PROJECT MANAGEMENT

Module 2: Basic aspects of project management

2.4. Economic management

Department of Management
Barcelona School of Informatics (FIB)

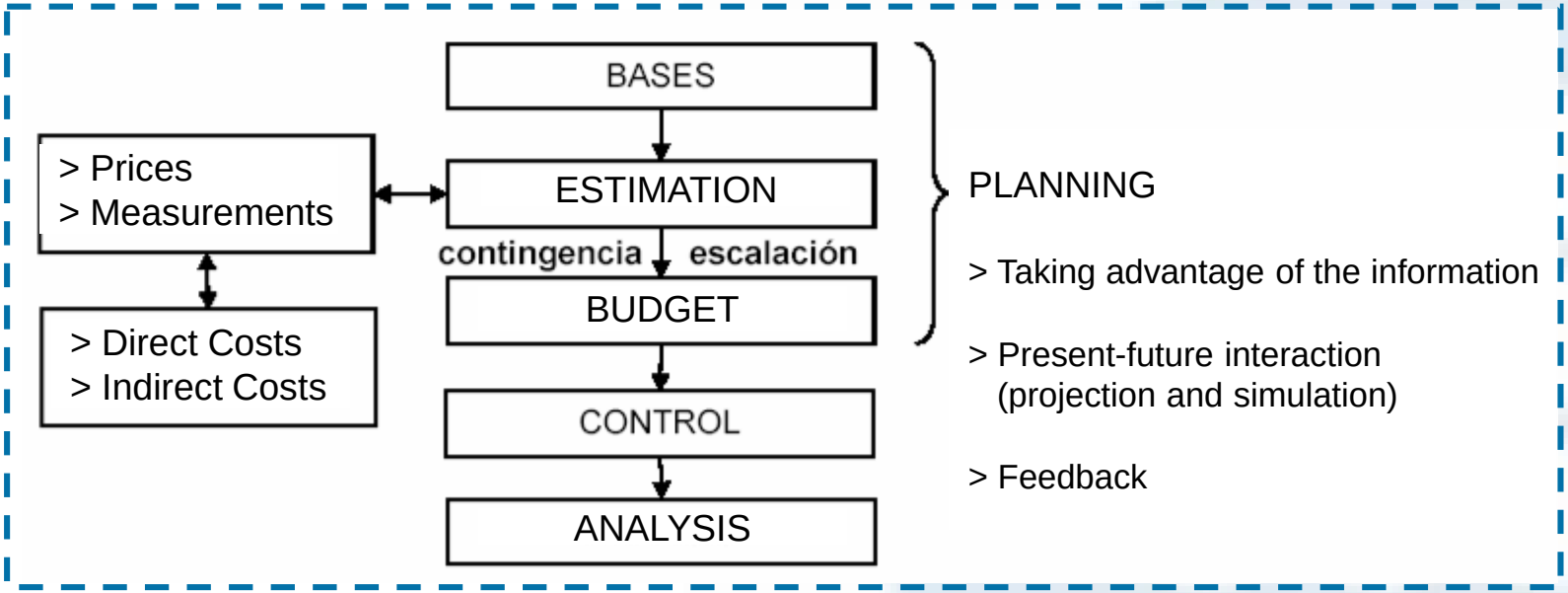
Economic management

1. Cost management
2. Planning
3. Control
4. Financial management and economic viability

1. Cost management

What is it?

A set of processes designed to ensure that the project is undertaken within the limits of the budget approved by the client.



1. Cost management

Cost ~ Economic evaluation of the consumption of a resource

Cost = Price x Quantity

Type of costs

- Costs of the **activity**: *in relation to the production volume*
  - Variable costs ~ depend on the production volume
    - ✓ *Lubricants / Purchases of raw material*
  - Fixed costs ~ the same cost, whatever the production volume
    - ✓ *Office rental / Insurance policies / Executive salaries*
- Costs of the **structure**: *when the factory is halted for a week, are there costs?*
  - Direct costs ~ attributed to a unit of the project. These are directly related to the manufacture of a product.
    - ✓ *Direct material costs/ direct labour costs / direct machinery costs*
  - Indirect costs ~ NOT attributed to a unit of the project.
    - ✓ *Electricity / Telephone / Executive salaries*

2. Planning

Budget > Basis for the estimate

- Knowing the project requirements → Scope
- Work plan or breakdown of the work: makes it easier to estimate costs and to include all the tasks that have been organized
- Resources
  - Type of resources
  - Amount needed
- Evaluating the resources
  - Knowing the performance of each resource:
    - ✓ *Staff costs per hour*
    - ✓ *Material costs per unit*
- Duration of activities
  - These times will be the basis for estimates referring to the unit of time

2. Planning

Budget > Structure and concepts to consider

Activity	Amount (€)	Observations
Act1 Act2 Act3 … Actn	1 1 1 1 1	· Acti: activities that are in the Gantt chart · The direct costs of each activity in the Gantt chart (i.e. costs that are directly attributed to the execution of the activity) should be estimated: human resources, material, etc.
Total DC	**5**	· Total DC: total direct costs of activities in the Gantt chart
IC*1* … IC*t*	1 1 1	· ICj: indirect costs that are not directly attributed to an activity, e.g. electricity · e.g. amortization (or depretiation) of equipment X. · p.e. rental of …
Total CD+CI	**8**	· Total de Costes Directos e Indirectos
Contingency	1,2	· When a level of contingency is established, such as 15%, this is calculated as: (Total DC+Total IC) *15%
Total DC+IC + Contingency	**9,2**	
I1 (Cost=1; risk=10%) I2 (Cost=1; risk=20%) … Im (Cost=1; risk=15%)	0,1 0,2 … 0,15	· Ik: are incidentals (plan B activities) that are not in the Gantt chart, whose direct costs should be estimated and accounted for according to the risk of the event occurring, in percentage terms)
Total incidentals (or unforseen costs):	**0,45**	
TOTAL:	**9,65**	This is the total cost: DC+IC+Contingencies+Incidentals
Note: the sales price will be calculated by establishing a profit margin and adding the total cost.		

2. Planning

Budget > Estimates

- Calculating the **cost of doing something**, when you have already defined a work plan.
  - Resources required for each activity (people, equipment and materials)
  - Starting point:
    - ✓ *Work plan: the elements of the project to which costs will be allocated*
    - ✓ *Project schedule: start/end dates for the elements with costs allocated*
    - ✓ *Estimate: approximate calculation of the resulting costs*
- **Three complementary ways** of creating a budget:
  - Calculating by activity → *e.g. subcontracted tasks*
  - Calculating by units of resources → *e.g. 2 hours of gardening at €10*
  - Calculating by units of work → *e.g. price per m^2 painted*
- Don't forget the **special accounts**:
  - Contingencies → % increase for certain budget items or a new item
  - Incidentals → cost attributed on the basis of probability of occurrence
  - Escalation → takes into account changes in prices during long projects

2. Planning

Budget > Concepts to consider

- **Contingency**: used to correct errors due to incomplete information or oversights.
  - This is another budget item.
  - Calculated as a percentage of the total value of the budget.
  - The percentage depends on:
    - ✓ The sector of activity
    - ✓ The level of detail: the percentage is lower for very detailed budgets.

2. Planning

Budget > Concepts to consider

- **Incidentals**: in addition to the activities in the Gantt chart, budgets generally include activities that are part of plan Bs, designed to manage incidental events.
  - Causes of incidentals:
    - ✓ *Insufficient defined scope of the project*
    - ✓ *Dependencies on others that cannot be controlled*
    - ✓ *Technological changes*
  - These activities (incidentals) are not costed at 100%, but according to a percentage that is equal to the estimated probability of occurrence (risk).
    - For incidentals with a 10% risk of occurrence, 10% of the estimated costs of the activity are taken into account.

2. Planning

Budget > Concepts to consider

- **Incidentals**
  - The incidentals included in a budget constitute a compensation system
    - ✓ Let us assume that a budget has 3 incidentals: I1, I2 and I3
      - As they are incidentals, we could suppose that only 1 occurs (I1).
      - The budget will include part of the costs of all 3 incidentals.
      - As I1 occurs, its costs are higher than calculated (as only a percentage of the cost of incidentals is included in the budget, depending on the risk of occurrence).
      - However, the rest of the funds can be obtained indirectly from the budget calculated for I2 and I3, which do not occur and therefore do not have any cost. We can use the partially budgeted costs of I2 and I3 to meet the costs of I1 that are not included in the budget.
    - ✓ If no incidentals occur, the amount calculated for them can be considered a contingency item.
    - ✓ In the unfortunate event that all three incidentals occur, the costs will be higher than budgeted, and could be offset by the contingency item.

2. Planning

Budget > Additional important information

For more information on the creation of budgets, see the following documents:

- Module 2.4.1 – Costs and sustainability of the IT project.pdf
- Module 2.4.2 – Example of a budget based on activities in the Gantt chart.pdf

3. Control

Cost control >

- In this case, **controlling** means **comparing**
  - Subcontracted work or outsourcing
    - ✓ *Comparing the completed work with the expected work*
    - ✓ *Comparing the actual cost with the expected cost*
  - Work on our structure with our resources
    - ✓ *Control depends on the completed work in relation to time and costs*
- **We should define a "cost control model"**
  - Using the budgeted amounts and the Gantt chart
    - ✓ *The budget can be compared with the amount actually spent per task and role*
- Concept of **flexible budget**
  - There is ONE budget: the one that has been agreed
  - The control process means that many estimates of the budget can be made. This is called an updated budget
    - ✓ *The example is that of a* flexible budget

3. Control

Cost control >

Objective: to **compare and assess** any variance between the budget and the actual costs incurred either on completion of the project or at the end of a stage or activity. This information is added to as the project progresses. The actual costs that are incurred are reported to the cost system.

- Basically, these three questions should be answered:
  - **Where** has the variance occurred (in which tasks or stages)?
  - **Why** did it occur (is it variance in rates or efficiency)?
  - **How much** variance is there?
- The variance should be calculated **for each cost concept and activity**, according to the scheme proposed in the budget structure:
  - Direct costs of activities on the Gantt chart (DC)
  - Indirect costs (IC)
  - Contingency and incidentals
  - Total cost: DC + IC + Contingency + Incidentals

3. Control

Cost control > for each of the previous costs, we will calculate:

Variance in cost by rate: estimated cost <> actual cost

- Variance in price of labour = (estimated cost – actual cost) * actual consumption in hours (variance in cost by rate)
- Variance in price of raw materials = (estimated cost – actual cost) * actual consumption
- ....

Efficiency variance: estimated consumption <> actual consumption

- Variance in consumption of labour = (estimated consumption in hours – actual consumption in hours) * estimated cost
- Variance in consumption of raw materials = (estimated consumption – actual consumption) * actual cost
- ....

Variance in totals:

- Sales volume variance = (actual sales – budgeted sales) * estimated margin
- Sales margin variance = (actual margin – estimated margin) * actual amount of sales
- Total labour cost variance = total estimated cost of labour – total actual cost of labour
- Total raw materials cost variance = total estimated cost of raw materials – total actual cost of raw materials
- Total sales variance = total budgeted sales – total actual sales
- Total fixed cost variance = total budgeted fixed costs – total actual fixed costs

3. Control

Cost control > Example > Analysis

- The way cost variance is visualized varies, as each project is unique. The objective is to be able to visualize and understand clearly the answers to the three initial questions:
  - **Where** has the variance occurred (in which tasks or stages)?
  - **Why** did it occur (is it a variance in rates or efficiency)?
  - **How much** variance is there?
- We can calculate which part would have been covered by contingencies and which part by incidentals, if the actual cost > budgeted cost.

For an example of how to allocate costs every day for their subsequent analysis, see the Excel example in the file:

➢ Module 2.4.3 – Example of costs.xlsx

THE CONTENT OF THE FOLLOWING SECTION IS FOR
INFORMATION ONLY

THE MATERIAL IS AVAILABLE IF THESE TOPICS NEED TO BE EXAMINED IN GREATER DEPTH

4. Economic and financial viability

Current value

An organization can only be successful if it carries out projects well and does the right projects.

Golf Gti

1987: €14,123

2010 (i=4%): €34,809

2010 price: **€30,330**

In May 1626, Peter Minuit purchased Manhattan Island from Native American Indians for $24. If the Indians had invested their capital in a Santander Bank "super account", at 14% annual compound interest,

how much money would they have now?

CF= 24(1+0.14)^384 = $1.7048(10)^23

4. Economic and financial viability

Net present value (NPV)

$$NPV = -C_0 + \sum_{t=1}^{n} \frac{CFF_t}{(1+i)^t} + \frac{RESIDUAL}{(1+i)^n}$$

If NPV > 0 viable

- **Determining <u>future</u> monetary flows**
- **Estimating the value of the readjustment rate**
- Intangible assets are not considered
- Calculate the time horizon
- The effects of inflation are not considered
- Interactions with other projects are ignored

Concept of **opportunity cost**

Other indicators

Internal rate of return (**IRR**) → Value of "i" that makes NPV = 0

Pay-back → Investment recovery period

4. Economic and financial viability

NPV > Example:

Once the costs of a project have been established, we need to analyse whether it is viable. To achieve this, we use the NET PRESENT VALUE (NPV). This indicates the value (in cash flow) created by the project at time 0.

To calculate the NPV, we need to estimate the future cash flows (FCF) in a period. In your bachelor's thesis, you can assume that CF = OCF

ESTIMATION OF CASH FLOW IN A PERIOD
Sales
- Direct Costs of the Product
Gross Margin
- Indirect Costs
EBITDA
- Amortization
EBIT
- Interest
EBT
- Taxes
Net Earnings
+ Amortization
Operating Cash Flow (OCF)
- Investment in maintenance > 1 year of Fixed Asset "Capex"
+/- Working capital investment (stocks, accounts receivable, accounts payable and liquid assets)
Net Cash Flow for the period (CF)

4. Economic and financial viability

Glossary of terms: https://portal.lacaixa.es/docs/diccionario/E_es.html

Sale: contract in which one of the parties undertakes to transfer ownership of an item, and the other party undertakes to pay for it in money, i.e. the amount the buyer gives for the item.

- Direct Costs of the Product or Variable Costs: amounts that can easily be identified with a product or service in particular. These are the costs incurred to manufacture 1 unit of the finished product.

Gross Margin: the surcharge added to the cost of an item, to determine its sale price.

- Indirect Costs: amounts that cannot easily be associated with a specific product or service, but do apply to it. Example: electricity consumption, internet access, etc.

EBITDA: acronym for earnings before interest, taxes, depreciation and amortization.

-Amortization: in an accounting context, the systematic distribution of the value by which an asset depreciates over its useful life, due to its use, the passing of time, having met its purpose, or other reasons of this kind.

EBIT: acronym for earnings before interest and taxes.

- Interest: cost or remuneration paid to use others' funds.

EBT: earnings before taxes

-Taxes: compulsory payment required by the state or other authority from individuals and companies that the law deems to be taxpayers. Taxes cover state expenditure and the provision of public goods and services.

Net Profit: surplus income after costs and expenses, made in a period of time.

Operating Cash Flow (CFO): net amount of money generated by a company through its commercial activity and other income, that is, the difference between income and payments.

-Investments in maintenance > 1 year of Fixed Asset "Capex": investments that take over 1 year for our project.

+/- Working capital investments (stocks, accounts receivable, accounts payable and liquid assets): balance at the end of the end of the accounting period, to take into account if the project takes over 1 year.

Net Cash Flow for the period (CF)

4. Economic and financial viability

NPV > Example:

For an initial investment of 4,200 euros, we have the following breakdown of flows for annual periods:

	Year N	Year N+1	Year N+2	Year N+3	Year N+4	Year N+5
Sales	16728	19220	21280	23500	26000	28900
- G. Variables	-14028	-15760	-17428	-19215	-21286	-23681
Gross margin	**2700**	**3460**	**3852**	**4285**	**4714**	**5219**
- G. Structure	-1537	-1558	-1709	-1851	-2035	-2229
- Amortization	-280	-670	-670	-720	-750	-800
EBIT	**883**	**1232**	**1473**	**1714**	**1929**	**2190**
- Financial charges	-331	-330	-330	-330	-330	-330
EBT	**552**	**902**	**1143**	**1384**	**1599**	**1860**
- Taxes	-193	-316	-400	-484	-560	-651
Net profit	**359**	**586**	**743**	**900**	**1039**	**1209**
Amortization	280	670	670	720	750	800
Cash Flow (CF)	**639**	**1256**	**1413**	**1620**	**1789**	**2009**
Fixed investment		-1500	-1100	-600	-500	-500
Net Cash Flow (NCF)	**639**	**-244**	**313**	**1020**	**1289**	**1509**

NPV according to cash flow with a rate of 10%	**5996**	Flows – initial investment 5996 - 4200 = 1796 acceptable
NPV according to net cash flow with a rate of 10%	**2621**	Flows – initial investment 2621 - 4200 = -1579 unacceptable

If we calculate the NPV according to the CF, we accept the investment, but if we use the NCF, we do not accept it because the resulting NPV < 0 (-1579)

4. Economic and financial viability

The amount of sales in a period may not be clear if the aim of the project is to construct a prototype, for example, rather than sell a product. In this case, the total sales is assumed to be the invoice that we would submit for our work or prototype, which for many of you will be the department's budget for your bachelor's thesis. If we divide this amount by the periods of your analysis, it can be used as an approximation to the concept of sales.

If we go back to the previous example, it would be incorrect to add the CFs without adjusting them to time 0, which is why we apply the rate of interest I in the denominator of the formula:

$$NPV = -I_0 + \frac{CF_1}{(1+I)^1} + \frac{CF_2}{(1+I)^2} + \ldots + \frac{CF_n}{(1+I)^n}$$

4. Economic and financial viability

Example of economic and financial viability

See the following document for a practical application of the information in this section:

- Module 2.4.4 – Example of financial viability.pdf

Material

The material in this module was written by:

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References

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