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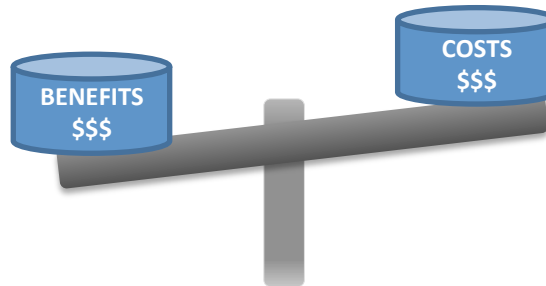
PMCAMPUS™

INTERNATIONAL CAMPUS
FOR PROJECT MANAGEMENT
EDUCATION



eTutorial

Cost Benefits Analysis for the modern Project Manager



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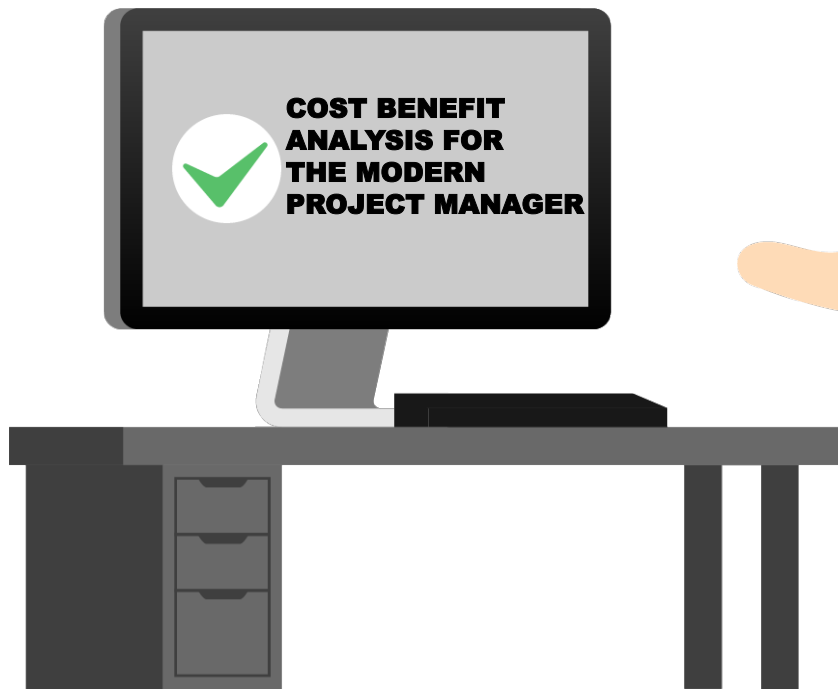
Hi!
Great to see you today.
I am Tim your course
virtual instructor.

Today, we will be
exploring together the
topic of Cost Business
Analysis.



What do you know about Cost Benefit Analysis (CBA) techniques?

Mastering this set of mathematics and financial tools will be most useful in your career!



You will typically use CBA techniques as you work with primary stakeholders at a **strategic** level!

Sounds exciting, right?



In the next screen I will tell you more about what I will be teaching today and what you can expect to learn. Please take good note!

LEARNING OBJECTIVES

*In this tutorial, you will learn how to use CBA tools and techniques to contribute to identify **best value projects and alternatives** for your organization and document informed recommendations.*

I am looking forward to show you how all this works.

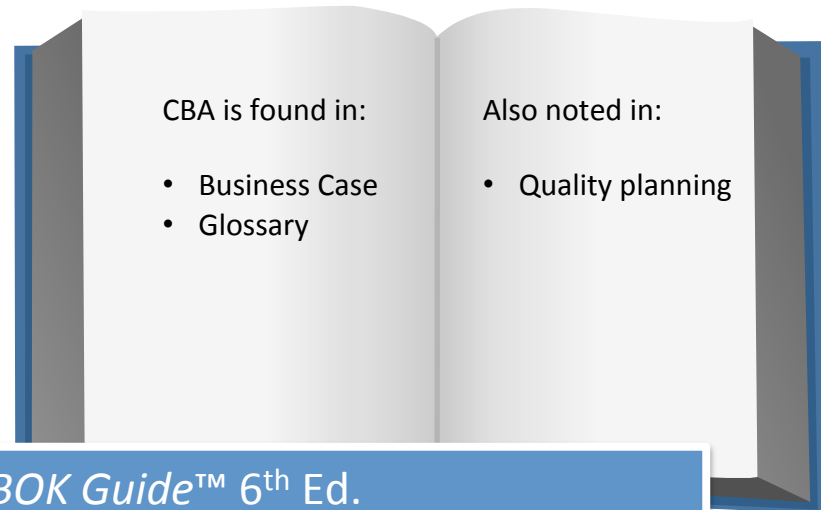
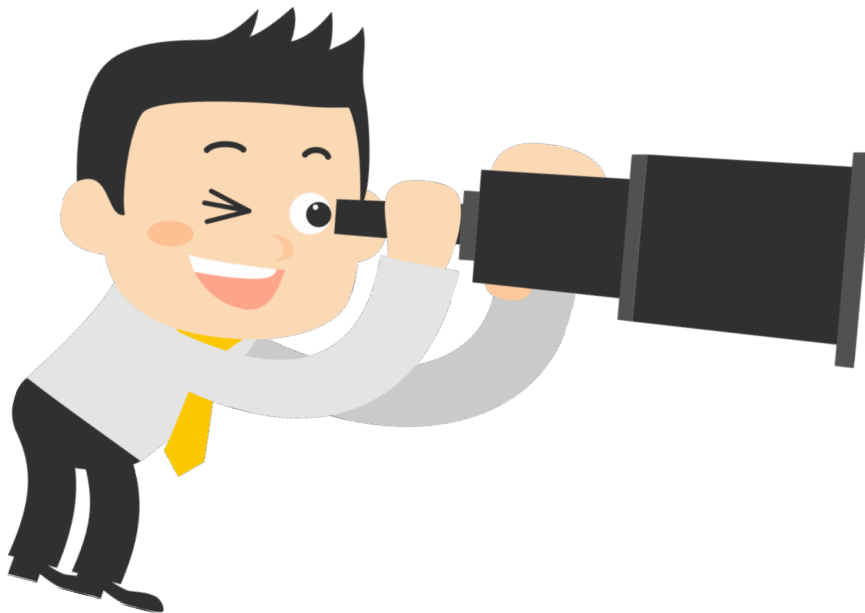
What do you think about our goals for today? How do you feel about our chances of success?

I am confident now we have set our aim, we can get there pretty quickly! We have 15 minutes to get this done. Let's go!




A useful resource for us is *PMI's PMBOK Guide™*. This is where you can search for typical best practice usage!

Search for CBA: There are several pages where you will find valuable information!



PMI PMBOK Guide™ 6th Ed.



Ok, so let's
do a quick
summary!

According to the *PMBOK Guide*[™], CBA is used by project managers during the initiation phase as a technique and tool to support the development of the project charter.

You will typically use CBA when working with a project sponsor, a business analyst or primary stakeholders to :

- justify the project
- compare alternatives
- set project boundaries

Another interesting usage of this financial tool is when you will be developing the quality management plan. It may help you to assess and justify which quality activities to retain in the project.

Did you know that CBA has been used for many years, even before the first version of the *PMBOK Guide™* was published?



Historical Perspective

The CBA
Process



Strategic
Decisions



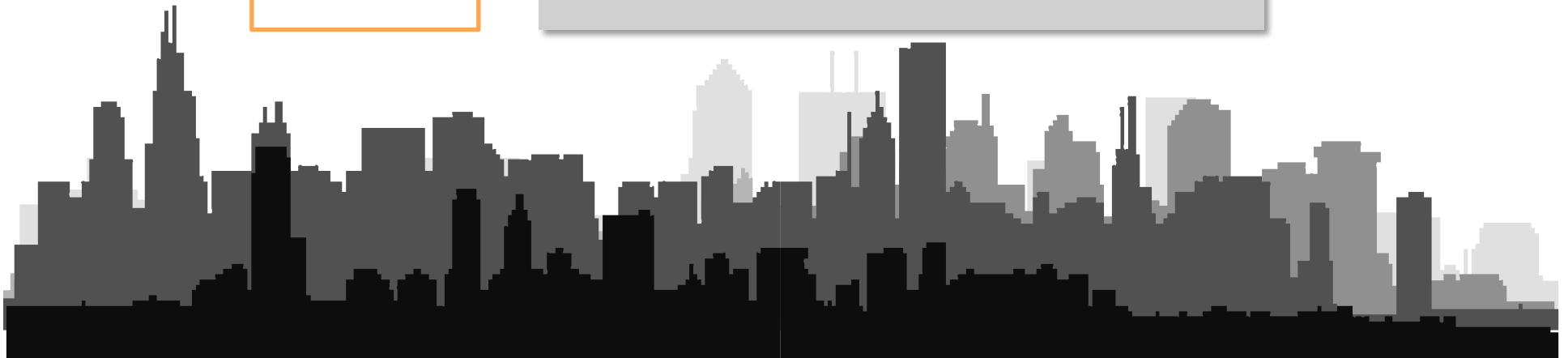
Project
Management



Jules Dupuit (1804-1866), a French civil engineer and self-taught economist is credited with bringing the notion of Cost-Benefit Analysis (CBA). Since the 19th century, CBA has grown as a well-established and reliable method to **appraise investment project value** and use **financial criteria for project selection**.

It is used by **public organizations** to evaluate the social worth of new policies and programs. **Private organizations** use it as a process to systematically assess the net value and potential benefits of business initiatives.

CBA provides an economically sound and reliable framework for decision making process. The **modern project manager** will understand essential financial aspects, engage the right stakeholders, manage assumptions, be aware of limitations and ensure the process is inclusive of business context and social welfare.

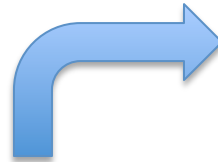


Now I can't wait to tell you a little more about the famous CBA tools and techniques! There are 4 formulas I want to show you.

When potential benefits out weight potential costs then projects create added value for the organization and should be undergone.



Let's write the first two formula associated with this economic principle: let's examine the **ratio of the benefits of a project related to its costs**, both expressed in monetary terms.



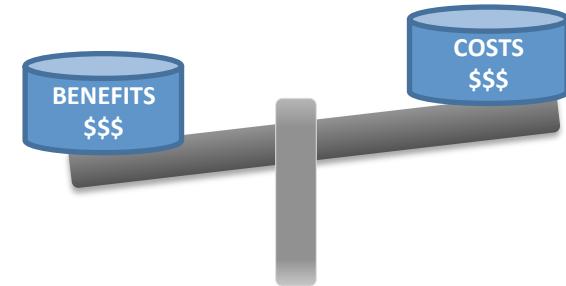
$$B/C = \frac{\text{BENEFITS}}{\text{COSTS}}$$

$$ROI (\%) = B/C \times 100$$



Is this Project profitable?
 What is B/C?
 What is ROI?

Is this Project profitable?
 What is CBA Ratio?
 What is the ROI?

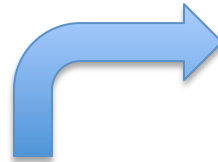


- Calculate CBA ratio and ROI for both projects
- Which Project is profitable?
- Which Project is NOT profitable?

→ *When you are ready, click next screen to check your answers .*



Hint: apply the formula and compare results. Which project brings value? Which project does not?



$$\text{CBA Ratio} = \frac{\text{BENEFITS}}{\text{COSTS}}$$

$$\text{ROI (\%)} = \text{CBA Ratio} \times 100$$



CBA Ratio > 1 Project is Profitable
 CBA = 12/10 = 1.20 > 1
 ROI = 120% > 100%

CBA Ratio < 1 Project is NOT Profitable
 CBA = 12/13 = 0.92 < 1
 ROI = 92% < 100%

So how do you like the CBA Ratio and ROI formula? I find it quite straightforward and easy to use!

In summary, when CBA ratio is superior to 1: project is a go. And when CBA is below 1: project is a no go. That simple!

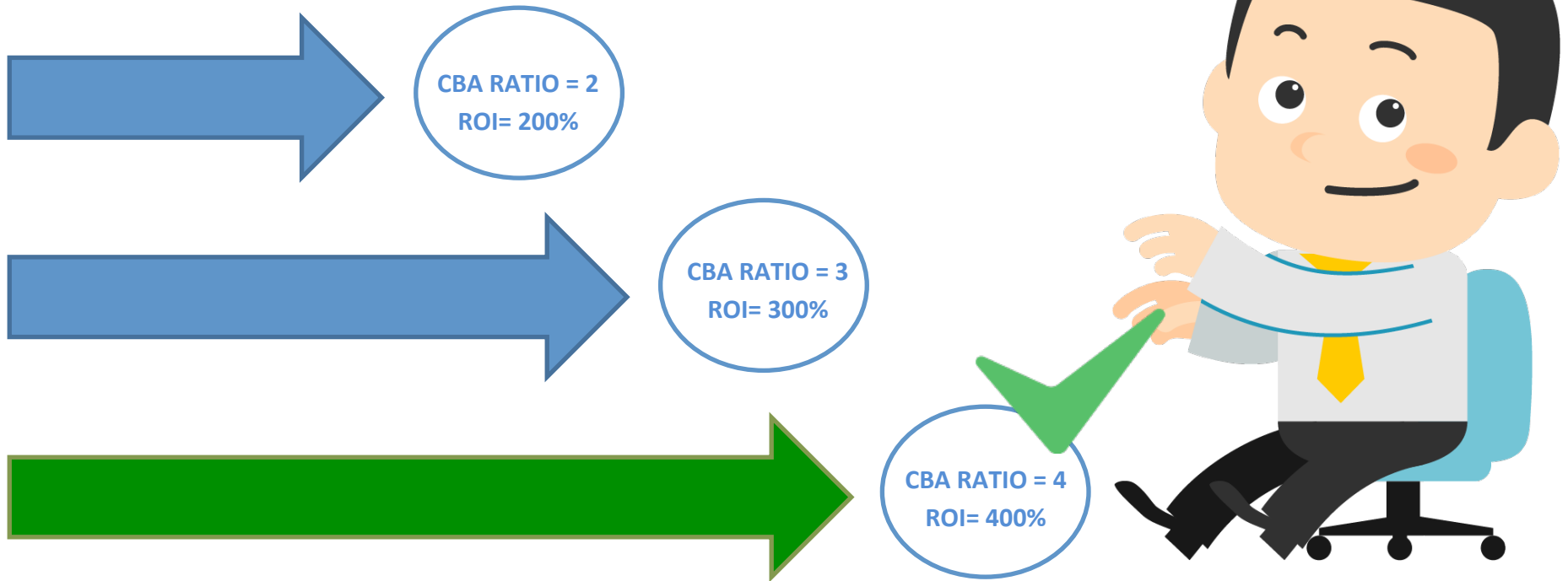
Oops! I forgot one case: what happens if CBA ratio exactly equals 1?

Well, that means $\text{Benefits} = \text{Costs}$, right? The project will not add value but will not lose money. In that case, this financial criteria is quite neutral!



We can also use these formula to evaluate the most beneficial and best option among profitable projects or alternatives.

Alternatives with the highest ROI and CBA Ratio will create the most value for your organization!



CBA ratio will tell me if my project is profitable so we know the future is bright. But hey, how do we know what will be the length of time before the benefits exceed the costs?

How long will it take before the benefits payback the costs?

Will it be in one month, one year, or more? That can make a big difference for stakeholders!

Good news! We have another formula that is very helpful to bring more insights into our decision process: “The **Payback Period** measures the time in which the initial cash flow is returned by the project”.



Wait a minute! To use the payback period concept, I need to introduce the financial concept of **cash flows**. As we switch terminology, we will simply translate benefits into money “in” (inflows) and costs as money “out” (outflows).

We will also need to organize cash flows (both inflows and outflows) in a timeline so we can visualize what happens year after year.

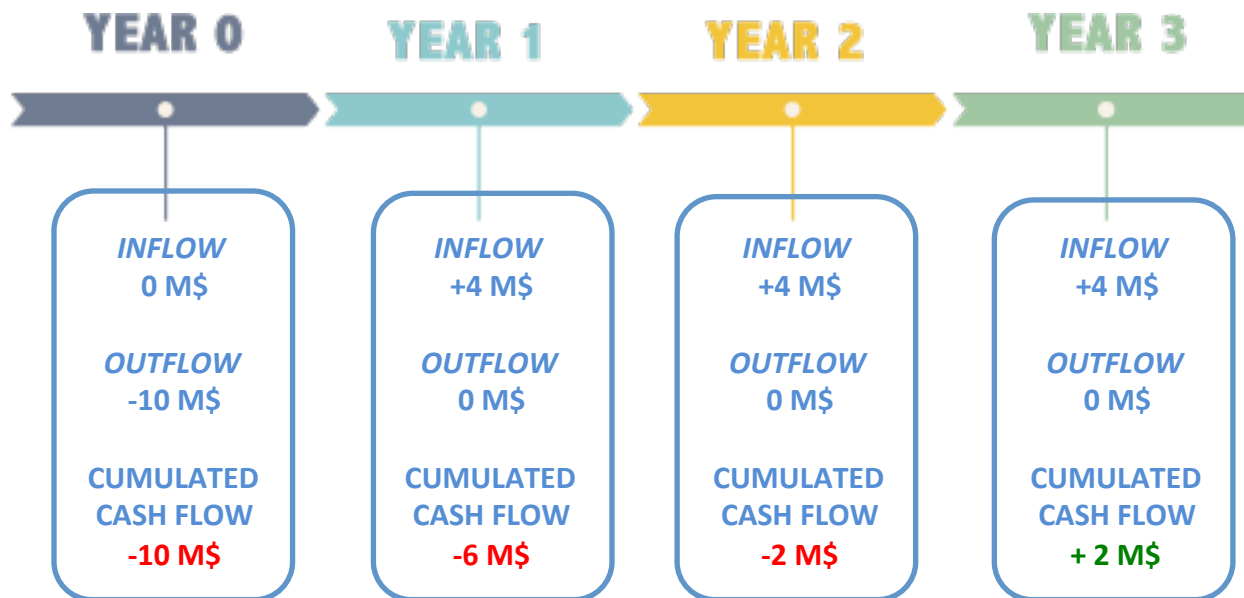
One more thing: In this lesson, I will use a simplified 3-year duration with even annual cash flows.

Ready to see the formula? I hope you will like my diagram!





$$\text{PAYBACK PERIOD} = \frac{\text{INITIAL INVESTMENT}}{\text{ANNUAL CASH INFLOW}}$$



Example: An initial investment (at year 0) of 10M\$ will generate a 3-year annual cash flows of 4 M\$ starting year 1. The payback period formula gives : $PBP = 10/4 = 2.5$ years

- Cash Flows = Inflows – Outflows are positive when the project creates value
- The project will start generating positive cash flows after 2.5 years.
- After three years, the project has produced total inflows of 12M\$ resulting in cumulated cash flows and a net value of 2M\$.



- A new system requires \$65,000 of development, implementation and training costs and will contribute \$135,000 in productivity gains over the next 3 years.
- Is the project profitable?
- What is the Payback Period, assuming even annual inflows?

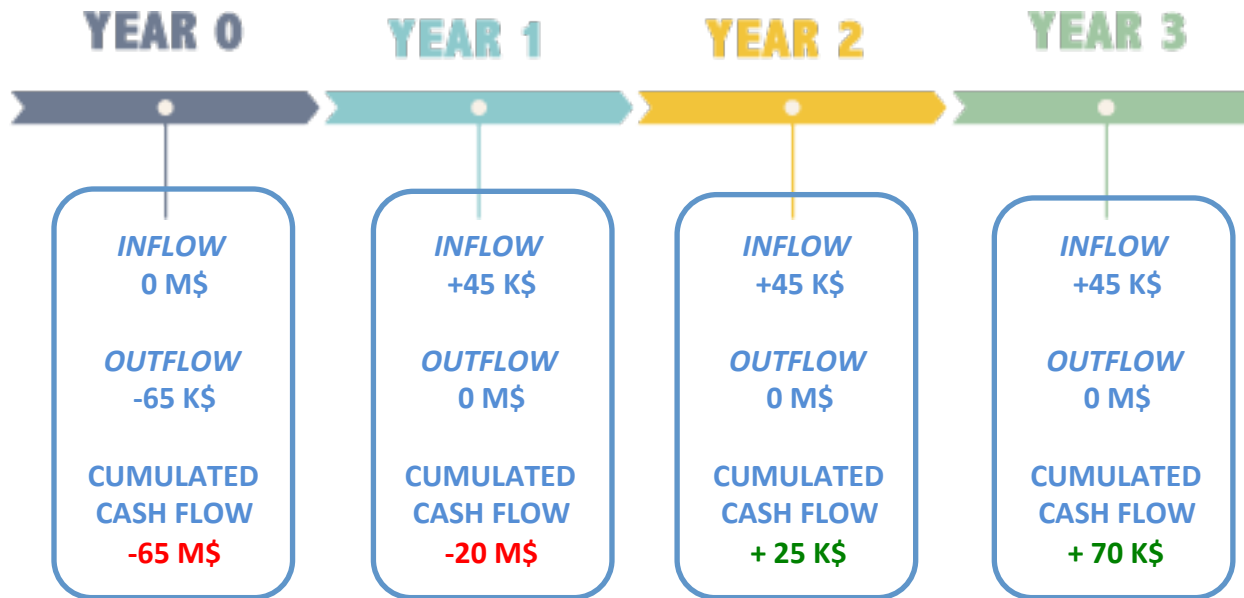
→ *When you are ready, click next screen to check your answers .*



Hint: Calculate ROI and CBA Ratio then use the PBP formula to find out the year when the project will become to generate positive cash flows. To verify your results, draw a timeline and enter all cash flows for 3 years.



$$\text{PAYBACK PERIOD} = \frac{\text{INITIAL INVESTMENT}}{\text{ANNUAL CASH INFLOW}}$$



- ROI= 135/65 x 100 = 208% . The Project is Profitable!
- The payback period formula gives : PBP = 65/45 = 1.4 years (approx. 1 year 5 months)
- After three years, the project has produced total inflows of 135K\$ resulting in cumulated cash flows and a net value of 70K\$.

Wow. PBP is not as simple as CBA ratio or ROI , but you got the idea right?

Have you noticed that our projects will not create value instantly? We will have to wait a few years



That opens our reflection to another consideration of importance: the **time value of money.**

Did you know that the money earned or spent in the future has less value than the money spent or earned today?



R (%) is the Discount Rate

Future value = R * Present value

\$1 in the future is worth less than \$1 in the present !

What causes this shift of value in time? The **inflation** is an important factor but in addition there is a cost of raising money to invest in projects.

It varies with organizations, but in any case when an investment is made, some expense are incurred: when cash is used for the project, there will be a loss on investment returns. In addition, if borrowing is required loan fees will apply. To account for these, we use a factor known as the “**cost of capital**” . This is used as the discount rate for future cash flows.

Hey there! Tim asked me to introduce the **Net Present Value**. It is a more sophisticated financial concept. As a financial analysis expert I need to tell you that ROI and PBP are not enough, they do not take into account the time value of money!

The modern project manager operates in an increasingly competitive and global business world where project alternatives need to be evaluated with more sophisticated financial tools!

Now we have to use a spreadsheet to get all our numbers organized and we will be able to apply the NPV formula easier. Stay with me!

We will need to calculate *the Present Value of cash flows*. This is done by applying a discounting factor to each yearly cash flows.



DISCOUNT FACTOR (YEAR n) = $\frac{1}{(1 + r)^n}$
 Where r is the assumed discount rate

DISCOUNTED CASH FLOW = Discount Factor x Cash Flow

NET PRESENT VALUE = SUM of (Net Discounted Cash Flows)

NPV CALCULATION SPREADSHEET					
CASH FLOWS	Total	year 0	year 1	year 2	year 3
TOTAL COSTS	\$8,000	\$8,000			
BENEFITS	\$12,000		\$4,000	\$4,000	\$4,000
NET VALUE	\$4,000				
DISCOUNTED CASH FLOWS					
Assumed discount rate	2%				
Discounting Factor		1	0.98	0.96	0.94
Discounted Outflows	\$8,000	\$8,000	\$0	\$0	\$0
Discounted Inflows	\$11,536	\$0	\$3,922	\$3,845	\$3,769
NET PRESENT VALUE	\$3,536				

Here is the step-by-step procedure:

- Enter all cash flows from year 0 to year 3, enter the assumed discount rate
- Calculate the discounting factor for each year
- Calculate the discounted cash flows for each year
- Sum up all discounted cash flows to obtain the Net Present Value.

I am back! So what do you think about NPV? It is quite a more complex tool, right? I am glad my friend is an expert and we can use his excel template.

If you have time now, you could use this example and challenge yourself with reproducing all the steps!

One tip: to be able to calculate the discounting factors you will need to apply the POWER function in your spreadsheet tool. Refer to the software help to get this done!

But if you prefer to complete this lesson in less than 15minutes, we can leave the mathematics for later and continue to *strengthen our project management muscles*. Let's take note of important notions about NPV!

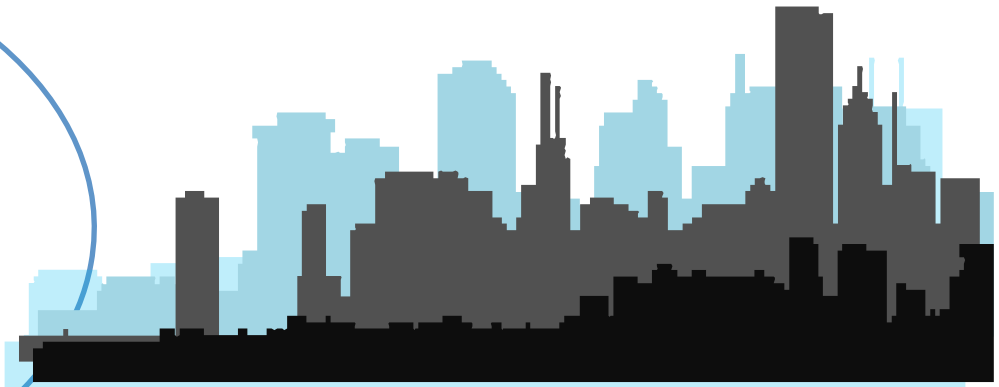


Have you noticed the **Net Present Value** is less than the **Net Value** in our example? This is an effect of the time value of money. In this project, we inject lots of real money today and will receive potential future cash flows that are less in value due to the discount factor!

Net Present value is a more realistic projection of the outcomes of a project and should be provided in CBA process as soon as the project takes more than one year to complete.

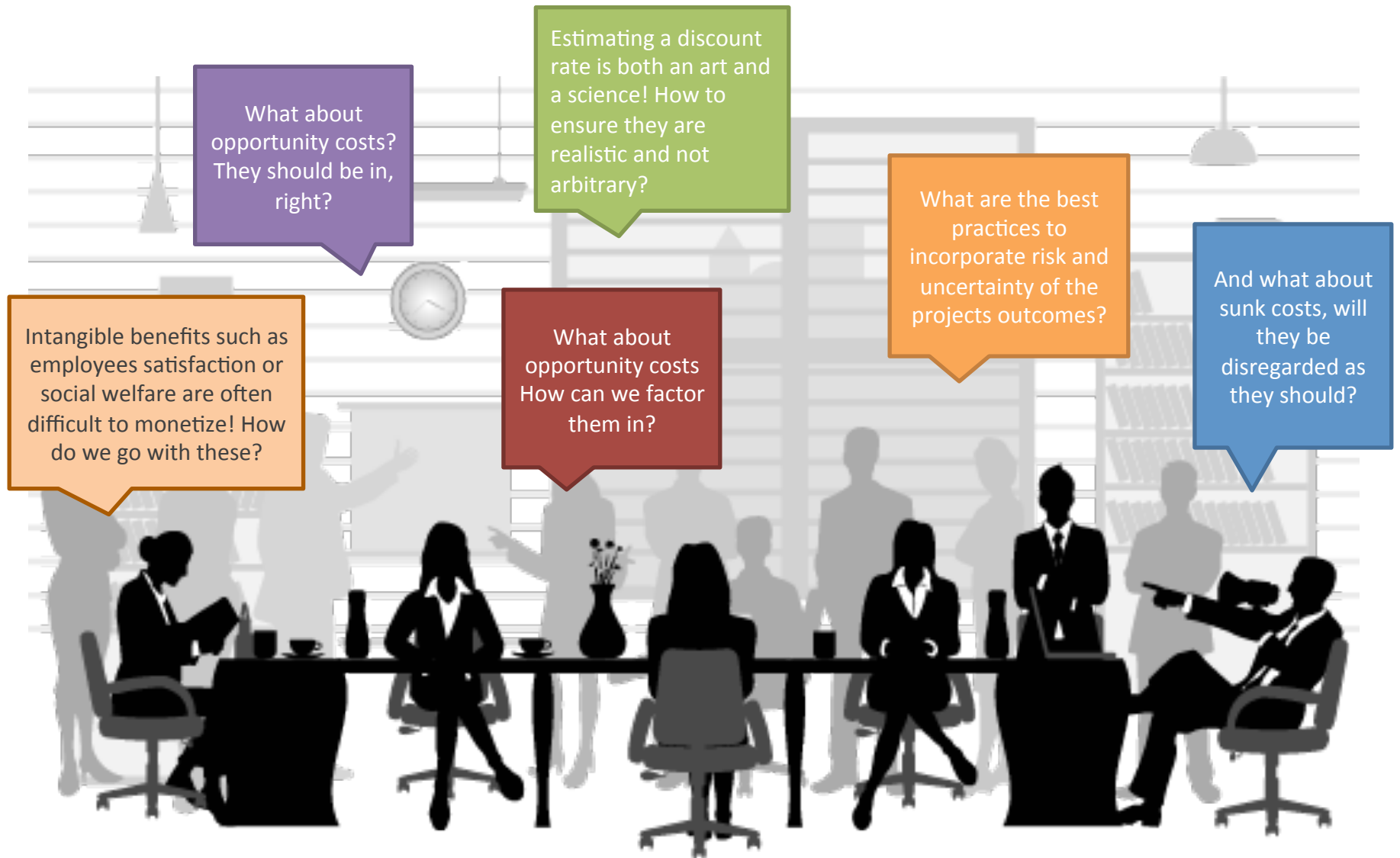


Although CBA presents itself as a rather simple method, one should be well aware of the complexities that inevitably come from real world application. Let's go and visit my friend: he is an experienced project manager and his perspective is often invaluable!



Hey, nice to see you Tim. I agree with you: a lot can go wrong using CBA resulting in inaccurate calculations. As a modern project manager your role is to be asking the tough questions and using a reasonable dose of skepticism will be highly beneficial to the process and stakeholders!

Let's hear the concerns that comes to mind when working on real projects...



Hey I think we've covered CBA essential quantitative aspects and limitations. We've done quite a lot, are you ok?



But before you leave, let's wrap up this lesson in style. I'd love to see you writing your own conclusion. It is a pretty good way to keep engaged and reap the learning rewards!

This is **Interview time!** One last "To-Do" to complete: Tell what you have learned and what you will keep in mind. It is your time to shine and impress your friends and colleagues!



Note: When you take this lesson as part of PMCAMPUS.com training you will be able to share your summary with other students within the virtual training center.



To DO:

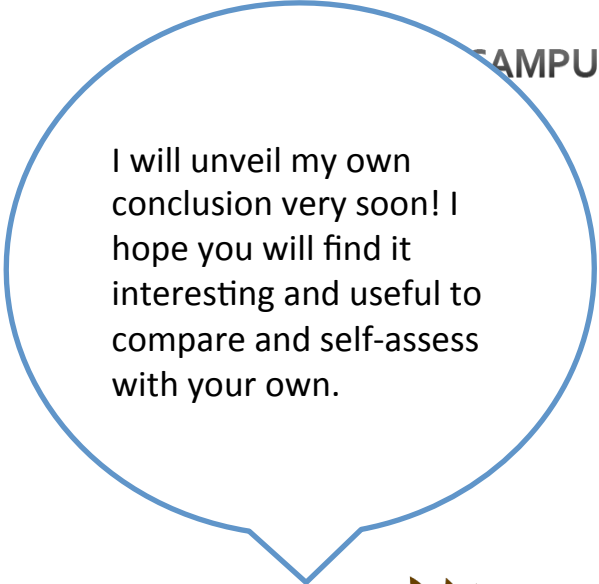
Are you ready for your Interview?

- Get prepared by reviewing and listing key learning from this mini lesson.
- Compose your script using your own words and a 2-part summary highlighting the key points you want to remember about the CBA process and formula.
- Then answer this last question: what will you be keeping in mind when using CBA in your day-to-day job?

➔ *When you are done, click next screen.*



Hint: What did you learn about the CBA Process? Do you remember why the first formula differ from the last one? What is the expected role of the project manager?



I will unveil my own conclusion very soon! I hope you will find it interesting and useful to compare and self-assess with your own.



CONCLUSION - PART 1

- *CBR, ROI and PBP are simple to calculate and useful for making quick decisions for short term or non-beneficial projects but they are usually insufficient to make more sophisticated decisions when time value of money needs to be accounted for.*
- *NPV is a more reliable financial formula but uncertainties associated with estimating costs and intangible benefits may lead to inaccurate outcomes.*



CONCLUSION - PART 2

We keep in mind: CBA is a method for informing decisions, not making them. Many factors can not be easily quantified and monetized.

The modern project manager is expected to use CBA as a framework to weigh pros and cons and develop a solid business case for the project.

