 'what-if'-technique to examine the effects of changes in output.

> vary fixed costs & variable costs

Margin of Safety

The margin of safety defines the possible drop in revenues until breakeven point is reached.

$$\text{Margin of safety} = \text{Budgeted/Actual revenues} - \text{Breakeven revenues}$$

$$\text{Margin of safety percentage} = \frac{\text{Margin of safety}}{\text{Budgeted/Actual revenues}}$$

8.4 – Effects of Sales Mix on Income

Sales Mix

Sales mix is the quantities (proportion) of various products (or services) that constitute a company's total unit sales.

General Approach

1. Create a bundle with a fixed ratio/product mix (observe)
2. Calculate numbers of interest with bundle
3. 'Unpack' calculated numbers using the predefined ratio

Problems with changing Bundles

Changing the ratio changes everything!

For any given total quantity of units sold, as the sales mix shifts towards units with lower contribution margins, the lower operating income will be.

9: Decision Making and Relevant Information

9.1 – Relevance

Decision Model

Decision Models are formal methods of making a choice involving relevant quantitative (easily measured numeraritive, e.g. money) and qualitative (difficult to measure accurately, e.g. employees motivation) analysis.

1. Identify problem and uncertainties
2. Obtain information
3. Make predictions about the future
4. Make decisions by choosing from alternatives
5. Implement decision, evaluate & learn

Relevance

Costs and Revenues are considered relevant when expected for the future and differing among the alternative options taken into account.

Relevant-cost analysis emphasizes quantitative factors expressed in financial terms.

- Past (historical) costs are irrelevant for future decisions
- Alternatives are compared by looking at the different values (not all numbers relevant!)
- Appropriate weight to qualitative factors and quantitative non-financial factors

Potential Problems

Incorrect assumptions, especially on unit-fixed-cost data can potentially mislead managers (when irrelevant costs are included, when the same unit costs are used at different output levels)

9.2 – Make-or-Buy Decisions

Make-or-Buy Decisions

Decisions about insourcing or outsourcing are called make-or-buy decisions.

Idle Facilities

Outsourcing processes does not eliminate the majority of fixed costs - that must be taken into account when making the decision. On the other hand the idle factory can be used to produce more profitable products.

Total Alternatives Approach

Buy price is deducted by additional revenue, which could be made from switching the produced products in ones own factories.

Opportunity-Cost Approach

Using resources in one way results in the forgo opportunity for another way. That lost opportunity is considered as a costs.

Make price is deducted by opportunity cost (in the example) due to forgone opportunity.

Opportunity Cost are difficult to predict. Thereby decision on that basis are under a certain risk.

9.3 – Product-Mix Decisions

Product-Mix Decisions

Decisions about which products to produce in what quantities are called product-mix decisions.

- Subject to constraints such as capacity and demand
- Choose the product with the highest contribution margin per unit of the constraining resource
 - > e.g. one products has a higher contribution margin - but it requires by far more of valuable machine time

9.4 – Equipment-Replacement Decisions

Equipment-Replacement Decisions

Past costs are sunk costs - they cannot be change. Therefore decision should focus on potential advantages in operating costs (incl. depreciation).

Decisions and Performance Evaluation

Changing a machine can lead to higher costs in a period due to losses from disposal of the old machine. Nevertheless buying a new machine is more profitable in the long run.

Managers with bonuses based on annual profits may tend to make decisions in their best interest rather than in the entities.

Cheatsheet

<p>Introduction</p> <ul style="list-style-type: none"> - Measures, analyzes, reports (non-)financial information related to costs of acquiring/using resources - Difference Management & Financial Accounting > Purpose: decision support communicate fin. Position > Focus (time): future (diff. time spans) past, annually - Company Strategies: cost leadersh., prod. differentiat. - Guidelines: cost-benefit approach, behavioral & technical considerations, diff. costs in diff. purposes 	<p>Basic Cost Terms</p> <ul style="list-style-type: none"> - Cost: foregone resource often measured in \$€ C - Actual Cost: costs, that actually occurred (calc. after) AC - Budgeted Cost: costs, that are pred. (calc. bef.) BC, NC - Cost Object: objects, which desire costs measure. CO - Cost Pool: grouping of individual indir. cost items CP - Direct Cost: can be traced (tracked) to CO easily DC - Indirect Cost: cannot be traced > reason. allocation IC - Variable Cost: change in prop. to Cdriver CD (outp.) VC - Fixed Cost: remain unchang. (in relevant range RR) FC - Cost-Allocation Base: way to link indirect CP to CO CAB 	<p>Inventory Costing</p> <ul style="list-style-type: none"> - Inventoriable Cost: assets, expensed when sold - Period Cost: expensed in period, in P&L-Statement - Variable Costing: VC>inventoriable, FC>period - Absorption Costing: VC+FC>inventoriable > Production-volume-variance (producing less than budgeted for FC allocation) is written of to COGS ~ PW = budgeted FC - allocated FC - Changing inventory levels change operating income > inv+: absorption income > variable income > inv-: absorption income < variable income
<p>Cost Allocation: Job Costing JC</p> <ul style="list-style-type: none"> - Used for units of distinct products consuming dif. resou. - General Approach: ident. job (CO) > ident. DC > select CAB > ident. ID assoc. with CABs > comp. rate per unit > comp. ID for CO > comp. total cost (by adding DC) > choose AC or NC - Underalloc.: allocated IC are lower than actual amount, Overalloc.: allocated IC are higher th. actual amount > Adjusting: Recalculation (actual numbers), Proration (allocate to COGS, WIP, FG), Writeoff (from COGS) 	<p>Cost Allocation: Activity Based Costing ABC</p> <ul style="list-style-type: none"> - Broad Averaging: plantwide CAB > over-/undercosting - Guidelines: DC-tracing, many ind. CP, CAB = CD - General Approach: ident. activities as CO > calc. costs of indiv. CO > assign costs to prod. based on activ. - Cost Hierarchy: output unit-level costs, batch-level costs, product-sustaining costs - Activity-Based Management: decision-making method using ABC to promote customer satisfac. & profitability 	<p>Cost Allocation: Process Costing PC</p> <ul style="list-style-type: none"> - Used for masses of similar units of a product - Categories: Direct Materials DM, Conversion Cost CC - Equivalent Units: WIP - with same input -> FG EU - General Approach, Weighted Average: calc. cost per EU of all work done > assign total costs to EU - General Approach, FIFO: Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed diam nonummy nibh euismod tincidunt ut laoreet dolore magna aliquam - Transferred-In Costs: like DM, costs from prev. depart.
<p>Allocation of Support-Department Cost</p> <ul style="list-style-type: none"> - Operating Dep. directly adds value to product OD - Support Dep. provides services for other dep. SD - Single-rate: not distinguish between FC & VC SR - Dual-rate: distinguish FC & VC, different CABs DR - SR, demand(&supply): budgeted rate for each actual use (supply: unused, materials-handling capacity UMH/C) - DR, demand(&supply): budgeted rate for each actual use (VC) + charge all budgeted FC (&supply: UMHC) - Allocating Costs between SDs > direct method: allocation only from SD to OD > step-down m.: rank SD, charge from SD to OD and SD to SD on lower level > reciprocal m.: SD to all OD and all SD € ~ repeated iterations until reaching 0 ~ linear equation (set) solving using substitution 	<p>Cost-Volume-Profit Analysis</p> <ul style="list-style-type: none"> - studies behaviour/relationships of revenues, costs, income and number of units sold, price, VC & FC - Contribution Margin = Tot. Revenues - Total VC - Expressing CVP-relations: equations, graphs - Opting for different cost structure is a strategic decision - Breakeven: Point, where Revenues = Costs BEP - Margin of Safety: Possible drop in revenues until BEP - Sales Mix: Calculate numbers with observed ratio <p>Decision Making & Relevant Information</p> <ul style="list-style-type: none"> - Decision Model: ident. problem/uncertainties > obtain information > make predictions on future > make decision from alternatives > implement, evaluate, learn - Relevance: Costs/Revenues different in alter. > relevant - Make-or-Buy: Total-Alternative Approach (buy-add.rev), Opportunity-Costs Approach (make-opp.cost) - Product-Mix-Decisions: choose highest contr.marg per unit of constraining resource - Equipment-Replacement: Past costs are sunk! 	<p>Determining How Costs Behave</p> <ul style="list-style-type: none"> - Cost Functions: math. func. describing dependencies > nonlinear: step VC, step FC functions - Cost Drivers: explanatory variable for function > physical, contractual, knowledge on operations > evaluate: goodness of fit, econom. plausability - Methods: Industr. Engineering, Conference, Account Analysis, Quantitative Analysis (high-low, regression analysis) > different qualities <p>Cost Allocation: Mixed Approaches</p> <ul style="list-style-type: none"> - Hybrid-Costing: combines JC & PC > Operation Costing: batches of similar non identical products, JC for DM, PC for activities performed <p>Determining Cost of Cost Objects</p> <ol style="list-style-type: none"> 1. Cost Accumulation: collecting cost data (organized) 2. Cost Assignment: trace direct, allocate indirect to obj

Formulas

$$\text{Unit costs} = \frac{\text{Total manufacturing costs}}{\text{Number of units manufactured}}$$

$$\text{Actual indirect cost rate} = \frac{\text{Actual annual indirect costs}}{\text{Actual annual quantity of the cost-allocation base}}$$

$$\text{Budgeted indirect cost rate} = \frac{\text{Budgeted annual indirect costs}}{\text{Budgeted annual quantity of the cost-allocation base}}$$

$$\text{Actual direct costs} = \text{Actual direct-cost rates} \cdot \text{actual quantities of direct-cost inputs}$$

$$\text{Normal direct costs} = \text{Actual direct-cost rates} \cdot \text{actual quantities of direct-cost inputs}$$

$$\text{Actual indirect costs} = \text{Actual indirect-cost rates} \cdot \text{actual quantities of cost-allocation bases}$$

$$\text{Normal indirect costs} = \text{Budgeted indirect-cost rates} \cdot \text{actual quantities of cost-allocation bases}$$

$$\text{Budgeted manufacturing overhead rate} = \frac{\text{Budgeted manufacturing overhead costs}}{\text{Budgeted total quantity of cost-allocation base}}$$

$$\text{Actual manufacturing overhead rate} = \frac{\text{Actual annual manufacturing overhead costs}}{\text{Actual annual quantity of cost-allocation base}}$$

$$\text{Plantwide indirect-cost rate} = \frac{\text{Total plantwide indirect costs}}{\text{Total plantwide quantity of the cost-allocation base}}$$

$$\text{weighted average cost} = \frac{\text{Total costs entering WIP}}{\text{total equivalent units of work done}}$$

$$\text{EU in beginning WIP} + \text{EU of work done in current period} = \text{EU completed and transferred out in current period} + \text{EU in ending WIP}$$

$$\text{budgeted allocation (dual-)rate} = \frac{\text{fixed costs}}{\text{quantity of cost allocation base (demanded/supplied)}}$$

$$\text{budgeted allocation (single-)rate} = \frac{\text{fixed costs} + \text{variable costs}}{\text{quantity of cost allocation base (demanded/supplied)}}$$

$$\text{Contribution Margin} = \text{Total Revenues} - \text{Total Variable Cost}$$

$$\text{Operating Income} = \text{Contribution Margin} - \text{Fixed Cost}$$

$$\text{Production-volume variance} = \text{Budgeted fixed manufacturing costs} - \text{Fixed manufacturing overhead allocated}$$

$$\text{Contribution Margin per unit} = \text{Selling price} - \text{Variable Cost per unit}$$

$$\text{Contribution Margin percentage/ratio} = \frac{\text{Contribution margin}}{\text{Revenues}}$$

$$\text{Revenues} - \text{Variable costs} - \text{Fixed costs} = \text{Operating income}$$

$$(\text{Selling price} \cdot \text{Quantity of units sold} - \text{Variable per unit} \cdot \text{Quantity of units sold}) - \text{Fixed costs} = \text{Operating income}$$

$$((\text{Selling price} - \text{Variable per unit}) \cdot \text{Quantity of units sold}) - \text{Fixed costs} = \text{Operating income}$$

$$(\text{Contribution margin per unit} \cdot \text{Quantity of units sold}) - \text{Fixed costs} = \text{Operating income}$$

$$\text{Breakeven number of units} = \frac{\text{Fixed costs}}{\text{Contribution margin per unit}}$$

$$\text{Breakeven revenues} = \text{Breakeven number of units} \cdot \text{Selling price}$$

$$\text{Quantity of units required to be sold} = \frac{\text{Fixed costs} + \text{Target operating income}}{\text{Contribution margin per unit}}$$

$$\text{Net income} = \text{Operating income} - \text{Income taxes}$$

Target net income = Target Operating income – (Target operating income · Tax rate)

Target net income = Target Operating income · (1 – Tax rate)

Target operating income = $\frac{\text{Target net income}}{1 - \text{Tax rate}}$

Quantity of units required to be sold = $\frac{\text{Fixed costs} + \text{Target operating income}}{\text{Contribution margin per unit}}$

Margin of safety = Budgeted (or actual) revenues – Breakeven revenues

Margin of safety (in units) = Budgeted (or actual) sales quantity – Breakeven quantity

Margin of safety percentage = $\frac{\text{Margin of safety in cash}}{\text{Budgeted (or actual) revenues}}$

Contribution margin percentage for the bundle = $\frac{\text{Contribution margin of the bundle}}{\text{Revenue of the bundle}}$

Breakeven revenues = $\frac{\text{Fixed Costs}}{\text{Contribution margin percentage of the bundle}}$

Number of bundles required to be sold to be break even = $\frac{\text{Breakeven revenues}}{\text{Revenue per bundle}}$