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BLAB

HANDOUTS

PERFORMANCE MEASUREMENT AND CONTROL SYSTEMS

-FIRST PARTIAL-

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PERFORMANCE MEASUREMENT

Revenues are on top of IS, and a relevant part of the IS and therefore a relevant part of the business. They can be defined as value given by the *market* (the exception to this definition are the companies like Apple that have been capable of building a monopoly for their customers, meaning that for those customers there is no alternative product -> if someone is not an Apple customer, it is probable that will look around for finding better opportunities with the same amount of money they would have spent in an iPhone.) to product and services *sold* (we use the past because when we look at the IS we are looking at something occurred in the past) by the company in a period of time -> they are value created by selling output. Obviously, there are different types of markets where the company can operate, which is the place where supply and demand match, and where all players can contribute (customers and company itself included). We cannot define it as cash inflow (as, in first, we are talking about an economic dimension), because they can be different in time, there could be some uncollected/uncollectible credits -> we use a monetary measure to identify and quantify this value.

Costs -> value given by the *market* (if a company has a monopolistic position, they have more power to influence these factors) to productive factors *consumed* (if we purchase raw material, for example, if they are not expired and they are in line with the current technology, they could be sold again. This doesn't mean that when we decide to purchase something just for reselling it we do not incur other types of costs, such as storage costs or financial costs) by the company in a certain period of time -> they are value created by purchasing input.

Companies are organizations running by making exchanges for satisfying human being needs. If we take the components of the IS, we can say that are the *monetary measure of exchange with all the different stakeholders* (which includes customers, workers, creditors, suppliers, governments, financial institutions, shareholders, local communities...), which have an interest in the company because by interacting with the company they are capable of satisfying their interests (investors provide money and they expect a remuneration from the company, as well as suppliers provide to the company the productive factors it needs for the company's activities and they expect some money in exchange) -> the positive difference between the *value generated by the sales* and the *value consumed by costs* we create an increase in value -> **cost measurement systems** are necessary for comparing the value consumed with the value created.

Do companies need to increase value? Yes, because in management the last stakeholders are shareholders, which they only get a marginal income through dividends -> if we are not capable of generating enough value, we are not capable to satisfy the interests of all stakeholders. If we don't generate enough value, we are not capable of choosing between alternatives for the different stakeholders, they can access to the best stakeholders. For example, if we generate enough additional value, we can take the decision to leave our current suppliers and go to the suppliers that we believe to be the best. Furthermore, if we generate enough value, we are capable of retaining the best management we have and so on.

Why do we say "doing shopping" and not "doing the costs"? When we do shopping, we spend money to purchase something -> the richness before and after the purchase is the same (assuming we are not considering the personal value we give to the product and not considering fluctuations of prices), but we cannot resell these products. When we allocate the products are allocated to the warehouse, we allocate the price of the products to the different parts, but the total value is still the same -> in order to have a change in this variable, we have to consume part of it (like if we consume a can of coke that we have previously allocated on top of the shelf).

Costing systems: Traditional approach

Costs = monetary value of productive factors consumed in a business activity. Costs are initially accumulated by nature (raw materials, labour, depreciation, power, rents, spare parts, sales commissions, advertising, etc.) in the *Financial Accounting chart of accounts*, as they are managed differently. Subsequently are assigned and allocated to cost objects, in *Managerial Accounting procedures*, to support management's decision-making. **Cost objects** are anything for which managers require a specific cost measurement:

- *product/services* -> all businesses sell products and services, which are the most relevant cost objects
- *geographical areas* -> if we operate in different geographical areas and each of one produce revenues, we have to calculate the relative costs (this analysis is particularly relevant if we have to decide to start or stop our activity in a specific country)
- *organizational units/departments/offices* (such as Administrative department, Customer Relationship Department, Maintenance departments…) in order to track their activities and control them
- *specific investments* -> if we have specific problems, we have to know the specific costs connected to it
- *distribution channels* (sales could be equal, but depending on costs connected to the distribution channel one could be convenient or not)
- *subsidiaries*
- *cost of internal processes* (such as delivering processes, which is a cross-functional process)
- *managing a precise category of customers*

The *purpose of cost measurement systems* is to assign costs to multiple objects managed by companies, known as *cost objects*. The most common cost objects are the *products or services produced and sold by the company* (all businesses pursue the production and sale of products or services, consequently, firms find useful formal mechanisms for measuring their cost). However, management need to calculate the cost of other objects (to support economically rational decision-making), such as *organizational units and departments, business processes, single specific activities like customer orders, distribution channels used, business areas managed, market segments in which the company competes, individual customers or groups of customers served, and so on*.

The most common decisions that management takes on cost information produced by costing systems include:

- *Setting selling prices*
- *Inventories valuation of work in progress and finished products*
- *Long-term decisions that affect the company's structure*
- *Short-term operational management decisions*
- *Application of the break-even point model*
- *Analysis of operational efficiency*
- *Analysis of structural efficiency*.

Variable Vs Fixed costs

Whenever we want to estimate the behaviour in advance of costs, the distinction between variable and fixed costs becomes very relevant.

- **Variable costs** -> *all costs items* where their total depends on volume -> if we increase volume, total variable costs increase, and vice versa.
- **Fixed costs** -> all costs items where their total do not depend on volume
- ➔ Across the world, the prices are kept the same (we ignore the efficiency that could reduce them), we have to move *only* the *quantity*

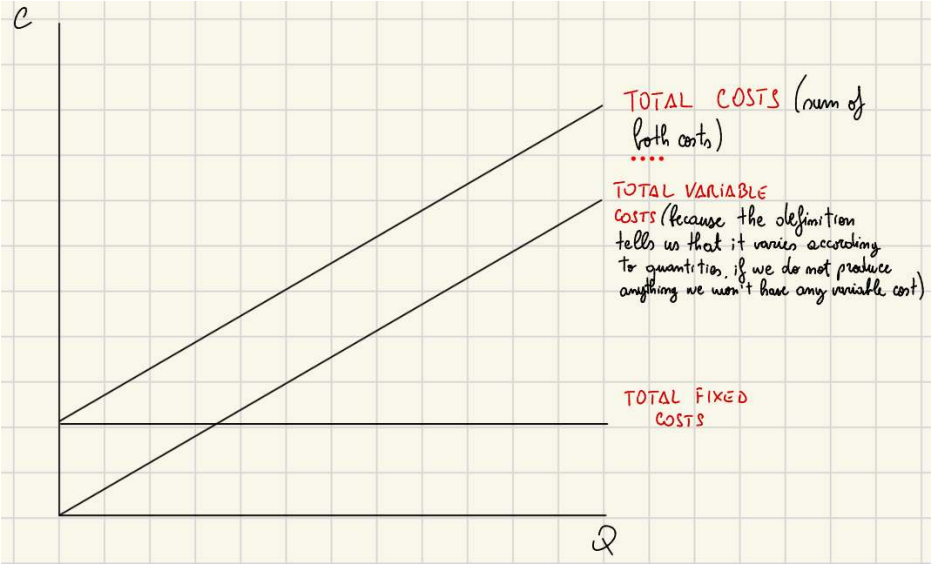
Let's assume we want to produce a marker. The *raw material* is an *example of variable costs*. Let's assume that 1€ is the variable price -> we need to assume that the price remains constant (we have to ignore factors such as efficiency or discounts) -> if we produce 100 markers, we spend 100€, if we produce 1mln markers, it costs 1mln€. On the other hand, let's suppose we use a machinery for the markers production. Assuming it has the adequate productive capacity, the fixed costs connected to it, such its depreciation of 10,000€, will be the same independently if we are producing 1, 100, 1,000 or a million units.

When we want to analyse variable and fixed costs, we have to look at the **behaviour of total amount of units**, not the behaviour of the single unit:

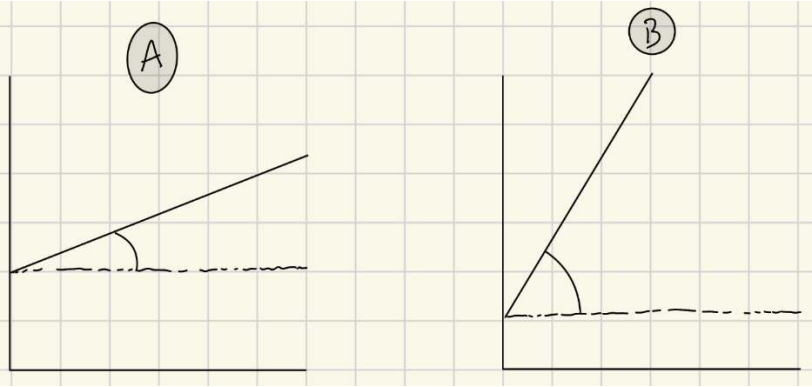
- For the variable costs, if we take the cost of a single unit, that price will be fixed (for example, independently by the amount produced, the cost of a single marker will always be 1€) -> we have to look at the behaviour with the total amount of unit to see how the variate
- For the fixed costs, if we take the cost of a single unit, that price will change, it is variable (for example, the depreciation of a machinery per unit is different depending on the amount of unit we have produced) -> we have to look at the behaviour with the total amount of unit to see how it remains constant
- ➔ In order to make a distinction between variable and fixed costs, we have to calculate it in total.

Break-even point -> is a model that connects prices, quantities, fixed and variable costs -> there is the possibility to play on graphs.

It is possible for us to create a graph to explain how the different costs behave.



The **cost structure** is different depending on the *sector* in which the company operates and also on *firm specific characteristics*, which can help us identify the risk profile of the company itself.

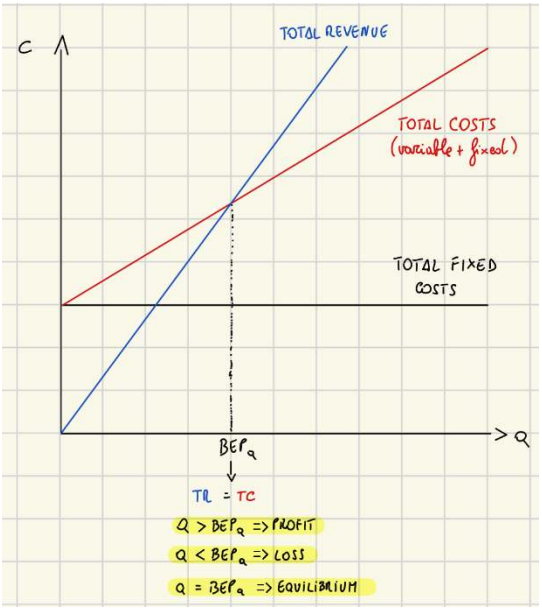


A and B have two different cost structures, as A has a more *rigid structure* (higher fixed costs, lower variable costs) while B has a *more flexible structure* (lower fixed costs, higher variable costs)

- ➔ *A* is considered to be *riskier to be managed*, mostly because the high level of fixed costs forces the company to produce higher quantities of products for reaching the BEP -> in some cases, it can be used as an incentive for managers to produce more, because otherwise the company will default. On the other hand, *B* is perceived to be *less risky* because having a lot of variable costs give the company the possibility to stop purchasing in case prices become to high.

Examples of companies like A are hotels of flight companies -> in both cases there are low variable costs (such as the soap, washing costs, power consumption, water consumption… which are almost irrelevant compared to fixed costs), but in case they are not capable of filling the rooms/seats, they are going to face high levels of fixed costs -> most of the time we refer to these costs as "capacity costs", which include all the costs that we face for having a certain level of capacity.

In today's world, it is very complicated to find companies that can be classified as *pure fixed* or *pure variable* structures, as in all companies we always both have a variable and a fixed part. In addition, there are cases where the *behaviour of a costs is ambiguous*, making difficult for us to classify it correctly and identify the most relevant drivers of that cost -> in these situations, in real life, it is better to classify these costs as fixed, as it stimulates managers to think of ways for taking care of them (otherwise, in case we classify them as variable cost, the common behaviour is not paying much attention to it as there will be the belief that it is something manageable).



After identifying the function of Total costs, we identify the **function of Total revenues**, which we'll represent as a linear function of quantities and price (which starts from the origin of the axes, as if we don't sell anything we won't have any revenue). Once we put these two functions together, we obtain the **Break-Even model**, which allow us to better understand the behaviour of the costs and put together *quantities*, *costs* and *revenues*. In particular, the model allows us to *define the quantity of product at which total costs are equal to total revenues*. It is a model frequently used for making simulation and to make analyses.

How do we calculate the BEP?

$$TR = TC$$

$$q * p = TVC + TFC$$

$$q * p = q * VCu\ (Variable\ Cost\ per\ Unit) + TFC$$

$$q * p - q * VCu = TFC$$

$$q * (p - VCu) = TFC$$

$$BEP_q = \frac{TFC}{p - VCu} = \frac{TFC}{CMu}$$

Where CMu refers to the Contribution Margin per Unit, which is different from the Gross Profit (which is Revenues – Manufacturing costs).

Example:

- TFC = 2,000€
- p = 50€
- VCu = 45€

➔ Every period we have to recover from 2,000€ of Fixed costs -> how do we cover them? With margin -> whenever we sell something, we receive 50€, but then we have to sustain 45€ of Variable costs -> we have a margin of 5€ per unit -> BEP tells us how many 5€ margin we need in order to cover those 2000€

$$BEP_q = \frac{2{,}000€}{50 - 45} = \frac{2{,}000€}{5€} = 400\ units$$

Another important formula is the **Break-Even Sales (BES),** which is the amount of revenues that we need to reach in order to cover all costs. We could calculate it by multiplying the *BEP*p* (in the previous example: 400 units * 50 € = 20,000€), but alternatively we can calculate it as:

$$BEP_q = \frac{TFC}{p - VCu} = \frac{TFC}{CMu}$$

$$BEP_q * p = \frac{TFC}{CMu} * p$$

$$BES = \frac{TFC}{\frac{CMu}{p}}$$

$$BES = \frac{TFC}{CMu\%}$$

In our example:

$$BES = \frac{2{,}000€}{\frac{5€}{50€}} = \frac{2{,}000€}{10\%} = 20{,}000€$$

The main reason why the BES formula is needed is because the calculation of the BEP becomes more difficult in case, instead of a single product line, the company operates by selling a multitude of products and services -> by using the *Weighted Average Contribution margin* we can solve the problem -> we need to identify the mix of the different products that allow us to reach the objective, where the weights are the *percentual impact of the revenues of that product over the total amount of sales generated by the company*. We have to consider that in reality companies that have a huge number of

product already know that there are some products that are not going to be sold, and it is better for them to focus on the most profitable products to generate the majority of required revenues and then leave only a small percentage of revenues to the rest of products.

If the BES and the BEP formula are used to find the quantity/sale level that allow us to reach the equilibrium, we should consider that it is common that some **objectives in terms of profit** could be established -> the formulas are the following:

$$BEP_q = \frac{TFC + Target\ profit}{CMu}$$

$$BES = \frac{TFC + Target\ profit}{CMu\%}$$

Direct vs Indirect costs

Another important distinction regarding the cost's classification is between direct costs and indirect costs:

- **Direct costs** -> they can be specifically and exclusively traced to a unit of product or to another cost object. Examples include the direct materials used in the production of a product and the commissions paid to salespeople on the revenue generated.
- **Indirect costs** -> they cannot be specifically and exclusively traced to a unit of product or to another cost object. However, they can be assigned to cost objects through an *allocation process* that uses *reliable output measures* (*allocating bases - cost drivers*). Example: depreciation of a production facility.

The **allocation of these costs is different**:

- *Direct costs = Price * Quantity* -> the problem in this case regards identify the *correct price* for these cost objects and the *quantities of direct factors*
- *Indirect costs = Total indirect costs/Allocating base* -> in this case, the problem regards *which* and *how many indirect cost pools should be allocated* and *which allocation bases* (cost drivers) should be selected

Assigning direct costs to products and services is particularly easy. It consists of valuing the production factors used in getting each unit of product or service

$$Direct\ costs\ =\ Price\ x\ Quantity$$

- Which elements should be considered in the *prices* of direct factors? Price of productive factor + custom duties + transportation costs taxes – (potential) volume discounts
- Which elements should be considered in the *quantities* of direct factors? + Quantity of productive fact + Over consumption for scraps + Over consumption for waste + Reworks + Set-up time -> we should not include the net consumption of productive factors, but the gross one

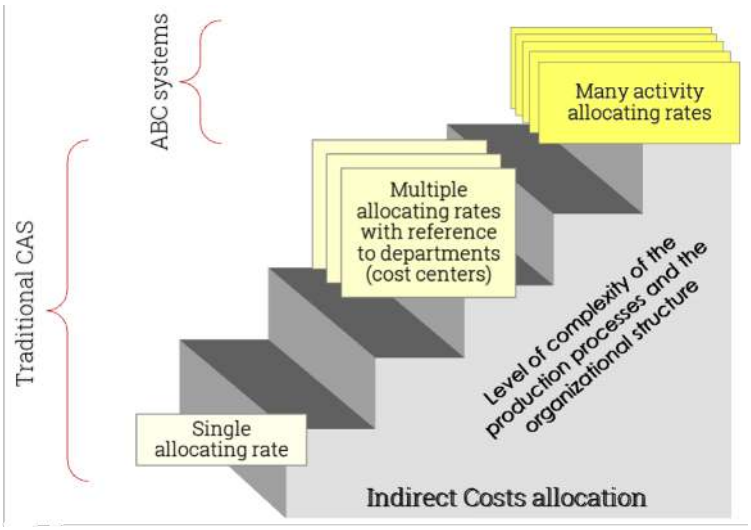
The **Indirect Costs allocation** is the *main issue in measuring the cost of whatever object* (particularly for the products or services sold). Raises in production investments and automation commonly determine growths in the Indirect Cost amount, but the contribution of each product to the increase of these costs is different, as they regard the production of different products. The allocation is based on the identification of a specific *allocation base*, which is strictly connected to the nature of the indirect cost we have to allocate -> we divide the indirect costs for the total amount of the allocation base and

then we multiply this *Allocating Ration* for the specific consumption of allocation base of the different cost objects (so, for example, we could divide the depreciation of a machinery for the total machine hours and then we multiply this result times the specific machine hours used by a specific cost object). There is no Indirect costs allocation method that can lead to a value considered the true cost of the product -> all methods for allocating indirect costs are *based on assumptions, estimates, and calculations*. It is responsibility of Management Accounting managers and Controllers to select cost assignments and allocation methods:

- In coherence with the production system features
- In coherence with the managerial information needs (relevance of cost information in making decisions).

Two alternative Costing Systems:

- *Traditional CS* -> Traditional Costing Systems (CS) are commonly focused on the full manufacturing cost calculation (so these method works very well in case our main source of costs are manufacturing costs). As a result, they have a *primary focus on production costs*, while *non-production costs* have often been *allocated using simplified methodologies*. In small and simple firms (with few cost objects) and where the most relevant costs consist of *direct materials (DM)* and *direct labour (DL*), indirect manufacturing costs are combined into a single cost pool and allocated using a single allocation base (or cost driver). As complexity increases, indirect costs are split over multiple cost pools, which may be identified as process stages (manufacturing departments), and are allocated to cost objects using specific cost drivers.
- *Activity-Based CS* -> Activity-Based Costing (ABC) systems measure all costs that are relevant for management and extend cost assignment beyond manufacturing, including *design, marketing, order processing, logistics, sales, and other related departmental costs*. In highly complex situations (with many cost objects) and when indirect costs represent a significant share of total costs, these costs are first allocated to the individual activities of a department, function, plant, etc., and are subsequently allocated to cost objects.



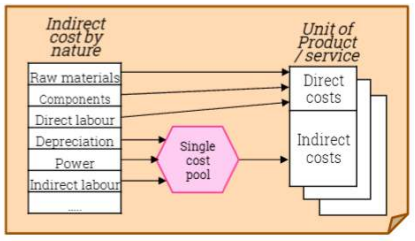
Traditional Costing Systems approach

The indirect cost allocation, throughout the traditional CS, can be implemented using two alternative models:

- **SINGLE BASE cost allocation system** -> Use of a single allocation base applied to a single cost pool grouping all the indirect costs.
- **MULTIPLE BASE cost allocation system** -> Use of multiple allocation bases defined with reference to cost pools representing process stages (cost centres/process-oriented approach). These cost pools are allocated to final cost objects using specific cost drivers.

Single base CS -> With this method, indirect (manufacturing) costs are grouped into a *single cost pool*, for which a *single allocation base is identified* (direct labour hours, direct labour cost, machine hours, etc.). In past, many companies used *direct labour hours* as common allocation base for indirect costs. This was because, in case of labour-intensive production processes, it was *reasonable to assume that indirect costs were in some way proportional to labour costs*.

$$\text{Single Allocating Rate} = \frac{\text{Total Indirect costs}}{\text{Total Direct Labour Hours (or another base)}}$$



Multiple base CS -> This process-stage-oriented (the costs are assigned depending on the different phases of the productive process) method consists of two steps:

1. *assign indirect costs to process-stages* which normally coincide with production departments (aggregate indirect costs according to destinations represented by *Cost Centres – C.C.*), to which we identify the most adequate allocating base and for which we identify the most adequate allocation rates
2. *allocate the cost pools to the unit of product/service*, through allocation rates, determined for each centre based on centre-specific allocation bases.

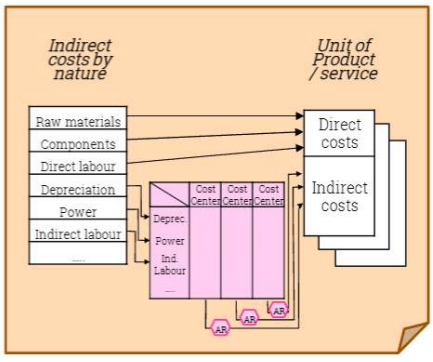
➔ For example, if we assume that the most adequate driver of the first cost centre are the machinery hours, we sum the machine hours of all cost object, calculate the allocating rate for the first cost centre and then we multiply this allocation rate with the consumption of machinery hours of each cost object, and we conduct this process for each C.C.

$$\text{CC 1 C.C. Allocating Rate} = \frac{\text{Indirect costs per C.C}}{\text{Allocating base per C.C.}}$$

$$\text{CC 2 C.C. Allocating Rate} = \frac{\text{Indirect costs per C.C}}{\text{Allocating base per C.C.}}$$

$$\text{CC 3 C.C. Allocating Rate} = \frac{\text{Indirect costs per C.C}}{\text{Allocating base per C.C.}}$$

$$\text{CC 4 C.C. Allocating Rate} = \frac{\text{Indirect costs per C.C}}{\text{Allocating base per C.C.}}$$



Example: Undersea Breathe UB Co. (A part)

Undersea Breathe is a company specialized in the development and production of diving masks. All components are manufactured through 3D printing in the Forming Department, while the finished products are assembled in the Assembling Department. Once the production process is completed, the Packing Department prepares the finished products for shipment to customers. Sales activities are managed by the Marketing Department, which is also responsible for several general and

administrative activities. The company's main products are two diving mask models: Overseas and Mediterranea. The General Manager has requested that the Controller implement a costing model to measure the total cost of each mask. The following information was available:

Product data	Oversea	Mediterranea
Unit price	200.00 €	270.00 €
Production and sale volumes	10,000	25,000
Component costs (per unit of product)	35.00 €	32.00 €
Forming machine hours (per unit of product)	1.4	2.2
Assembly direct labour hours (per unit of product)	1.5	1.4
Direct labor cost per hour	24.00 €	24.00 €

Indirect costs	Total
Indirect labour	1,200,000 €
Depreciation	800,000 €
Utilities	80,000 €
Rents	530,000 €
Indirect material	20,000 €

Calculate the full cost per unit of product using a Single Base cost allocation system. Allocate indirect costs using direct labour hours as the allocation base

	OVERSEA	MEDITERRANEA
COMPONENTS COST (components of different parts × price)	35.00 €	32.00 €
DIRECT LABOUR	36.00 € ($1.5\ h/u \cdot 24\ €/h$)	33.6 € ($1.4\ h/u \cdot 24\ €/h$)
INDIRECT COSTS	78.9 € ($1.5\ h/u \cdot 52.6\ €/h$)	73.64 € ($1.4\ h/u \cdot 52.6\ €/h$)
FULL COST PER PRODUCT	149.9 €/u	139.24 €/u

$$\frac{1,200,000€ + 800,000€ + 80,000€ + 530,000€ + 20,000€}{(10,000\,u \cdot 1.5\,h/u) + (25,000\,u \cdot 1.4\,h/u)}$$

$$= \frac{2,630,000€}{50,000\,h} = 52.6\ € \text{ of indirect cost / direct labour hour}$$

→ ALLOCATING RATE

we assume indirect costs are directly proportional to direct labour hours

probably by knowing the intensity of labour activities we can affirm the goodness of the allocation method

Calculate the full cost per unit of product using a Multiple Base cost allocation system: the four departments are the cost centres. In developing the CS consider the additional information below:

Indirect costs data	Forming	Assembling	Packing	Marketing
Indirect labour costs refer to 6 workers with the same salary. These workers are staffed in the department shown here	2	6	3	3
Depreciation costs have to be assigned to cost centers accordingly with these percentages	50%	20%	20%	10%
Utilities specific costs are	45,000 €	20,000 €	10,000 €	5,000 €
Rental specific costs are	250,000 €	150,000 €	100,000 €	30,000 €
Indirect material costs are proportional to depreciation	50%	20%	20%	10%
Cost Centers allocating basis	Forming machine hours	Direct labour hours	Units sold	Total revenues

	FORMING	ASSEMBLING	PACKING	MARKETING
INDIRECT LABOUR $\frac{1,200,000€}{14} = 85,417.29$ €/workcen	171,429 € (85,417.29€ · 2)	514,286 € (85,417.29€ · 6)	257,143€ (85,417.29€ · 3)	257,143€ (85,417.29€ · 3)
DEPRECIATION (the percentages can be found considering total investments and the use of each department)	400,000 € (800,000 · 50%)	160,000 € (800,000 · 20%)	160,000 € (800,000 · 20%)	80,000 (800,000 · 10%)
UTILITIES	45,000 €	20,000€	10,000 €	5,000 €
RENTAL COSTS	250, 000€	150,000 €	100,000 €	30,000 €
INDIRECT MATERIAL	10, 000 € (20,000€ · 50%)	4,000 € (20,000€ · 20%)	4,000 € (20,000€ · 20%)	2,000 € (20,000€ · 10%)
TOTAL COSTS PER COST CENTER	876,429 €	848,286 €	531,143 €	374, 143 €

↳ from now on, we'll only care about the total costs of each cost center

ALLOCATING BASE	forming machine hours	direct labour costs	units sold	total revenues
	10,000 · 1.5 + 25,000 · 2.2 = 69,000 MH ↓ machine hours	10,000 · 1.5 + 10,000 · 1.4 = 50,000 DLH ↓ direct labour hour	10,000 + 25,000 = 35,000 u	10,000 · 200 + 25,000 · 270 = 8,750,000 €
ALLOCATION RATE	$\frac{876,429€}{69,000} = 12,70$ €/MH	$\frac{848,286€}{50,000 DLH} = 16,97$ €/DLH	$\frac{531,143€}{35,000 u} = 15,18$ €/u	$\frac{374,143€}{8,750,000} = 4.28\%$ ↓ for each euro of revenues we spend 4c in marketing

	OVERSEA	MEDITERRANEA
COMPONENTS	35,00 €	32,00 €
DL	36,00 €	33.60 €
FORMING	17.78 € (1.4 · 12.7 €/MH)	27.94 € (2.2 · 12.7 €/MH)
ASSEMBLING	25.45 € (1.5 · 16.97 €/DLH)	23.75 € (1.4 · 16.97 €/DLH)
PACKING	15.18€	15.18€
	8.55 €	11.54 €
TOTAL COST	137.96 €	144.02 €

The two methods give two different results. The second method is more detailed, but how could we say that it is more accurate? The second method, which is more complex than the first one, has some situations where it is better to use -> The production processes are highly diversified:

- *products differ in terms of manufacturing activities required* -> with the first method, we assumed that indirect costs were directly related to direct labour hours (so, the assumption behind is that the amount of indirect costs is proportional to direct labour hours) -> the accuracy depends on the level of technology used (in case we have a manufacturing activity mainly manual, then it is a good)
- *production processes operate with different levels of automation* -> if the different technologies used in the different steps are manually used, then the first method is more adequate. But instead, if you have different levels of automation, if we try to make an average by using the same allocation base with different productive phases that have different methodologies (like using direct labour hours for everything, but there are some departments that are highly manual and others that are not), we can make mistakes
- there are *differences in the use of departments/process stages by products*.

➔ We are capable of considering the difference level of technology and complexity in each cost centre

The use of a Multiple Base model serves a **twofold purpose**:

- to provide more relevant product/service cost information for *cost management* (we are more aware of the costs of each product) and decision support
- to facilitate the accounting and tracking of costs related to products and services.

Advantages of Multiple Base CS:

- The allocation of Indirect Costs reflects more accurately the use of resources (type of departmental direct labor) and production capacities (departmental technologies) employed for each product
- The use of different Allocating Rates makes it possible to adopt a differentiated Allocating Bases according to the technological characteristics of each department (direct labor hours, machine hours, etc.)
- The differentiation of Allocating Bases requires the clear identification of cost drivers within each department.

When we want to apply these traditional systems, which kind of numbers should we use? If we have to use all the costs *known*, then traditional methods are good. Differences in direct & indirect costs *estimation* determining the cost values used as input to a Costing System:

- **Direct costs can be measured in real time while production is underway**. This is because they are calculated by multiplying the current price of each production factor by the quantity of that factor consumed at any given moment -> If we need 1000 markers, we know how much plastic we are using for producing the marker, and by looking at the current price of plastics, and we calculate the direct costs. As a result, *direct costs can be observed and monitored continuously as production progresses*.
- **Indirect costs, on the other hand, are incurred over a specific period of time and may be either variable or fixed**. For this reason, they cannot be measured directly when they arise. Instead, they must be estimated in advance, based on *expected levels of activity*. Their actual amount becomes *known only at the end of the reference period*, when production has already been completed (and the cost information would be late), making real-time measurement impossible

➔ The approach combining actual direct costs and estimated indirect costs is called **Normal Costing** (on the base of a specific period).

Normal costing advantages -> Budgeted-estimated overhead rates, for indirect costs, grant the following advantages:

1. Calculate product costs in real time, also for the indirect cost items, without having to wait until the end of the period
2. Eliminate the fluctuations of the overhead rates that will occur if actual monthly rates are used (if we calculate allocating rates on a monthly base, we could have indirect costs that fluctuate between the different months)

For example:

Indirect cost	January	February	March	April	Annual Total
Fixed indirect costs	2,000,000 €	2,000,000 €	2,000,000 €	2,000,000 €	24,000,000 €
Machine hours	200,000	100,000	400,000	300,000	2,400,000
Hourly overhead rate	10 €/hour	20 €/hour	5 €/Hour	6.67 €/hour	10 €/hour

Therefore, budgeted (estimated, predetermined) overhead rates are used (normal costing system) to allocate indirect costs.

Under- and Over- recovery of overheads

Example:

Estimated annual indirect costs (overhead)	2,000,000 €
Estimated allocating base (machine hours)	1,000,000 mac. hrs
Estimated (or predetermined) allocating rate	2 €/machine hour

If actual allocating base (level of activity) or overhead spending are different from that used to compute the estimated overhead rates, there will be an under or over recovery of fixed overheads, that need to be disposed at the end of the period.

Assume actual level of activity is 900,000 Machine hours and actual overhead are 2,000,000€:

Overhead allocated to products are	1,800,000 € *(900,000 x 2€)*
Under-recovery is	200,000 € *1,800,000 € -2,000,000 €*

Assume actual level of activity is 1,000,000 Machine hours and actual overhead are 1,950,000€:

Overhead allocated to products are	2,000,000 € *(1,000,000 x 2€)*
Over-recovery is	50,000 € *2,000,000 € - 1,950,000 €*

When we have an under-recovery, we have to reduce our profit, because we have charged less than the actual level of fixed costs. The opposite is the over-recovery.

Activity-Based Costing approach

If we take the production of plastic water bottle, the highest costs regard activities that are outside of the manufacturing activities, such as *marketing* or *logistics*. If we take the production of a smartphones, because they produce millions of products, it means that the efficiency is very high, and therefore the productive costs are not that high (less than 100€) -> we would miss the real costs, such as design, technology, innovation…some intangible items that are not part of the manufacturing process -> we need a Costing System capable of considering this costs.

Activity Based Costing Systems -> measure all costs that are relevant for management and extend cost assignment beyond manufacturing, including *design*, *marketing*, *order processing*, *logistics*, *sales*, and *other related departmental costs*. In highly complex situations (with many cost objects) and when indirect costs represent a *significant* share of total costs, these costs are first allocated to the individual activities of a department, function, plant, etc., and are subsequently allocated to cost objects -> the methodology is the same of the Multiple-bases approach, but instead of cost centres we use activities.

ABC: needs a more accurate CS than traditional ones

- Technology has *reduced the relevance of direct costs* and, more generally, of manufacturing costs, thanks to the process of *servitization* (which is the process where manufacturing companies start selling additional services), losing their hard parts (making the requirement for material requirement) -> when we talk about servitization, *direct labour is disappearing* (also because of the automation of productive processes). The most relevant examples are music and videos
- *Intense competitive pressure* has *compressed margins*, making accurate cost measurement essential
- *Product variety and customer requirements have increased complexity*, leading to more differentiated activities across the company's organizations (such as the flavour range of Pringles, which can reach to 46 different products -> it is not complex from the technological point of view, but from a managerial point of view, because, for example, it requires an ID product for each flavour). Within the complexity, we have to consider also the customer complexity, as *customers require customization*, which does not impact significantly on productive process but rather in other activities (delivering, selling, working with customers…)

- Variety and complexity require *more accurate cost drivers to be properly measured* -> these drivers differ from simple production volume determinants
- The *growing relevance of cross-departmental control objects*, such as processes & activities, highlights how ABC supports a process-oriented organizational approach
- *Variety and complexity generated by the offer to customers*, together with the cross-departmental nature of many activities, require the valuation of new cost objects that were previously not relevant, such as customers, business processes, distribution channels, and so on

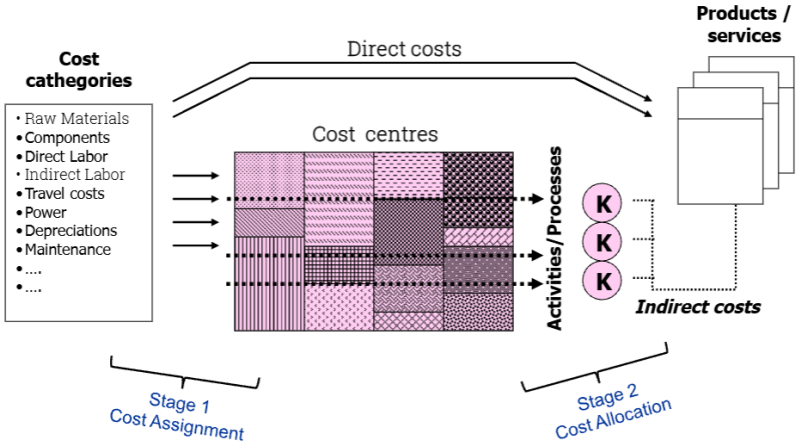
For example, because Amazon is capable of tracking the behaviour of customers (what product the customer usually buy, if they usually buy more expensive or cheaper product, how often you send back

a packages), and because one of the most expensive and complex procedures are connected to sending back the product purchased (which need to be tracked considering the single customer), they do not have to consider the profitability of product, but the profitability of customers

ABC and Customer Profitability analysis -> Assume that the company serves several customers and is now assessing the profitability of its commercial relationship with two key customers: Customer A and Customer B. Both have *generated the same annual revenues*, ordering a *similar product mix*, with a *Cost of Goods sold equal to 45%*. A detailed analysis of the orders placed by the two customers reveals the following situation:

	Customer A	Customer B
Total revenues	100,000€	100,000€
Total CoGS	45,000€	45,000€
Total Gross margin	55,000€	55,000€
N. of items ordered	200	2000
N. of orders managed	10	200
N. of deliveries	4	100
N. of invoices issued	50	250

Even though the two customers generate the *same gross margin on sales*, it is easy to see that *the cost incurred by the company to serve them is not the same*. To achieve a gross margin of € 55,000, Customer B requires the performance of many more activities. If the cost of picking each ordered item, as well as the costs of order processing, shipping, and invoicing, were calculated and allocated to customers using an ABC system, *Customer B would be far less profitable than Customer A*. *Customer B is more complex to serve (and costly) than A*.



To design an ABC system the four **following steps** are necessary:

1. *Determine the key components of the system* (cost items, activities, cost drivers, final cost objects, and activity drivers)
2. I*dentify the relationships between resources and activities*, and between *activities and final cost objects* (through management interviews). ABC requires a deep understanding of business processes);
3. *Collect the relevant data on costs, cost drivers, and activity drivers*;
4. *Calculate and interpret the new cost information for each final cost object*

ABC vs Traditional systems:

- The allocation bases, used in traditional systems for assigning indirect costs, in ABC systems are called *drivers*
- Both systems use the two-stage allocation process:

  - In the first stage *traditional systems* tend to assign costs to departments whereas *ABC systems* assign costs to activities (ABC systems tend to have more cost pools)
  - In the second stage *traditional systems* rely on a small number of volume-based allocating bases (typically direct labour or machine hours) whereas *ABC systems* use many second stage cost drivers
- ABC systems seek to use only cause-and-effect cost drivers whereas traditional systems sometimes rely on arbitrary allocation bases
- ABC systems tend to establish separate cost driver rates for support departments whereas traditional systems merge support and production centre costs.

Example: Undersea Breathe UB Co. (B part)

Undersea Breathe is a company specialized in the development and production of diving masks. All components are manufactured through 3D printing in the Forming Department, while the finished products are assembled in the Assembling Department. The Packing Department prepares the finished products for shipment to customers, and the Marketing Department manages the sales and other general and administrative activities. To improve the cost measurement of the products produced (Overseas and Mediterranea masks), the Controller of the company decided to implement a new Activity Based Costing system. The following information was available:

Product data	Oversea	Mediterranea
Unit price	200.00 €	270.00 €
Production and sale volumes	10,000	25,000
Component costs (per unit of product)	35.00 €	32.00 €
Forming machine hours (per unit of product)	1.4	2.2
Assembly direct labour hours (per unit of product)	1.5	1.4
Direct labor cost per hour	24.00 €	24.00 €

Indirect costs	Forming	Assembling	Packing	Marketing
Indirect labour	171,429 €	514,286 €	257,143 €	257,143 €
Depreciation	400,000 €	160,000 €	160,000 €	80,000 €
Utilities	45,000 €	20,000 €	10,000 €	5,000 €
Rents	250,000 €	150,000 €	100,000 €	30,000 €
Indirect material	10,000 €	4,000 €	4,000 €	2,000 €
Total Indirect costs assigned to Cost Centers	876,429 €	848,286 €	531,143 €	374,143 €

Calculate the full cost per unit of product using the Activity Based Costing. Below are shown the activities mapped in each department and the time spent by departmental workers to run each activity.

Activities mapped	Forming	Assembling	Packing	Marketing
Machinery set-Up	30%			
Machining	70%			
Components' grouping		15%		
Assembly		85%		
Order management			20%	
Products packing			30%	
Deliveries			50%	
Selling				90%
Invoicing				10%
Total time worked in each department	100%	100%	100%	100%

The information regarding the activity drivers to be used is following:

Activity drivers	Overseas	Mediterranea	Total
N. of set-up	500	2,500	3,000
Machine hours	14,000	55,000	69,000
N. of components	40,000	150,000	190,000
Assembly DL hours	15,000	35,000	50,000
N. of orders	1,250	6,250	7,500
Unit sold	10,000	25,000	35,000
N. of deliveries	1,250	12,500	13,750
Unit sold	10,000	25,000	35,000
N. of invoices	1,000	500	1,500

First step, we have to apply the percentages in order to allocate the costs of the different deparments to the different activities

Cost per activity

Activities mapped	Forming	Assembling	Packing	Marketing
Machinery set-Up	262,929 €			
Machining	613,500 €			
Components' grouping		127,243 €		
Assembly		721,043 €		
Order management			106,229 €	
Products packing			159,343 €	
Deliveries			265,571 €	
Selling				336,729 €
Invoicing				37,414 €
Total dipartmental costs	876,429 €	848,286 €	531,143 €	374,143 €

Activity driver rate calculation

Activities mapped	Activity costs	Activity driver	Q.ty of activity driver	Activity driver rate
Machinery set-Up	262,929 €	N. of set-up	3,000	87.64 €
Machining	613,500 €	Machine hours	69,000	8.89 €
Components' grouping	127,243 €	N. of components	190,000	0.67 €
Assembly	721,043 €	Assembly DL hours	50,000	14.42 €
Order management	106,229 €	N. of orders	7,500	14.16 €
Products packing	159,343 €	Unit sold	35,000	4.55 €
Deliveries	265,571 €	N. of deliveries	13,750	19.31 €
Selling	336,729 €	Unit sold	35,000	9.62 €
Invoicing	37,414 €	N. of invoices	1,500	24.94 €
Total dipartmental costs	2,630,000 €			

Total cost per product line	Oversea	Mediterranea
Components	350,000.00 €	800,000.00 €
Direct labor	360,000.00 €	840,000.00 €
Machinery set-Up costs	43,821.43 €	219,107.14 €
Machining costs	124,478.26 €	489,021.74 €
Components' grouping costs	26,787.97 €	100,454.89 €
Assembly costs	216,312.86 €	504,730.00 €
Order management costs	17,704.76 €	88,523.81 €
Products packing costs	45,526.53 €	113,816.33 €
Deliveries costs	24,142.86 €	241,428.57 €
Selling costs	96,208.16 €	240,520.41 €
Invoicing costs	24,942.86 €	12,471.43 €
Total cost per product line	**1,329,925.69 €**	**3,650,074.31 €**
Total units produced and sold	10,000	25,000
Full cost per unit of product	**132.99 €**	**146.00 €**

ABC advantages:

- Intermediate aggregation by activity brings CAS to the highest level of detail, setting a more accurate CAS
- The focus of ABC systems is on the indirect costs allocation, particularly the SG&A costs
- In *complex contexts*, with *many cost objects* and a *high share of indirect costs*, costs are first assigned to the activities of a department, function, or plant, and only afterwards allocated to the cost objects.
- ABC systems enable management to understand the cost of activities performed by different business functions and assess the costs in relation to the value generated by activities for both the company and its customers -> we have always to remember that increasing services and product sold by the company imply more resources and more complexity
- ABC systems also facilitate the profitability analysis of multiple cost objects, such as customers, geographic areas, market segments, and other similar categories.

ABC: instructions for use (cautions):

- ABC systems influence behaviours and require incremental resources/information (we need to identify the products, the relevant activities, the costs, the drivers, the total amount of drivers

and the specific drivers for each cost object…), as well as *significant expertise*. They are more costly than traditional systems -> the *benefit of increased information relevance must outweigh these additional costs*.

- ABC systems produce results that are very different from those produced by traditional costing systems. The ABC results need a higher attention to be understood and used.

➔ Data generated by the application of the ABC methodology should be used with care in the decision-making process.

Another advantage of applying the ABC methodology is that you realize what are the original costs behind the different activities allow the company to managing activities as costs-objects, in order to increase the efficiency of the company.

	Accuracy of measurements	Accountability	Price & Cost Management	Cost of implementation and maintenance
Plantwide/ Blanket allocation	Low	Low	Low	Low
Departmental allocation	Medium	High	Medium	Medium
Activity-based allocation	High	Low	High	High

Accuracy of measurement:

- single based systems are very simple and fast, with a very low accuracy
- With multiple based systems, we increase the accuracy of measurement, but there are additional conditions we have to respect
- ABC -> much more detailed information, more complex system but more accurate

Accountability -> means who is in charge and who is responsible for that specific cost object:

- Single based systems -> high-level management is responsible for it, but because they are responsible for everything, we don't know how much time and effort they have spent in that cost object
- Multiple based system -> it is normal that every department has its responsible
- ABC -> usually it is difficult to have a specific responsible for the different activities, in particular when they are cross-functional

Price & Cost measurement:

- Single based systems -> they are simplifying a lot the situation of the company
- Multiple based system -> there is a more accurate distinction between costs
- ABC -> it is easier to identify the most profitable and value creating activities and customers

Cost of implementation and maintenance:

- Single based systems -> very low, because it is a very easy system
- Multiple based system -> more complex, more costly
- ABC -> maintenance and monitoring activities are more complex (both in terms of structures and information required), therefore more expensive

The design of performance measurement and control systems

Performance measurement & control systems (PMCS) are the formal, information-based routines and procedures managers use to maintain or alter patterns in organizational activities -> instruments to *stimulate management to active* -> we stimulate organisations in *continuing, maintaining, or in changing*. There are 4 important aspects:

1. *They convey information* -> we are addressing information. Suppose that in the case of company, starting from tomorrow, okay, we are using individual cross-margin, so cross-margin produced by each salesperson as a sample system. So the idea is that starting from the 1st of March, instead of, we'll be rewarding based on that use of your boxes, instead of being based on that, we will be based on cross-margin -> we are *addressing attention of salespeople*. They know that something is changing.
2. *They are "formal"* -> we made an official communication, *where companies tell how the performance measurement and control systems will change*. We made an official communication starting from the 1st of March. We modified our control systems tracing orders by orders and the cross-margin per order in the case of our salespeople. The money, the cross-margin, they are producing day by day.
3. *They are used by managers*
4. *They influence patterns in organizational activities* -> the scope is to influence the behaviour of people. Because probably starting from the 1st of March our salesperson will start taking care about the marginality of what they propose to customers. Probably they will realise that if we apply if they exceed in terms of discounts, they have their own problems. Because the more they make discounts the more they lose results because their performance is based on cross-margin not on revenues.

PMCS are **meant to solve different trade-offs**:

1. *Profit, Growth and Control* -> in case we promote one, we risk to sacrifice the others.
    a. if we say that we want to grow, we could mean increasing sales, customer base, enter new markets… if we want to increase sales we could face a limit with profit, as we might decide to reduce the price in order to increase the sales.
    b. Selling out in other countries could be, could be but probably entering new countries we need to spend money. If we want to remain in the same geographic area, probably we need to improve something in terms of context, in terms of quality, in terms of service -> increase costs and reduce profitability
    c. If we want to grow, we risk improving complexity and we risk losing control -> If we increase the customer base, we face risk to meet new customers to stimulate trials, promotion and samples but we are not sure about the return of this. And we are not sure that all the new customers will be, financially speaking, good customers (because if we sell but they don't pay you know that bad credit more or less are proportional to our sales)
    d. If we grow, we increase complexity and we risk to lose control (for example, in case we want to reach new customers, we might not be capable of better reaching them)

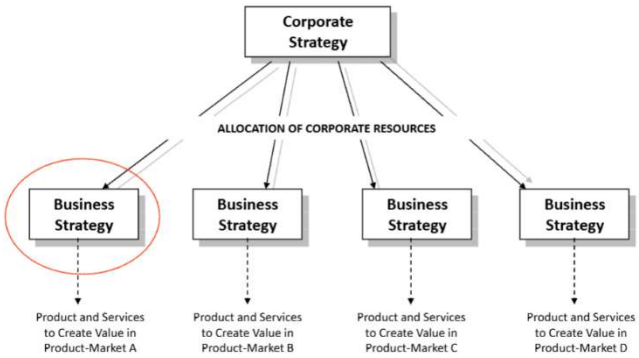
1. *Short-Term Results against Long-Term Capabilities and Growth Opportunities* -> if we want to produce results now, we are not allowed to sacrifice anything. On the other hand, if we want to reach objectives in the long-run, we have to spend money today (reducing our performance) in

order to be better in the future by making investments that allow the development of a new product

2. *Performance Expectations of Different Stakeholders* -> common shareholders want profits and dividends, workers to receive salaries, customers want good quality -> good quality means lower margins, profits, and dividend
3. *Opportunities and Attention* -> opportunities is more long-term, attentions means understand what is happening now to motivate human behaviour.
4. *Motives of Human Behaviour* -> In order to maximise profit, we need to stimulate our manager with benefits, incentives, whatever. But if you have other kind of managers, suddenly this kind of pressure, they don't want to be engaged, they don't want to be involved, they have other kind of expectations they want to have a good work-life balance. They would like to have certain kind of benefits that different generations don't want
   ➔ We have to find a balance between these tensions

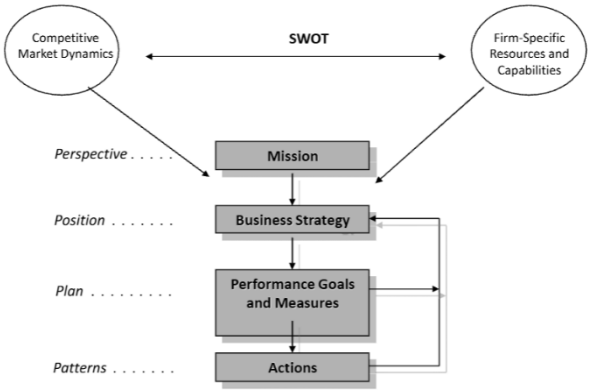
The design of PMCS: the relevance of strategy -> PMCS provide the analytic discipline and communication channels to formalize business strategy and ensure that strategic goals are communicated throughout the business. PMCS are the primary vehicle to monitor the implementation of strategies -> it is important the coherence between performance, measurement, and control systems and strategy, because if we use strange measures or inappropriate measures or wrong measures, to the end, we stimulate wrong behaviours or incorrect behaviours, "you get what you measure". For example, if I track managers based on revenues, we are forcing them to focus on sales -> they will start to try to sell as much as they can, without considering prices, discounts, credit collection, profitability...but not because they are stupid, but because the measurement system is designed to force them to behave in a certain way.

We need to understand the **relevance of the performance measurement control system** to brand strategy implementation, because if we use wrong measures, probably it will be impossible to put in place strategies as people *behave differently than what we expect*. There are 2 levels of strategy:



- *Corporate strategy* -> definition of *overall strategy of the company, the main values, principles and objectives*
- *Business strategy* -> companies work in different industries, selling specific products/services, by using specific productive processes -> we have to *deploy the overall strategy of the company into more specific and detailed business strategy*

➔ At *corporate level*, we have the overall allocation of resources among the different businesses, in order to *allocate investments according to the specific needs and strategies* that want to be implemented



Hierarchy of business strategy:

- *Perspective* -> we define the mission, we define the values and principles
- *Position* -> we have to define how to translate the values at business level (for example, if the value and objective of the company is to preserve the

health of our customers, we have to define by which activities we want to implement in order to do it)
- *Plan* -> identify resources, assign resources, we create a sequence of actions, decisions, investments to put in place the business strategy.
- *Implementation* -> we have to consider also the context, so we need to adapt

Obviously, we can even plan everything in details, but we always have to consider the context in which the company is operating and adapting in case it changes. In particular, it is important to define an **efficient feedback system** that allow us to *communicate the results achieved* in order to *readjust the target and plans if the expectations are not met* -> in order to deploy the mission, and to create more powerful business strategies, usually we take into account all the potential information that are relevant. An important instrument for this analysis is the **SWOT analysis**, which allows us to compare the competitive market dynamics (and identify the relevant risks and opportunities) with the firm-specific competences and resources (in order to identify strengths and weaknesses) and identify coherences.

In order to analyse the competitive market in which we operate, we can use the **Porter's Five forces model**:

- *Potential Entrants to the Market* (which can compete byusing maybe different perspectives, so different distribution channels, or different technologies, or different approaches to solve the same problem)
- *Substitute Products or Services*
- *Suppliers of Inputs and Resources*
- *Buyers and Customers* (in our competitive environment, pressures could also come from changes in customer behaviours, as buyers could change something, could modify their expectations, could have different needs)
- *Rivalry among Existing Competitors*

Assets and resources:

- An *asset* is defined as a resource, owned or controlled by the entity, that will yield future economic benefits.
- A *resource* is more broadly defined as a strength of the business embodied in the tangible or intangible assets that are tied semi-permanently to the firm

Assets are customarily recorded on the balance sheet, and these accounts are *imposed to test* and *must add future value to the firm* and the *value must be quantifiable with reasonable precision* -> we have to use a **formal representation**, as thanks to the financial statements we are communicating to the world our ownership of those assets.

Intangible assets are much more problematic for accounting purposes: their monetary value is difficult to measure so they more rarely appear on a firm's balance sheet. Whenever we talk about assets, we talk about assets shown in the BS, of which we have to be capable of protect our ownership of those assets -> there are *some intangible assets that can be protected* (such as ideas thanks to copyright) and, therefore, written in the BS, and *others that you cannot*. If, for example, if we have a good reputation on the market, and we have a customer base of 10,000 customers (we are well-recognised on the market, and we have a customer base of formal information, such as all the names of customers, their locations, so everything), it is something valuable (because if there is another company buying us, we have to include in the valuation), but we cannot expose them in the BS, because it is not something secret. Another example: if we invest a lot of resources in the training of a

managers, we are creating something valuable for the company, but we cannot write that experienced manager in our balance sheet, because we cannot stop it to leave the company

Intangible resources:

1. *Distinctive internal capabilities*: special resources and know-how possessed by a firm that give it competitive advantage in the marketplace (Functional skills, Market skills or Embedded resources) -> here, if we talk about patents and trademarks, we can easily identify and protect them because they are formally evaluated
2. *Market franchises*: a business's distinctive ability to attract customers who are willing to purchase the business's products and services based on market wide perceptions of value.
3. *Relationships and networks*: long-term relationships with important suppliers and customers.

The design of PMCS: the relevance of organizational structure -> PMCS are aimed at supporting the control of work units on the basis of the *accountability principle*. A *work unit* represents a grouping of individuals who utilize the firm's resources and are accountable for performance (we have the operational manager who's carrying the operation, we have sales manager or marketing manager is their responsibility to put in place the strategy) -> It is the *basic building block of organizational design*. Accountability defines:

- The *outputs that a work unit is expected to produce*
- The *performance standards that managers and employees* of that unit are *expected to meet*

➔ you are in charge of something. You are accountable for something. You will be considered responsible for something. Because we are expecting you to do that and you produce this kind of results. You maximise these outcomes

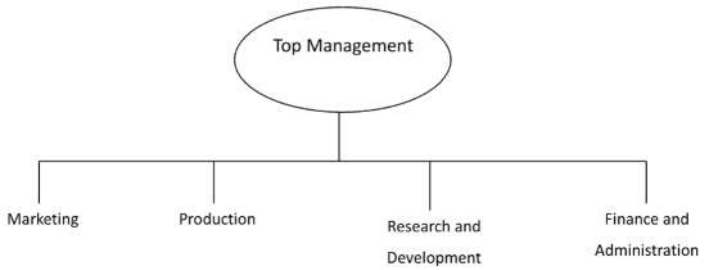
The *organizational chart* is a picture, a diagram of accountability units that can be of two basic types:

1) *Groups of people and resources engaged in a similar work process* (FUNCTIONS)
2) *Groups of people and resources focused on a specific market* (DIVISIONS or BUSINESS UNITS)

➔ We group people. We put people with the same expertise facing the same problems managing a specific business process

Units clustered by work processes: the functional organization

A **FUNCTION** is the most basic organizational component, comprising a group of managers and employees who specialize in *specific work processes*.



Whenever we create marketing or sales departments, we are talking about *people who's main function is to*, basically, *sell* (Sales is selling) and *promote our business* (Marketing is communicating), *maximising the exposure of our brands and our product lines*. If we talk about production, basically we are talking about *managers mainly working on production in a certain company, they are working on production processes, they are working on our plans* -> the approach is different because they are probably *much more technical*. The other are *more focused on communication*, in trying to sell, in involving, in interacting with the market. Production is more focused on *internal competencies*, they

are usually more technical, they are probably e*xperts on technologies of raw material, of transformation process,* while the other *are experts of the way to communicate*, the way to present in the best way the company and the offer.

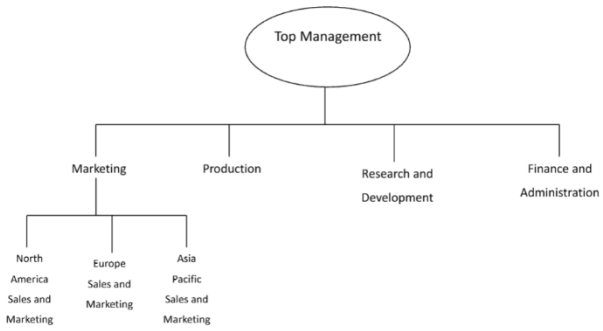
➔ they are **doing totally different jobs**, they usually have *different skills* and usually they could have also *different personalities*. Markets and sales are mainly focused on outside the company. Production is more focused on inside the company.

In function organisation, *people are divided by their specialisation* -> All technicians are mainly in production department, all salespeople are in sales and communication people are in marketing, sales, and whatever -> they are running segments of the same business, different segments of the same business, and the concept is to *integrate these different perspectives*. Functional analysis is an organisation mainly focused on the internal knowledge = we look inside us and we organise our competencies, our capabilities in function.

Units clustered by market focus

Market-focused units (DIVISIONS or BUSINESS UNITS -> in each division we have a combination of competencies focussing on a specific businesses) are normally found as:

1. *Units clustered by PRODUCT*: in such cases units are called *product divisions*. These are created in order to exploit *economies of scale* and *scope* related to product specialization
2. *Units clustered by CUSTOMER*: these are found when the market needs of each customer segment are unique so that specialized expertise and knowledge about customers are essential to compete, as they allow the recognition of needs and



3. *Units clustered by GEOGRAPHY*: they are often referred as regional business. Specialization is required to understand and respond to local specificities

➔ each business area is a sort of small company combining all competencies referred to a specific market, to a specific product, to a specific geographical area (in fact, most of the time everyone has its own marketing division, product division…), focussing their attention on that specific business. Depending on the external perspective, we *organise our internal competencies* and *workforce* in order to reach our objectives

Span of control and span of accountability

SPAN OF CONTROL -> indicates how many (and which) subordinates and functions report to each manager in the organization. It describes the *resources*, in terms of *people* and *work units* (department, business units, functions), directly *under a manager's control*. Span of control outlines reporting relationships (who is accountable to whom) but does not tell us what they are accountable for, it tells us the hierarchical relationships.

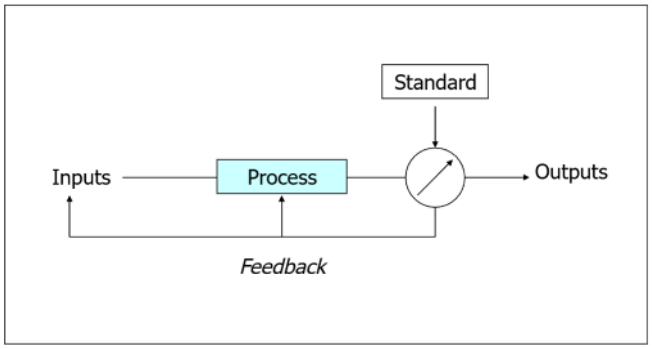
SPAN OF ACCOUNTABILITY -> describes the range of performance measures used to evaluate a manager's achievements -> we use *measures to evaluate managerial performances*, and we consider these measures accountable for really precise kind of results. When we talk about responsibility accounting is deployed by using *financial responsibility centres* (Financial measures to rate managerial performances we compare to responsibility centres):

- *cost centres* -> evaluated on the capability of control costs -> we require them to reduce the variability, not necessarily minimize costs (as we'll face additional risks, because we could sacrifice security, safety, quality). Typical cost centre could be, a typical cost centre could be, raw material (which is an organisational unit, not a cost item)
- *profit centres* -> organizational unit with the responsibility of keeping under control cost and maximise revenues -> we are extending responsibility
- *investment centres* -> we are increasing the responsibility by making them responsibility of investments too -> ROI becomes a relevant measure (we are combining the capability of manager to access investment, or to create a price between the profit you create to maximise the return on investment).
- *engineering expense centres* -> there are connections between effort and resource and where the efficiency of each production line (which is a relationship between input and output), there is a sort of algorithm behind (as we know exactly which will be the output of the machinery if it works in a certain way and, therefore, we are capable of measuring their work).
- *discretionary expense centres* -> If we take the Customer Care department, they spend money -> could we measure the efficiency in the same way we measure it with machinery? No, because we need all the time to talk with the customer. Usually, the way we measure performance is respecting the budget and non-financial measure, such as *satisfaction rate* -> differently from manufacturing activity, we cannot measure precisely the efficiency.
- *revenue centres* -> organizational units that do not manage costs, but only revenues, such as the Sales department. Whenever we talk about revenue centres, we talk about net revenues centres -> they have to decide about *discount, order management, contractual conditions, promotion* -> these are costs in the end, so we have to subtract them from revenues

Work units
Span of control
Span of accountability
} are employed in order to influence

SPAN OF ATTENTION -> which refers to the domain of activities that are within a manager's field of view and defines what an individual will attempt to gather information on and influence. Basically, it is impossible to interact and control all the collaborators, in particular in case the department is required to produce high number of documents and reports, which will not be analysed entirely by the manager. This will consume the memory and energies of a person. The way we decentralise, we need to create feasible situations where managers can really take care about the portion of the business -> performance management control systems are systems to support these limited capabilities of people, of human beings, to manage a complex situation, as the PMCS *select and identify the critical issues to simplify the reporting system*, just to reduce attention on the most critical issues

Inputs – Process – Outputs Model of controls



Whenever we need to design a control/measurement system, what do we measure? In order to put under control, we could measure Input, Process or Output depending on the situations (sometimes you are forced to use one or the other):

- *Input* -> we check the Input used for the process (resources we use, the skills we are using…)
- *Process* -> we control the actions (we control the action, exactly what we do)
- *Output* -> focus on results produced

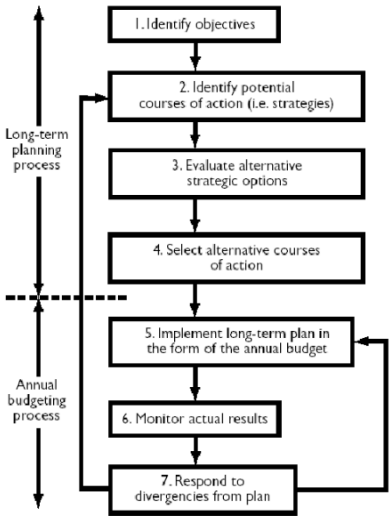
Let's consider three examples:

1. I want to plan and control an assembly line (we are in a manufacturing line) -> input moving slowly, workers need to make modifications -> we have to focus on Process, because we have to focus on the production, they do not make decisions and respects written manuals, they have precise activities to be done -> we
2. Control system for sales people (not online, in person, such as B2B situation) -> they have to meet in person. We are excluding the process, because there is not a manual for definition of a single style for selling -> we exclude process. Output -> we don't care about the approach, we just care about reaching objectives of sales
3. Hospital -> control the surgery department. Identify the output is difficult, and we could define some guidelines but -> in selecting people we care about the instruments we are going to use and the doctors we are hiring

➔ we can generate and distribute feedback about the controlling systems

Profit plans and budgets

Whenever we talk about **profit plans and budgets**, we are talking about planning instruments. Planning systems usually play their role *before* the action, before the period, at the beginning of the period by *setting targets and goals, plans and we identify targets*. After these goals identification, we normally supposed to act to put in place our, to implement our decisions. After this action, we control the results -> using various analysis, so *comparing budget values and actual values*, we understand how the management activity went.



Profit planning -> is a simulating approach to planning, to get the best scenario that makes the highest performance. Whenever we set, whenever we have decided a scenario, deploying these targets and goals all over the organisation, usually we do the budgeted process. Budget usually is the way we deploy these scenario, involving all the infrastructures, all the organisation.

An **overview of the planning process**

1. *Identify the objectives of the organization.*
2. *Identify potential strategies.*
3. *Evaluate alternative strategic options* (profit planning).
4. *Select course of action* -> we deploy the scenario over the organization, we do budgeting.
5. *Implement the long-term plan in the form of the annual budget.*

6. *Monitor actual results* -> we make various analysis or respond to divergences from plan in order to readjust our long-term plans or readjust the potential actions we could analyse as alternatives.
7. *Respond to divergences from plan*.

Objectives of profit planning:

- *Profitability* ("profit wheel")-> translate an initiative into a detailed plan to create value -> Check of expected financial performance deriving from the strategic objectives and alternatives selected
- *Feasibility* ("cash wheel" because we have to verify our project from a financial point of view)-> To evaluate whether resources are available to implement the intended initiative -> Check of financial resources available and needed
- *Accountability* ("responsibility wheel")-> To create a link between goals and indicators of the intended initiative -> Definition of targets for performance evaluation of managers and to address the attention of managers and to maximise their contribution to the overall result of the company

The **Profit Plan/Budget**:

- A *master budget* can be divided into operating and financial budgets.
    - *Operating budgets* describe the income-generating activities of a firm: sales, production, selling and administrative activities (in fact, one of the most first intermediate result is Operating Income)
    - *Financial budgets* detail the inflows and outflows of cash and the overall financial position.

➔ Combining both we have a BS

The final synthesis is the *production of financial statements* (Balance Sheet, Income Statement and Cash Flow Statement), but we have to deploy all the components and the details of our plans (for example, whenever we talk about budgeted revenues, we need to deploy, what does it mean? How many products you want to sell? What kind of pricing? How many units? What mix? What price?).

For example, if we want to stimulate demand, we need to invest in market and sales. But investing in market and sales, we cause cost, and so we lose profit -> we have the profitability to respect. If we increase revenues will cause a proportional increase in account receivables, and probably we could have a similar proportional increase in stock of finished products to keep the same time to serve, right? But so increasing revenues, we are creating needs in terms of financing additional account receivable financial stocks.

The **operating budget** consists of a budgeted income statement accompanied by the following support schedules:

- *Sales budget* -> initial note we play in order to set-up the orchestra, as we are going to ajust all the other departments (for example, if we are planning to increase selling, the purchase department will need to know how much to purchase)
- *Production budget*
- *Direct materials usage and purchases budget*
- *Direct labour budget*
- *Factory overhead budget*
- *Selling and marketing budget*
- *Research and development budget*

- *Administrative budget*

➔ we normally only arrive to the operating income. So we are excluding taxes, we are excluding extraordinary items, because our main focus is to work on operating income

The usual financial budgets prepared are:

- *Capital budget* (asset allocation systems) -> it is related to investment, medium-long term budget -> if we make the annual BS, even though in the past we made an evaluation of the investment over multiple years, we have to take into account of the annual portion of an investment and the required capital only for the following year
- *Cash budget* (like the following) -> Cash budget is simply the estimation of inflows and flows, and outflows, and measuring our financial balance, if we are self-sufficient in terms of financial resources or not.
- *Budgeted Balance Sheet*

Beginning cash balance		$x,xxx
Add: Cash receipts		x,xxx
Total cash available		$x,xxx
Less: Disbursements	$x,xxx	
Minimum cash balance	x,xxx	
Total cash needs		x,xxx
Excess (deficiency of cash available over needs)		$x,xxx
Total financing:		
Plus: Borrowings		x,xxx
Less: Loan repayments and interest		x,xxx
Plus: Minimum cash balance		x,xxx
Ending cash balance		$x,xxx
		====

	Q1	Q2	Q3	Q4	Year
Sales units	10,000	15,200	20,000	40,000	85,200
Normal discount	0%	0%	10%	10%	
Direct materials per unit (square meters)	1	1	1	1	1
Direct materials cost per square meter	$ 100.00	$ 100.00	$ 100.00	$ 100.00	$ 100
Direct labor time per unit	1.5	1.5	1.5	1.5	1.5
Wage per hour	$ 40.00	$ 40.00	$ 40.00	$ 40.00	$ 40.00
Variable overhead rate	$ 40.00	$ 40.00	$ 40.00	$ 40.00	$ 40.00
Budgeted fixed overhead*	$ 2,000,000	$ 2,000,000	$ 2,000,000	$ 2,000,000	$ 8,000,000
Variable marketing expenses per unit	$ 20.00	$ 20.00	$ 20.00	$ 20.00	$ 20.00
Fixed marketing expenses:					
Salaries	$ 700,000	$ 700,000	$ 700,000	$ 700,000	$ 2,800,000
Advertising	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 4,000,000
Depreciation	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 1,000,000
Travel	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 400,000
R&D expenses:					
Compensation for extern. researchers	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 400,000
Prototype design and development	$ 220,000	$ 220,000	$ 220,000	$ 220,000	$ 880,000
Administrative expenses:					
Salaries	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 1,200,000
Insurance	$ -	$ 1,500,000	$ -	$ -	$ 1,500,000
Depreciation	$ 125,000	$ 125,000	$ 125,000	$ 125,000	$ 500,000
Travel	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 40,000
Income taxes				$ 4,000,000	$ 4,000,000

*Operating depreciation for each quarter included: $500,000. OH are allocated based on DL hours

Detailed example – Data for operating budgets

The company sells the following products with the corresponding list price:

- Evelyine: $ 680
- Brigitte: $ 700
- Sophie: $ 720

The desired finished goods inventory is set at 40% of the next quarter sales. The desired ending inventory for direct materials is set at 50% of the next quarter needs. Sales for the first quarter of the next year are expected to be 12,000 units, while the amount for second quarter is 14,000 units. The ending inventory of the last year amounts to 10,000 units of finished goods and 13,000 units of direct materials (other inventories are negligible). Last year BS:

ASSETS		LIABILITIES	
Current assets:		Current liabilities:	
Cash	$ 1,600	Accounts payable	$ 5,000
Accounts receivable	$ 10,000		
Raw materials inventory	$ 1,300	Stockholders' equity:	
Finished Goods	$ 4,000	Common stock	$ 2,000
Total current assets	**$ 16,900**	Retained earnings	$ 16,400
		Total stockholders' equity	**$ 18,400**
Property, plant & equipment:			
Land	$ 500		
Building and equipment	$ 12,000		
Accumulated depreciation	$ (6,000)		
Total PP&E	**$ 6,500**		
Total assets	**$ 23,400**	**Total liabilities and equity**	**$ 23,400**

Data for cash budget:

a) A $100,000 minimum cash balance is required for the end of each quarter. Money can be borrowed and repaid in multiples of $100,000. Interest is 8% per year. (Assumption: all borrowing takes place at the beginning of a quarter and all repayment takes place at the end of a quarter).
b) 20% of all sales are for cash, 80% are on credit. Half of credit sales are collected in the quarter of sale, and the remaining half are collected in the following quarter. The sales for the fourth quarter of 20XX-1 were $25,000,000.
c) Purchases of raw materials are made on account; 50% of purchases are paid for in the quarter of purchase. The remaining 50% are paid for in the following quarter. The purchases for the fourth quarter of 20XX-1 were $10,000,000.
d) The capital budget for 20XX revealed plans to purchase additional equipment to handle increased demand at a small plant. The cash outlay for the equipment, $6,000,000, will take place in the first quarter. The company plans to finance the acquisition of the equipment with operating cash, supplementing it with short-term loans as necessary

Sales budget -> we are talking about expected quantities * expected price

	Quarter				
	1	2	3	4	Year
Units*	10	15.2	20	40	85.2
Unit average list price	$700	$700	$700	$700	x $700
Normal discount	0%	0%	10%	10%	
Unit average net price	x $700	x $700	x $630	x $630	
Sales	$7,000	$10,640	$12,600	$25,200	$55,440

* Please notice that items in blue represent given data.

Figures are in thousands

If we are planning to use special discount policies, because we believe that these discount policies will boost, will influence in a positive way volumes, we could include here discount. Obviously, including these discount percentages, we need to remember in developing the last row sales, that we have to subtract those discounts. Because we have quantity of one product and price of one. In reality, probably we could have more products with different expected prices, but to the end, it's a sum of quantities and prices.

Production budget -> the conversion should take into account the inventory at the beginning and the end of each period. In this case, we want to keep in the inventory 40% of next period sales -> in order to calculate the desired ending inventory of Q4, we have to predict which will be the sale quantities of Q1 2xx+1. In this way, we calculate the total need -> in order to identify the quantity to be produced, we subtract the inventory of bop. In the Year column, we have to include the inventory at the beginning and ending of the year, not of the last period.

	Quarter				
	1	2	3	4	Year
Sales (units) (Schedule 1)	10	15.2	20	40	85.2
Desired ending inventory	6.08	8	16	4.8*	4.8
Total needs	16.08	23.2	36	44.8	90
Less: Beginning inventory	10	6.08	8	16	10
Units to be produced	6.08	17.12	28	28.8	80

*12 x 40% (12 = sales in Q1 20XX+1)

Units to be produced in Q1 20XX+1:
(Q1 200X+1) Sales (units): 12
(Q1 20XX+1) Desired ending inventory: 14 x 0.4 = 5.6 (14 = unit sales in Q2 20XX+1)
(Q1 20XX+1) Total needs = 12 + 5.6 = 17.6
(Q1 20XX+1) Units to be produced= 17.6 - 4.8 = **12.8**

Direct materials usage and purchases budgets

	Quarter				
	1	2	3	4	Year
Units to be produced (Sch. 2)	6.08	17.12	28	28.8	80
Direct materials per unit	x 1	x 1	x 1	x 1	x 1
Production needs	6.08	17.12	28	28.8	80
Cost per sqm	x $100	x $100	x $100	x $100	x $100
Total DM usage cost	$608	$1,712	$2,800	$2,880	$8,000
DM Production needs	6.08	17.12	28	28.8	80
Desired ending inventory	8.56	14	14.4	6.4*	6.4
Total DM needs	14.64	31.12	42.4	35.2	86.4
Less: Beginning inventory	13	8.56	14	14.4	13
Direct materials to be purchased	1.64	22.56	28.4	20.8	73.4
Cost per sqm	x $100	x $100	x $100	x $100	x $100
Total DM purchase cost	$164	$2,256	$2,840	$2,080	$7,340

* 12.8 x 0.5 (12.8 is the forecasted units to be produced in Q1 20XX+1)

Note: the production needs are changing in square meters -> we have to change the unit of measurement in order to calculate the need of direct material. In order to calculate the need of direct material to be purchased, we have to identify the inventory policy for direct material, which could be different from the inventory policy for finished products.

Direct labour budget -> we assume it is proportional to units produced -> similarly from before, we have to convert the finished products into direct labour hours.

	Quarter				
	1	2	3	4	Year
Units to be produced (Sch. 2)	6.08	17.12	28	28.8	80
Direct labor time per unit	x 1.5	x 1.5	x 1.5	x 1.5	x 1.5
Total hours needed	9.12	25.68	42	43.2	120
Wage per hour	x $40	x $40	x $40	x $40	x $40
Total direct labor cost	$364.8	$1,027.2	$1,680	$1,728	$4,800

Factory overhead budget -> the hypothesis is that factory overhead is proportional to DLH.

	Quarter				
	1	2	3	4	Year
Budgeted DLH (Sch. 4)	9.12	25.68	42	43.2	120
Variable overhead rate	x $40	x $40	x $40	x $40	x $40
Budgeted variable overhead	$364.8	$1,027.2	$1,680	$1,728	$4,800
Budgeted fixed overhead	2,000	2,000	2,000	2,000	8,000
Total overhead	$2,364.8	$3,027.2	$3,680	$3,728	$12,800

Ending finished goods inventory (figures not in thousands) -> the 8,000,000$ refers to fixed overheads while 120,000 refers to the DLH, as we can found in the previous budget. The 4,800 finished goods represent the desired ending inventory that emerge from the production budget.

Unit cost computation:	
Direct materials (1 sqm. @ $100)	$100
Direct labor (1.5 hr. @ $40)	$60
Overhead:	
Variable (1.5 hr. @ $40)	$60
Fixed (1,5 hr. @ $66,6667*)	$100
Total unit cost	$320

*$8,000,000/120,000 = $66.666

	Units	Unit Costs	Total
Finished goods	4,800	$320	$1,536,000

Cost of goods sold

Direct materials used (Schedule 3)	$8,000
Direct labor used (Schedule 4)	4,800
Overhead (Schedule 5)	12,800
Budgeted manufacturing costs	$25,600
Beginning finished goods (from balance sheet)	4,000
Goods available for sale	$29,600
Less: Ending finished goods (Schedule 6)	1,536
Budgeted cost of goods sold	$28,064

Another way to estimate COGS is by multiplying the volume sold times the unit cost of good sold -> 85,200 units * 320 $/unit = 27,264 $ -> the difference is due to the fact that beginning inventory is values at a different cost per unit. This method works if the unit cost at which we value inventory does not change.

Marketing budget

	Quarter				
	1	2	3	4	Year
Sales (units)	10	15.2	40	20	85,2
Variable marketing expenses per unit	x $20	x $20	x $20	x $20	x $20
Total variable expenses	$200	$304	$800	$400	$1,704
Fixed marketing expenses:					
Salaries	$700	$700	$ 700	$ 700	$2,800
Advertising	1,000	1,000	1,000	1,000	4,000
Depreciation	250	250	250	250	1,000
Travel	100	100	100	100	400
Total fixed expenses	$2,050	$ 2,050	$ 2,050	$ 2,050	$ 8,200
Total marketing expenses	$2,250	$2,354	$2,850	$2,450	$9,904

Here the values in blue are budgeted values/input, and the total marketing expenses consider both the Variable Marketing costs and the Fixed Marketing costs.

Research and development budget

	Quarter				
	1	2	3	4	Year
Salaries	$100	$100	$100	$100	$400
Product design and development	220	220	220	220	880
Total R & D expenses	$320	$320	$320	$320	$1,280

They are not usually related to sales volumes.

Administrative budget -> these are usually fixed costs. Budgeting process: manufacturing expenses tend to be connected to volumes. Whether we enter into estimation of administrative costs, it becomes difficult to do so -> the main concern of SGAI costs is that we do not have a clear algorithm -> we usually estimate them by using an incremental approach (i.e. using last year + increase).

	Quarter				
	1	2	3	4	Year
Salaries	$300	$ 300	$300	$300	$1,200
Insurance	--	1,500	--	--	1,500
Depreciation	125	125	125	125	500
Travel	10	10	10	10	40
Total administrative expenses	$435	$1,935	$435	$435	$3,240

Budgeted income statement -> before the Operating Income, we have the Operating Budget, which include all the values included in the Operating Income calculation. In order to calculate the Net Income, we need some values from the financial budget, such as the interest expenses and taxes.

Sales (Schedule 1)		$ 55,440
Less: Cost of goods sold (Schedule 7)		28,064
Gross margin		$ 27,376
Less: Selling and marketing expenses (Schedule 8)	9,904	
R & D expenses (Schedule 9)		1,280
Administrative expenses (Schedule 10)		3,240
Operating income		$ 12,952
Less: Interest expense (Schedule 12)		14
Income before taxes		$ 12,938
Less: Income taxes		4,000
Net income		$ 8,938

Cash receipts from customers -> collection and payment criteria related to operating budgets. We have to take the budgeted sales and look at the collection policies. In particular, we assume that all the remaining account receivable from the previous year is collected, 20% of sales of each quarter are collected immediately, 40% are collected in the following quarter and the remaining 40% in two quarters from now.

	Quarter			
	1	2	3	4
SALES (Sch. 1)	**$ 7,000**	**$10,640**	**$12,600**	**$25,200**
Cash sales	$1,400	$2,128	$2,520	$5,040
Received on account from:				
Quarter 4, 20XX-1 (from BS)	10,000			
Quarter 1, 20XX	2,800	2,800		
Quarter 2, 20XX		4,256	4,256	
Quarter 3, 20XX			5,040	5,040
Quarter 4, 20XX				10,080
Total cash receipts	$14,200	$9,184	$11,816	$20,160

Cash disbursements for direct materials -> similarly to before, we assume that all the account payable for direct materials are paid in the first quarter and then the purchases are paid 50% immediately and the remaining half in the following quarter of the purchase.

	Quarter			
	1	2	3	4
PURCHASES (Sch. 3)	**$ 164**	**$ 2,256**	**$ 2,840**	**$ 2,080**
Current quarter	$82	$1,128	$1,420	$1,040
Prior quarter	(from BS) 5,000	82	1,128	1,420
Total cash disbursement for raw materials	$5,082	$1,210	$2,548	$2,460

Cash Disbursements (total) -> we put together all the cash outflows, both the ones coming from operating activities and the investments and taxes

	Quarter			
	1	2	3	4
Direct materials	$5,082	$1,210	$2,548	$2,460
Direct labor	364.8	1,027,2	1,680	1,728
Overhead	1,864,8	2,527,2	3,180	3,228
Marketing expense	2,000	2,104	2,600	2,200
R&D expense	320	320	320	320
Administrative	310	1,810	310	310
Income taxes	--	--	--	4,000
Equipment	6,000	--	--	--
Total disbursements	$15,941.6	$8,998.4	$10,638	$14,246

Cash Budget -> we have to remember that it is different from the cash flow. Cash flow take aggregate of total inflows and outflows, flows can be added/subtracted and stock value per quarter does not sum together (they are totals at a certain point in time),

	Quarter				
	1	2	3	4	Year
Beginning cash balance	$ 1,600	$ 152.4	$ 132	$ 1,208	$ 1,600
Cash collections	14,200	9,184	11,816	20,160	55,360
Total cash available	$ 15,800	$ 9,336.4	$11,948	$21,368	$56,960
Total disbursements	$15,941.6	$ 8,998.4	$10,638	$14,246	$49,824
Minimum cash balance	100	100	100	100	100
Total cash needs	$16,041.6	$ 9,098.4	$10,738	$14,346	$49,924
Excess (deficiency) of cash	$ (241.6)	$ 238	$ 1,210	$ 7,022	$ 7,036
Add: Borrowings	300	--	-	--	300
Less: Repayments	--	200	100	--	300
Start of quarter short term debt	300	300	100	--	--
Less: Interest paid	6	6	2	--	14
Ending cash balance	$ 52.4	$ 32	$ 1,108	$ 7,022	$ 7,022
Plus: Minimum cash balance	100	100	100	100	100
Ending cash balance	$ 152.4	$ 132	$ 1,208	$ 7,122	$ 7,122

Budgeted balance sheet

ASSETS		LIABILITIES	
Current assets:		Current liabilities:	
Cash	$ 7,122	Accounts payable	$ 1,040
Accounts receivable	$ 10,080		
Direct materials inventory	$ 640	Stockholders' equity:	
Finished Goods	$ 1,536	Common stock	$ 2,000
Total current assets	**$ 19,378**	Retained earnings	$ 25,338
		Total stockholders' equity	**$ 27,338**
Property, plant & equipment:			
Land	$ 500		
Building and equipment	$ 18,000		
Accumulated depreciation	$ 9,500		
Total PP&E	**$ 9,000**		
Total assets	**$ 28,378**	**Total liabilities and equity**	**$ 28,378**

Surveys of financial officers of the largest industrial companies indicate that the use of master budgets is wide-spread in all countries:

- United States 91%
- Japan 93%
- Australia 100%
- United Kingdom 100%
- Holland 100%

Differences arise with respect to some other dimensions of budgeting. U.S. controllers and managers prefer more participation and regard return on investment as the most important budget goal. In contrast, Japanese controllers and managers prefer less participation and regard sales revenues as the most important budget goal. Surveys of Ausralian and Japanese managers report that budgeting is the management accounting practice that has the single highest benefit to them. Given the fast changing nature of business, companies seems to prefer use of models that adjust input in real time.

CASE STUDIES

Forrest gamp case study

It is about the profitability of these products -> how the movies generate profits, so which are the revenues generated and the relative costs. The case tells us that the product, the "Forrest Gump" movie, even though it has been a success (the case takes in consideration only the revenues from theatre and the year after), Paramount affirms that the movie produced losses, as it is shown in the following Table:

Table 1. Statement of Profit and Loss for net profit participants on the motion picture, *Forrest Gump*, through December 31, 1994

Box office gross revenues			$382
Amount retained by movie theaters (approx. 50%)			191
Paramount's gross revenues			$191
Negative costs:			
Direct costs:			
Production costs	$66.8		
Gross profit participation by director, actors, etc. (16% of studio gross revenues)	30.6		
Total direct costs	$97.4		
Studio overhead (allocated — 15% of direct costs)	14.6		
Total negative costs		$112.0	
Promotion and distribution costs	$67.2		
Advertising overhead (allocated — 10% of promotion and distribution costs)	6.7		
Distribution fee (32% of studio gross revenues)	61.1		
		135.0	
Financing costs (calculated at 3% above prime, on unrecovered costs — the 'loss' below)		6.0	
Total costs			253
Profit (loss) through December 31, 1994			($62)

As we can see, according to communication made by Paramount the Forrest Gump movie has been the 25th movie of all time for adjusted revenues -> we take the revenues of the different movies, and we adjust them for inflation. In addition, differently from Paramount, by including all sources of revenues (not only revenues from theatre, but also cassette and cable tv) -> in the end, the movie has generated above 700m$.

Let's consider the remuneration system that could have been applied to different players. We usually define a proportional remuneration system in case we are self-confident about the performance of that product. On the other hand, if you are not sure about the performance or, at least, you are just a minor player, it is better to receive a fixed amount of money, which implies that the person does not take any risk. If we look at the structure of the product, we can see how there are 5 kinds of stakeholders that participate to the generation of value in different ways:

- Investors (producers) -> they incur in financing costs and they take part in the net profit/loss
- Productions:
    - Subcontractors (companies providing for logistics, locations…all the supporting activities required to produce the movie) -> paid on the basis on production costs and studio overhead
    - Major talents (such as the actors) -> salary, but because they are usually big actors, they usually take part to the gross profit/loss -> even if the net profit might be negative, in the end they could receive an additional compensation because it is calculated on the gross profit
    - Minor talents (like irrelevant actors) -> wages and salaries + participation in the net profit -> if net profit < 0, they do not receive nothing in addition to their salaries

- Distribution -> based on promotion and distribution costs, advertising overhead and distribution fee

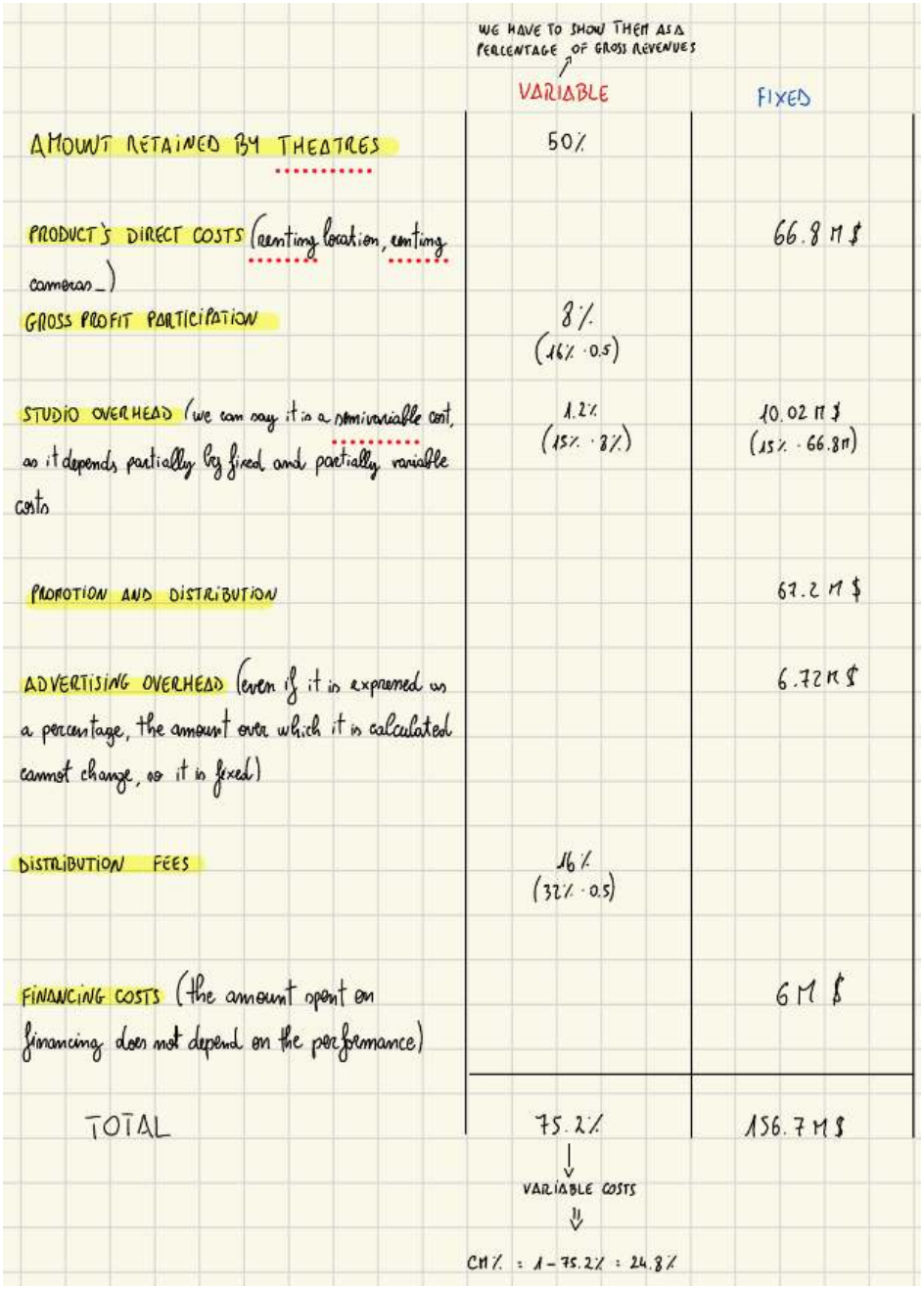
➔ In this case, Paramount is at the same time producer and distributor, and the only players that are left out are major and minor talents -> their risk to receive a compensation is very different, because the gross profit will be obtained by subtracting a percentage to revenues (so it is basically sure that is going to be positive), while the net profit takes into account several additional costs (and the risk of facing a negative net profit increases)

Because Paramount plays different roles, there is a suspect that some costs are not accounted correctly:

- Financing costs -> these are the costs of financing the activity, which are charged as 3% of gross revenues -> because it's a convention, the risk that it hides a portion of profit is very high
- Studio overhead -> they are calculated as a percentage of direct costs, which are calculated as a percentage of gross profit -> also in this case there is the risk that they hide some profit. Within the production costs are included also the costs related to major actors, such as Tom Hanks that received 20M$
- Advertising overhead -> fixed costs connected to the infrastructure of managing advertising, mostly the salary of people connected to the advertising activity -> fixed costs that are not directly connected to the production of the movie, but they are put as a percentage, which include profit
- Distribution fees -> also in this case, they are put as a percentage of gross profit even though they are fixed costs

➔ Several items include profits, charged as a cost by Paramount in order to reduce the amount of money that should be given to minor actors. This happened because Paramount did not properly trace the actual costs, but they just put some estimates. An example of the impact of this practice was from Winston Groom, which has received 250,000€ in advance even though technically he shouldn't have received anything because of negative net profit. Because in reality the profit generated by the company was much higher, they should have paid him much more than 250,000€.

In order to better understand the cost behaviour, we have to make a distinction between variable and fixed costs connected to the production:



We have to remember that for Paramount the movie Forrest Gump is a product and a cost object -> because of this, we can make a distinction between the direct (so that can be directly allocated to Forrest Gump) and the indirect costs (which cannot be allocated directly to the movie because it might refer to other movies' production) that should be attributed to it.

- Among the costs identified before, there are some costs that can be assigned directly to the movie, such as the production costs (because the location, the cameras...used for Forrest Gump are not the same for the Batman movie production).
- Overhead are clearly indirect costs, because they are usually backoff costs that regards also other movies, such as the costs connected to a Public Relations Office

➔ The problem is in the allocation of overheads -> in order to do it, if they would have used percentages based on fixed amount, they would have charged a fixed amount of overhead. But instead, if they would have charged an amount based on variable amount (like Paramount did), we don't know if it is the actual costs that the companies have sustained for that product (for example, if we say that distribution fees are 32% of gross revenues, in order to accept this

percentage we have to assume that for all products the company has sustained the same percentage for all products, which is very complicated) -> by doing this procedure, it is very likely the company will destroy value in order to achieve a specific objective of distributing remuneration among participant, as if the net profit is negative because of overcharging of indirect costs, minor participant will receive nothing

After we have done this, we can calculate the BES (box office gross revenues):

$$BES = \frac{TFC}{CMu\%} = \frac{156.7M\$}{24.8\%} = 632M\$$$

➔ Assuming the cost structure shown by Paramount is real, these should have been the revenues the company should have achieved in order to cover all costs -> actual revenues of the movie, adjusted for inflation, were 790M$, much higher than BES

As we said before, because the company has shown negative net profit Winston Groom could get nothing more than the compensation of 250,000$ against his net profit participation, as otherwise they should have paid an additional 3% on positive net profit -> let's calculate the required BES Paramount should have achieved so that those 250,000$ represent the percentage given to Winston Groom on an hypothetical profit:

$$250{,}000\$ = 3\% * profit$$

$$profit = \frac{250{,}000\$}{3\%} = 8.33M\$$$

$$BES_{profit} = \frac{TFC + profit}{CMu\%} = \frac{156.7M\$ + 8.33M\$}{24.8\%} = 666M\$$$

➔ Still, way lower than the 790M$ generated by the movie

Last simulation: let's not consider the overhead shown as a percentage of box office gross revenues, because we believe that they are exaggerated (because they include an hidden profit of Paramount) and we want to consider only the real variable costs-> the CMu% is higher than before, as from the variable costs in percentage (0.752) we have to subtract the studio overhead (0.012) and distribution fees (0.16) -> the new BES becomes:

$$BES = \frac{TFC}{CMu\%} = \frac{156.7M\$}{(1 - 0.58)} = 373M\$$$

➔ Lower than the real revenues, but closer to the box office gross revenues shown by Paramount

Wilkenson case study

The company is about mechanical devices (focused on the water purification equipment) operating in a context where competitors are reducing prices in order to create a competition, as apparently Wilkenson is losing money -> probably, they say, there is something wrong in the way we evaluate the cost of our products. The company has 3 main products which refers to different market situations, because they are completely different in terms of productive process and component requirements

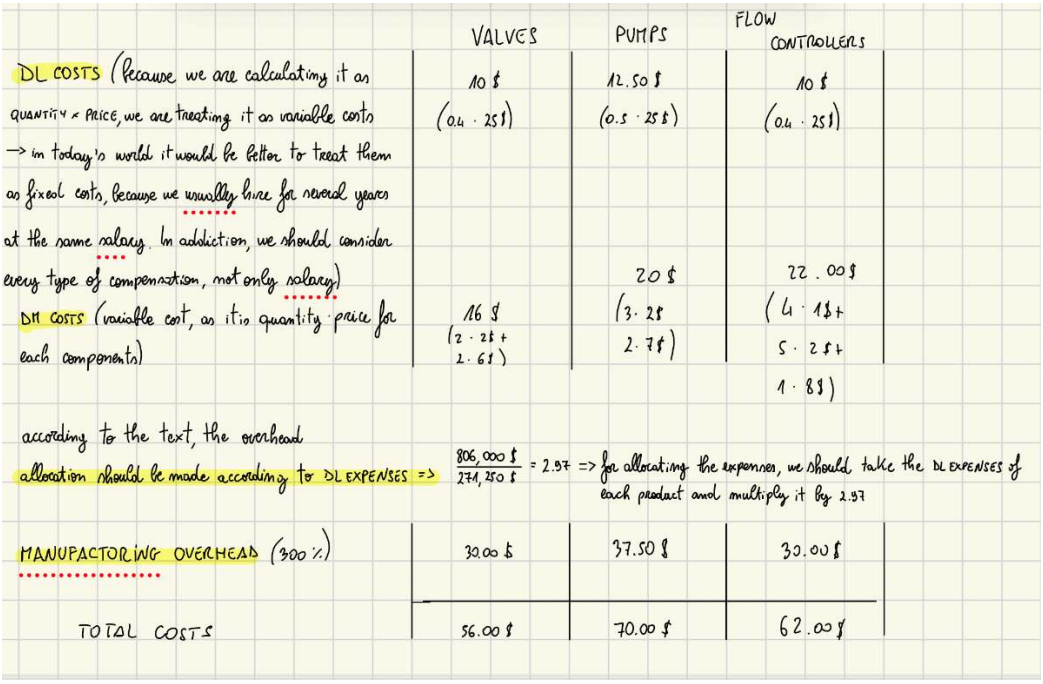
- Flow controllers -> are customized, so we are answering specific request from the market -> market is less competitive and the demand is inelastic (if we increase prices, customers are willing to purchase them because they can obtain a product that fits their needs)
- Valves -> standard product shipped in large loots, delivered in large quantities and the margin is high (still, little below than 35%), with high competition from companies that can set competitive prices
- Pumps -> very similar to valves, they are basically commodities, usually produced in high volumes and competition is about prices -> margin is falling below 20% (this information is important because they are considering increasing in some cases the prices of the products)

➔ The nature of the products is very different

The company is leader in quality, but the exposition is under attack because of the increasing presence of competition on the market -> they are preparing for a competition in prices (as competitors are getting ready to reach the company in terms of quantity produced), and because of this they are discussing the role of overhead, in order to measure and assign them correctly to the products -> if we want to understand the impact of the new assignment process and make proposals, we have to know the starting point.

Exhibit 2 Product Profitability Analysis (March 2000)

	Valves	Pumps	Flow Controllers
Direct labor cost	$10.00	$12.50	$10.00
Direct material cost	16.00	20.00	22.00
Manufacturing overhead (@300%)	30.00	37.50	30.00
Standard unit costs	$56.00	$ 70.00	$ 62.00
Target selling price	$86.15	$107.69	$95.38
Planned gross margin (%)	35%	35%	35%
Actual selling price	$86.00	$87.00	$105.00
Actual gross margin (%)	34.9%	19.5%	41.0%



So as you are suffering a lot of pressure, so they are planning, they are making hypotheses on prices -> increase the prices in order to keep the gross marginality above 30%. Let's start talking about pumps. They are planning to increase prices from 87 to 107, 108, but they know it is really difficult because competitors are making pressures over prices.

As regards flow controllers, if they want to keep 35%, they could reduce prices in flow controller, and so as regards valves, so the price could remain more or less similar. But we know that pumps are ecologically, they are under pressure because of competitors, while flow controllers are custom products where the demand usually is insensitive. So the idea to change prices in the way they are planned, so we see here the hypothetical target price, sounds strange, probably impossible to realise.

Let's consider different factors in the overhead allocation.

The first idea could be to abandon the hypothesis to assign overheads because they are mainly fixed. We have to recover these overheads, selling everything because we are running three different products. Why do we exclude the overheads? Could we exclude the overall allocation over these three products and think about the logic of contribution margin? If we exclude the manufactured overhead, okay, we just focus on time and labour -> price - labour – material = contribution margin. Could we work just in terms of contribution margin and try to produce a total contribution margin in order to recover the common infrastructure of overheads? So the first answer to this hypothesis is no. Why? Simply because whenever we talk about these direct costing or contribution margin analysis, okay, we need to be aware that contribution margin or direct costing analysis approach is more relevant for short-term decisions, for break-even analysis, as we did with the first case study -> in the long run, companies have to recover fixed costs, which cannot be skimmed. We need to take into account because if we just focus on valuable costs, we need to have an unprecise picture. We don't understand exactly because we are excluding overhead in the evaluation of the cost of each product.

The problem with this one is we need to change approach because the current approach is classified as a volume-based approach -> The more we consume direct labour, the higher will be the allocation of fixed overhead = products consuming more labour will receive additional, more than others, more overhead. The problem with this approach is that it simplify a lot the problem, also because of the importance of manufacturing overhead (which, as we said before, represent 3 times the cost of overhead).

Let's try to apply ABC:

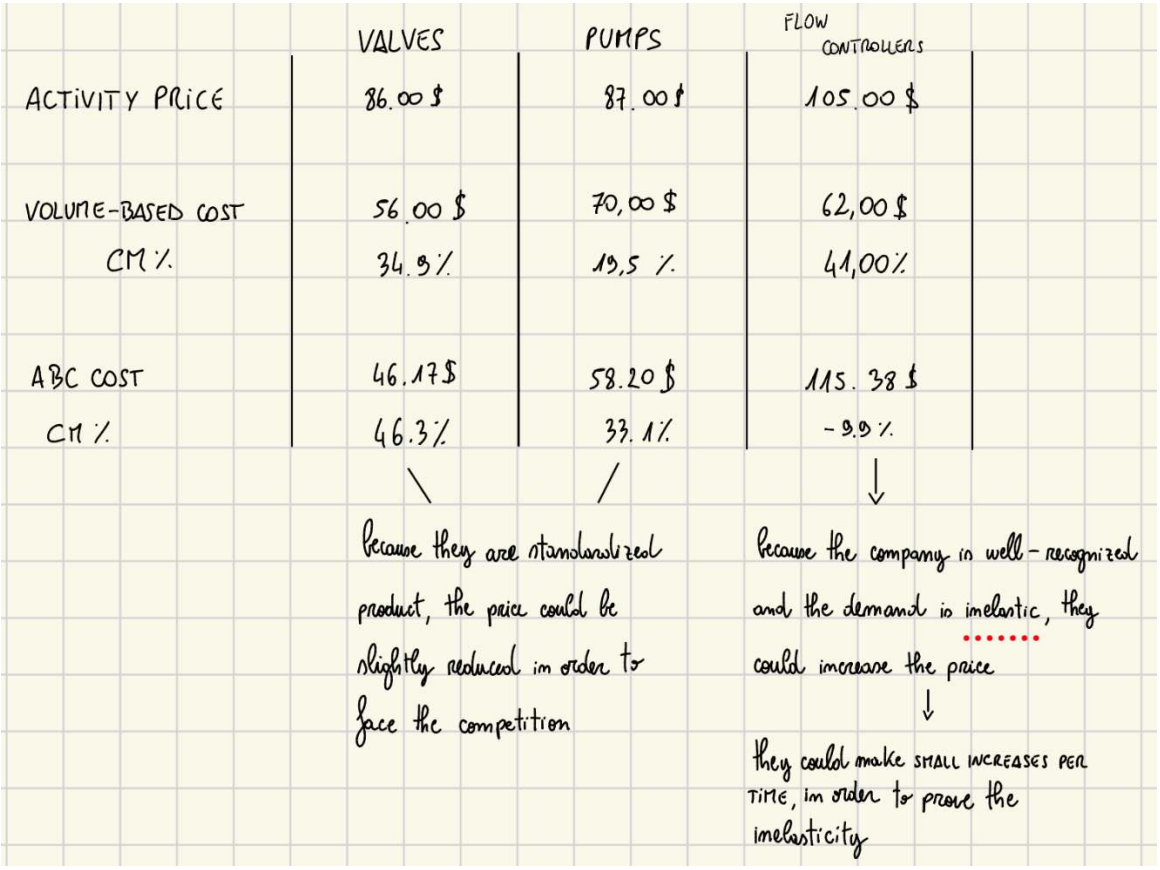
We have to identify the activities behind the production of these products. They identified 5 activities: machinery activity, set-up activity, receiving and production control, engineering and packaging activity. Packing and shipping is something outside the plan, outside the real manufacturing, as welle as engineering (which is design, is planning process) -> It's not pure manufacturing or productive.

Exhibit 4 Monthly Production and Operating Statistics (March 2000)

	Valves	Pumps	Flow Controllers	Total
Production (units)	7,500	12,500	4,000	24,000
Machine hours	3,750	6,250	1,200	11,200
Production runs	10	50	100	160
Number of shipments	10	70	220	300
Hours of engineering work	250	375	625	1,250

COST POOLS	$	COST DRIVER	AMOUNT	ABC RATE
MACHINE RELATED EXPENSES	336,000 $	MACHINE HOURS	11,200 MH.	5.3 $/MH
SET-UP LABOUR (depends on the number of times we stop for preparing for a new prod. process)	40,000 $	NR. PRODUCTION RUNS	160 PROD. RUN	250 $/PROD. RUN
RECEIVING AND PROD. CONTROL (it depends on the nr. of set-ups, as if we would make the machine run with no problem, the control activity will be useless)	180,000 $	NR. PRODUCTION RUNS	160 PROD. RUN	1,125 $/PROD. RUN
ENGINEERING	100,000 $	HRS. ENGIN. HOURS (we measure them by filling timesheets in order to understand how much to charge to customer) ↓ they are going to be higher for customized products	1,250 HR	80 $/HR
PACKAGING ACTIVITY	150,000 $	NR. OF SHIPS	300 SHIP	500 $/SHIP

	VALVES	PUMPS	FLOW CONTROLLERS	
DM	10 $	12.50 $	10 $	* we are making the highest number of set-up for the product that has the lowest nr. of units
DL	16 $	20 $	22.00 $	
MACH. REL.	15,00 $ (0.5 · 30)	15,00 $ (0.5 · 30)	9,00 $ (0.3 · 30)	
SET-UP LABOUR	0.33 $ (10 · 250/7500)	1,00 $ (50 · 250/12,500)	6.25 $ (*100 · 250/4000)	we have to consider that we are calculating the cost per unit of product -> we have to divide the AR (which refers to the whole prod. run) for the units of each prod.
RECEIV. & PROD. CONTROL	1.50 $ (10 · 1125/7500)	4.50 $ (50 · 1125/12500)	28.13 $ (100 · 1125/4000)	
ENGINEERING	2.66 $ (250 · 80/7500)	2.40 $ (375 · 80/12500)	12.50 $ (625 · 80/4,000)	
PACKAGING ACTIVITY	0.67 $ (10 · 500/7500)	2.80 $ (70 · 500/12500)	27.50 $ (220 · 500/4,000)	
TOTAL COSTS	46.17 $	58.20 $	115.38 $	



Among the overheads, there are mainly fixed costs -> when we assign this costs, we are assigning them on the basis of current production/volumes, but now they are working at a certain level of capacity. If we think that the capacity required will be higher, probably the driver will be reduced. Stimulating the demand, reducing prices in automobiles, they probably have to take advantage of an increase in the workload. Because the number of fixed costs will be reduced by lower activity days of drivers or co-drivers.

Another topic. So by definition, sales managers want to sell at the lowest price they can, because by selling at the lowest price they have, they produce a huge revenue -> in this way, they don't care about the marginality of each product, they simply sell, because they are rewarding for sales. As we discover that these products are really different in terms of marginalisation, probably the best way to assign incentives to salesforce will be on the basis of profitability of each product in order to stimulate salesperson to sell, to maximise the most profitable product, not simply revenues involved -> changing the compensation system, probably we will create a connection between companies' results, maximised profits, and individual results.

North country auto INC.

We are talking about a car dealer where the performance measures have changed. Inside this dealer, there are several departments running new car sales, second-hand or pre-used car sales, and also a warehouse of parts, spare parts, a repair factory or laboratory, and so on. They decided to move from a collaborative model (all these activities are combined all together to run the business), to a divisional model (each one of these departments became a profit centre), trying to separate responsibilities of

these different departments. After the decision, so creating an independent profit centre, unfortunately, a problem happened when the new car department decided to over-evaluate a used car in order to sell a new model -> this event raised a discussion about this new kind of responsibility.

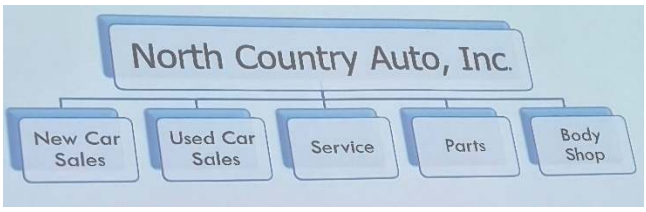
They are distributing three different cars pertaining to three different brands. Each of three manufacturers use a different computer system for tracking inventory (manage stock, to order spare parts...) and placing new orders and require dealers to maintain an adequate service facility with a crew of trained technicians and spare parts inventory.

They have a reference market in New York but also in other areas close to this core location. North Country, the company, began operation in 1968 owned as a corporation by George W. and Andrew Jones. George W. and Andrew Jones are the entrepreneurs owning the car dealership in New York. Mr. Liddy focused on a new and used car sales (so, he's focused on the selling activity), while Mr. Jones concentrated on managing the parts, service, and body shopping part (so, back office activities).

George Liddy was feeling pretty good about the new control systems recently put in place for his five department managers' new and used car sales, services, body, and fun partners. He's positively in the process of evaluating each department individually as profit centre, as I told you. So each department is a sort of autonomous profit centre.

- Regarding the industry in which the company operates:
- There is a strong pressure on prices, which means that frequently they put in place aggressive discounts, reducing the profits over which the performance are evaluated.
- The other point is that they need to run high inventory -> let's consider that if they run three brands, they have to keep a minimum amount of the most common spare parts per three brands -> the amount of stock is particularly heavy.
- So usually, they face with more educated customers, which means they have customers that pay attention to the service they receive, a customer particularly selected with high expectations.
- The industry is particularly competitive because of new covers in this dealership activity. Industry analysts estimated that fewer than 50% of dealers in the United States would make a profit on new car sales. So probably, the most profitable business is in new car sales.
- Overall, that profit margin, we're expecting to fall below 1% of sales. But in general, the net margins are not particularly high. Let's consider that the automotive industry is an industry particularly competitive, where in general, margins are not so big. On the contrary, they are usually particularly low. So, this is not a high profitable industry.

Departmental structure:



We need to understand better the change that you put in place in the organisation and in the platform of financial assistance to be able to discuss about the problems raised in front of the transaction involving a used car and the sales of a new car.

Before George made the decision, all five departments operated as part of one business. They were collaborating because the idea was to consider all the activities provided inside this leadership as an integrated business. When we decide to buy a new car, it's frequent that you have an old car to be

managed. And frequently, when you approach a car dealer, you are expecting to receive a good evaluation of your old car converted in a sort of discount for the new one -> problem to be managed. Department managers were paid salaries and year-end bonus determined on the owner's discretion based on overall results for the year (just because they were considering all the five activities as an integrated business) and a subjective appraisal of each manager. The system did not provide proper motivation for the managers because they didn't have individual goals, individual targets used to evaluate each individual performance.

George Mitty introduced these new changes in the performance measurement control systems, all five departments were operated as profit centres. He decided that each department was stimulated to maximise the profit run by each specific activity. Mr. Liddy believed in decentralised profit centres and performance-based compensation as a superior model of control -> decentralising, so delegating the responsibility to make profit in charge of each departmental manager, probably we are able to stimulate better these managers and focus their attention on maximising the profit of each centre. He instructed each of his departmental managers, new services, colleagues and partners, to run each of their department as if it were an independent business, because the idea is that now they are not part of the same, of a unique entity, but they are cooperating in different markets. And so they have to maximise its own results. So the management of each department were awarded bonuses based on departmental gross profit -> if we do that, what's happened to the under-dependence? So what's happened when a new customer approached this car dealer desiring to buy a new car, but also desiring to receive an evaluation of its pre-used or old car? Because this transaction typically involved at least two departments, new car departments and used car departments.

So the potential problem, in addition to finding a way to effectively track departmental performance, generally had to devise a sensible system from trust enterprises. So the idea is, if we evaluate an old car and we are the new car director, what's happened? Is all pre-used and all pre-owned car, what's happened? This used car became a responsibility of used car department. So there is a problem of transferring these cars from one department to the other.

Mr. Liddy acknowledged that a complex interrelationship existing among the profit centres is the cause of normal business transactions -> if you want to stress the idea of making profit, and we want to simulate our departmental manager can maximise it very soon, but we have to consider them to be multilateral transactions.

Now, if we are approached by a customer desiring to buy a new car without a pre-used, it's not a problem, because new car will be managed by the new car department. If we have another customer approaching this car dealer to buy an old, a pre-used car, it's not a problem. The problem is when we have a customer approach to this organisation, but with two different leads.

Using the data in the new transaction, compute the profitability of this one transaction to the new, used, parts and service departments. Assume a sale commission of 250$ for the trade-in on a selling price of 5,000$ (note: use the following allocation -> new 835$, used 665$, parts 32$, service 114$) for overhead expenses while computing the profitability of this one transaction.

They received these new customers, and the idea of new customers was to buy a new car. So the contact with the director of new car departments to purchase a new car. So, to purchase a new car, the price proposed for the new car was based upon the car evaluation. So, plus a cash amount for the new car and plus a bank loan -> the total value of the new car proposed by the new car department director, Mr. Alex Walker, was equal to:

$$cash\ 2{,}000\$ + used\ car\ evaluation\ 4{,}800\$ + bank\ loan\ 7{,}350\$ = 14{,}150\$$$

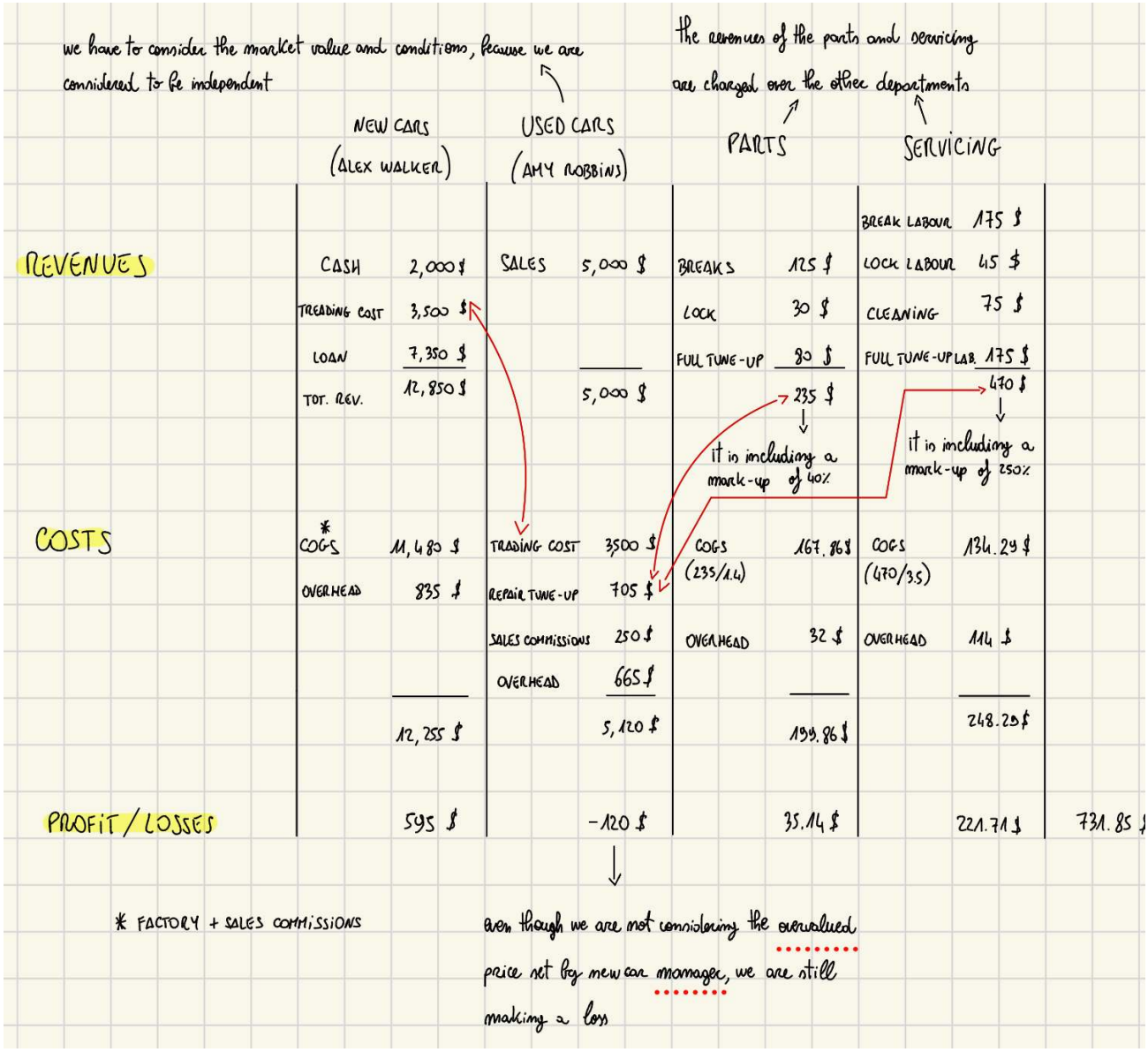
The value of the car as it is in this condition on the wholesale market is $3,500. How do we manage this used car? If the new car manager decided to over-evaluate in other words, so giving an extra discount to the customer. How do we manage this expense? In addition, if we want to sell this new car, the point is we have to adjust this new car -> the directors of the other departments analysed this new car and decided, so on how to manage the refurbishment of this car. To try to sell this car not on the wholesale market, but to provide the customers probably getting more value than the value recognised by the wholesale market.

The new car manager decided to require an evaluation of the refurbishing activities required to refurbish this model and he asked for a quotation coming from the colleagues of the other departments (the colleagues of the other departments produced these reports):

USED CAR REFURBISHING COST

DESCRIPTION	TOTAL	PARTS	LABOUR
BRAKE	300 $	125 $	175 $
LOCK ASSEMBLY	75 $	30 $	45 $
CLEANING TOUCH-UP	75 $	0 *	75 $
FULL TUNE-UP	225 $	80 $	175 $
TOTAL REFURBISHING	705 $	235 $	470 $
SALES COMMISSIONS	250 $	* it's just a service, not spare parts	
USED CAR WHOLESALE VALUE	3,500 $		
GRAM TOTAL	4,455 $		

We have to build an IS for each division:



Let's now consider the value of the transaction with the perspective of the company as a whole

NEW CAR	
CASH	2,000 $
TRADE-IN	4,800 $
LOAN	7,350 $
USED CAR VALUE	5,000 $
COSTS	
NEW CAR + COMMISSIONS	- 11,420 $
USED CAR VALUATION	- 4,800 $
SALES COMMISSIONS	- 250 $
PARTS	- 167.6 $
SERVICE	- 134.29 $
OVERHEAD	- 1,646 $
TOTAL PROFIT	731.85 $

We get the same profit we had with the analysis of the different departments. But this way of splitting is a problem whenever we are in front of an integrated systems because here decision taken by for example new car or used car are affecting their own profitability, because the evaluation of the old car was provided by the new car but the responsibility of selling and managing a used car is in charge of another director -> probably this is a common situation.

The problem is if we really believe to create an independent profit centre this probably is the worst situation because we are talking about an integrated system or there is the problem of transfer pricing on how to evaluate transfers (transfer prices are based on market prices, transfer prices transfer of spare parts and services from these divisions to the old-car division…). Here this problem of integration, this problem of internal transaction will be particularly frequent so probably the idea of creating an independent profit centre is a bad idea not in general but here when we have a high interdependency among different departments so here the evaluation provided by this manager is impacting in a negative way the evaluation the performance of the used car manager.

How should the transfer pricing system operate for each department (market price, full retail, full cost and variable cost)?

Whenever we talk about transfer prices, we have different alternatives. Here the hypothesis is they are independent, they are run as profit centres -> market price should be the rule because each department is requested to produce a profit.

If it were found one week later that trade-in could be wholesaled for only 3,000$, which managers should have taken the loss of 500$?

We must check the strategy of the company all businesses are independent profit centres this is the decision transfer prices based on market prices we said many times if they are independent if they are considered as independent profit centre transfer has to be evaluated and minus 500 is the responsibility for the used car manager -> at the moment of transaction, the wholesale price was 3,500$ -> if it decreases on time, it is responsibility of the used car manager.

All businesses are part of an integrated system with several cost centres, they have to cooperate .> TB based on costs and -500$ is responsibility of new car manager.

If we force the situation assuming that they are independent, we are forcing the reality because this is one episode but probably this episode will appear constantly this similar episode will appear constantly.

North country incurred a year-to-date loss of about 59,000$ before allocation of fixed costs on the wholesaling of used cars. Wholesaling of used cars is theoretically supposed to be a break-even operation. Where do you think the problem lies?

Should cost centres be evaluated on gross profit or "full cost" profits?

North country incurred a year-to-date loss of about it's possible that this loss occurred because new car managers were giving trading allowance above the market evaluation. If we continue running like this, who is paying for this over-evaluation? Used car if we transfer or the company as whole because the company is sacrificing part of the profit but it is invisible.

It's better to go back to the previous situation because we are in a collaborative system -> if we are running a collaborative system and we force the creation of independent units we are forcing reality because we are forgetting the frequent transaction will happen among these entities because the profit has to be evaluated as the profit of the whole situation.

What advice do you have for the owners?

Combine new car and used car in a single unit (profit center) with two cooperative contents.

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TEACHING DIVISION

OUR PARTNERS

TEGAMINO'S

LA PIADINERIA

LA PIADINERIA dal 1994