

Patou Tips #29 / Toolbox #1 v2

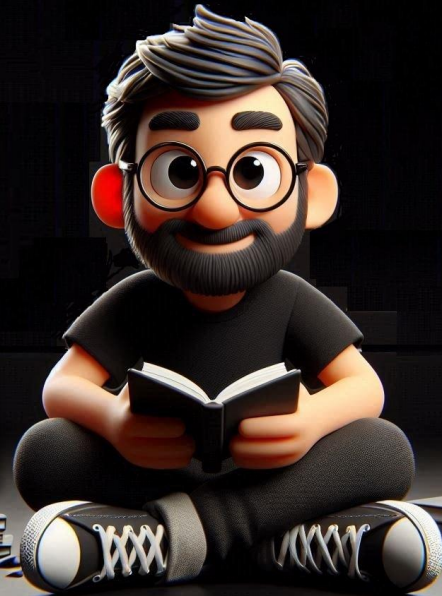
Use case with PowerBI

"Finance Toolbox"

**FREE**  
PowerBI pbix  
to practice

# Profitability of a project

The Complete Guide

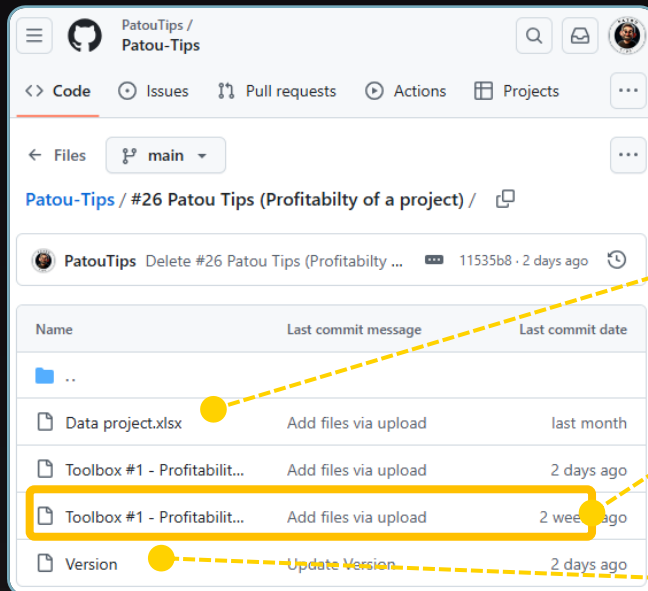


# To practice with this Patou Tip

## Profitability of a project



Find all the resources  
on the Patou Tips GitHub



Data resources (Excel file)

Toolbox #1 - Profitability of a project v2.pbix

Explanations about  
PowerBI project versions

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## About data...



The dataset comes from the fictitious Parisian company "IceCream' Macaron," taken from my book "Financial Forecast with PowerBI: Story of a Point."

Year	Revenue	Cost	Investment
2024	150 000 €	-50 000 €	-200 000 €
2025	160 000 €	-100 000 €	-30 000 €
2026	190 000 €	-150 000 €	-10 000 €
2027	230 000 €	-150 000 €	-10 000 €
2028	260 000 €	-150 000 €	-10 000 €
2029	275 000 €	-150 000 €	-10 000 €
2030	300 000 €	-150 000 €	-10 000 €
2031	330 000 €	-150 000 €	-10 000 €
2032	360 000 €	-150 000 €	-10 000 €



This project represents the launch of a new store for the company "IceCream' Macaron." It involves a significant initial investment and residual investments for possible improvements to the store structure.

Note: If you would like to use the PowerBI toolkit with your own data, please insert it into this Excel spreadsheet.

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# Profitability of a project

Part 1: Financial  
explanations & DAX  
measures





0

# Financial explanations & DAX measures

## Main calculation steps...

### Project inputs

Revenue + Costs  
+ Investment

Discounted Rate\*  
+ Project Term

Free Cash Flow (FCF)

Significant financial indicators must be taken into account

Discount Rate

Depreciation of the "Discounted Rate" for each project term

Discounted Cash Flow (DCF)

= Free Cash Flow  $\times$  Discount Rate

IRR

Payback Period

NPV\*\*

Profitability of a project is good when these 3 conditions are met...

✓ IRR > Profitability rate required

✓ Payback period < Project Term

✓ NPV > 0

\*Discounted Rate: WACC, inflation rate, internal financial rate of return...

\*\* Notes : NPV = Cumulative Discounted Cash Flow

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# Financial explanations & DAX measures

## Free Cash Flow (FCF)



Free cash flow (FCF) is the money a company has left over after paying its operating expenses and capital expenditures.

$$\text{Free Cash Flow (FCF)} = \text{Revenue} + \text{Costs} + \text{Investment}$$

Year	Revenue		Cost		Investment		Free Cash Flow (FCF)
2024	150 000 €		-50 000 €		-200 000 €		-100 000 €
2025	160 000 €		-100 000 €		-30 000 €		30 000 €
2026	190 000 €		-150 000 €		-10 000 €		30 000 €
2027	230 000 €	+	-150 000 €	+	-10 000 €	=	70 000 €
2028	260 000 €		-150 000 €		-10 000 €		100 000 €
2029	275 000 €		-150 000 €		-10 000 €		115 000 €
2030	300 000 €		-150 000 €		-10 000 €		140 000 €
2031	330 000 €		-150 000 €		-10 000 €		170 000 €
2032	360 000 €		-150 000 €		-10 000 €		200 000 €

### Dax measure

```
1 Free Cash Flow (FCF) = CALCULATE([N])
```

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# Financial explanations & DAX measures

## Discount Rate



The discount rate allows us to **evaluate the value of one euro** (or other money) according to a **required rate of return** and the **number of term**. Required rate of return is the Discounted Rate and it can be based on the WACC, the inflation rate, the financial internal rate of return...

$$\text{Discount Rate} = 1 / (1 + \text{Discounted Rate})^{(\# \text{Period} - 1)}$$

Year	Discount rate
2024	1,00
2025	0,91
2026	0,83
2027	0,75
2028	0,68
2029	0,62
2030	0,56
2031	0,51
2032	0,47

### Dax measure

```

1 Discount rate =
2 VAR Selected_Year = SELECTEDVALUE(DimDate[Year])
3 VAR Number_Term = Selected_Year - [First Year Project] + 1
4 VAR Discounted_Rate = [Discounted rate selected] --From input parameter
5
6 VAR Yearly_Discount_Rate =
7 IF(
8     ISINSCOPE(DimDate[Year]),
9     IF(Selected_Year>=[First Year Project] && Selected_Year<=[Last Year BP],
10        (1/(1+Discounted_Rate)^(Number_Term-1))
11    ))
12
13 RETURN Yearly_Discount_Rate

```

Example with a Discounted Rate of 10% and a project calculation at 2028:  
 $0,68 = 1 / (1 + 10\%)^{((2028 - 2024 + 1) - 1)}$

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## Financial explanations & DAX measures

### Discounted Cash Flow (DCF)



Discounted cash flow (DCF) is a **valuation method** that estimates the value of an investment using its **expected future cash flows**.

**Discounted Cash Flow (DCF) = Free Cash Flow x Discount Rate**

Year	Free Cash Flow (FCF)		Discount rate		Discounted Cash Flow (DCF)
2024	-100 000 €		1,00		-100 000 €
2025	30 000 €		0,91		27 273 €
2026	30 000 €		0,83		24 793 €
2027	70 000 €	+	0,75	=	52 592 €
2028	100 000 €		0,68		68 301 €
2029	115 000 €		0,62		71 406 €
2030	140 000 €		0,56		79 026 €
2031	170 000 €		0,51		87 237 €
2032	200 000 €		0,47		93 301 €

#### Dax measure

1 Discounted Cash Flow (DCF) = [Free Cash Flow (FCF)]\*[Discount rate]

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# Financial explanations & DAX measures NPV (Net Present Value)



When the NPV is positive, the project is adding value to by generating revenues that exceed the costs, once they are discounted.

NPV = Cumulative  
Discounted Cash Flow



NPV must be positive

Year	Discounted Cash Flow (DCF)	NPV
2024	-100 000 €	-100 000 €
2025	27 273 €	-72 727 €
2026	24 793 €	-47 934 €
2027	52 592 €	4 658 €
2028	68 301 €	72 959 €
2029	71 406 €	144 365 €
2030	79 026 €	223 392 €
2031	87 237 €	310 629 €
2032	93 301 €	403 930 €

This project starts creating value from the fourth year, means that this project must have at least 4 years as a term to be profitable

## Dax measure (2 variants)

With XNPV function

```
1 NPV DAX =
2 XNPV('Project Data',
3     [Discounted Cash Flow (DCF)],
4     'Project Data'[Year],
5     [Discounted Cash Flow (DCF)])
```

With cumulative iteration. Better to display for each year.

```
1 NPV =
2 -- NPV (Net Present Value) = Cumulative Discounted Cash flow
3 VAR Selected_Year = SELECTEDVALUE(DimDate[Year])
4
5 RETURN
6 IF(Selected_Year<=[Last Year BP],
7     CALCULATE(
8         SUMX('Project Data',[Discounted Cash Flow (DCF)]),
9         DimDate[Year]<=Selected_Year
10    )
11 )
```

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## Financial explanations & DAX measures IRR (Internal Rate of Return)



The IRR is the **discount rate** at which the net present value (NPV) of a set of **discounted cash flows is equal to zero**. On PowerBI or Excel, creating such a calculation is so complex, fortunately there is the "XIRR" function.

### Dax measure

```
1 IRR =  
2 VAR First_Term_Year = [First Year Project]  
3 VAR Last_Term_Year_Selected = [Last Year Term Selected]  
4  
5 RETURN  
6 CALCULATE(  
7     XIRR('Project Data',[Free Cash Flow (FCF)],'Project Data'[Year]),  
8     FILTER(  
9         DimDate,  
10        DimDate[Year] >= First_Term_Year && DimDate[Year] <= Last_Term_Year_Selected))
```



### IRR limits:

- The IRR assumes that the project's future cash flows are reinvested at the same rate as the IRR, which may not be realistic or achievable. ...
- Sometimes project A may have a higher IRR than project B while project B generates more cash flow (NPV).

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# Financial explanations & DAX measures

## Payback Period



The **payback period** is the amount of time it takes to recover the cost of an investment. Simply put, it is the length of time an investment reaches a **breakeven point**.

A payback period relatively short indicates a rapid return on investment, that reduces risk and improves liquidity.

**Payback Period = (Project Start Date - Date when NPV >= 0) +1**

### Dax measure



The payback period must be less than or within the "project duration"

```
1 Payback Period =
2 VAR Payback_Period_End =
3 year(CALCULATE(
4     MIN('Project Data'[Year]),
5     FILTER(
6         ADDCOLUMNS(
7             'Project Data',
8             "CumulativeCashFlow",
9             CALCULATE(
10                SUMX('Project Data',[Free Cash Flow (FCF)]*[Discount rate]),
11                FILTER(
12                    ALL('Project Data'),
13                    'Project Data'[Year] <= EARLIER('Project Data'[Year])
14                )
15            )
16        ),
17        [CumulativeCashFlow] >= 0
18    )
19 ))
20
21 RETURN Payback_Period_End-[First Year Project]+1
```

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# Profitability of a project

Part 2: Explanation of modeling and details on DAX measures



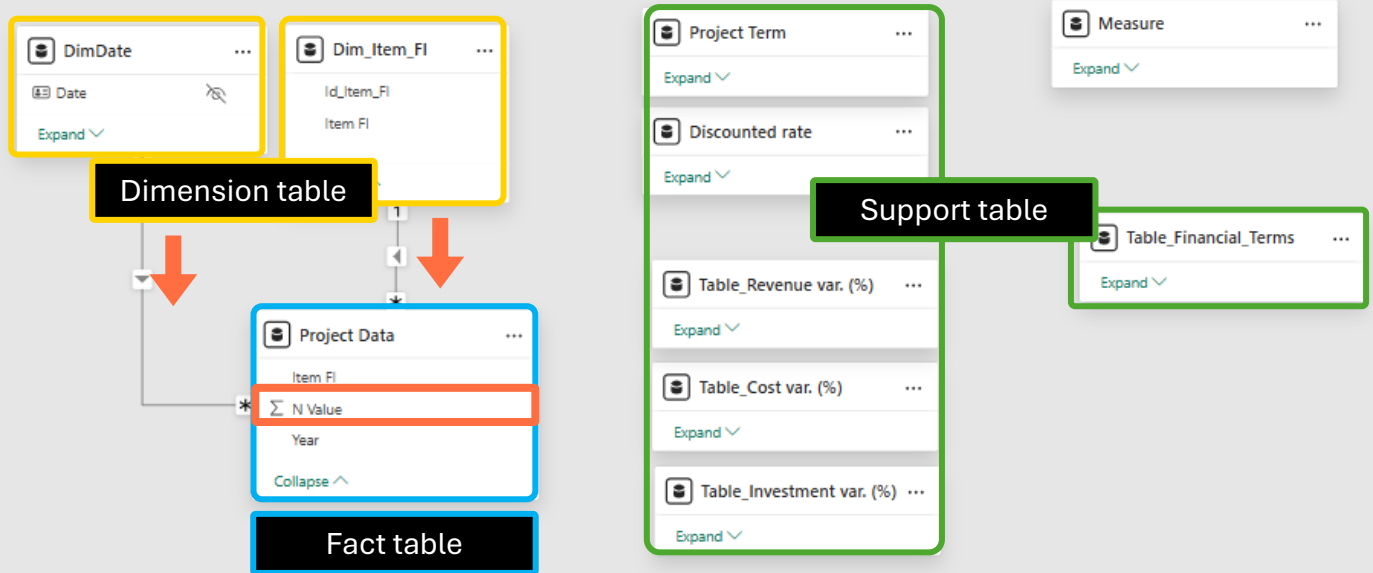


1

# Explanation of modeling Main architecture...

## Star schema

The "N value"\* is in the heart of the project!



\*See Patou Tips # 25 "The complete guide to start with PowerBI" for more information.

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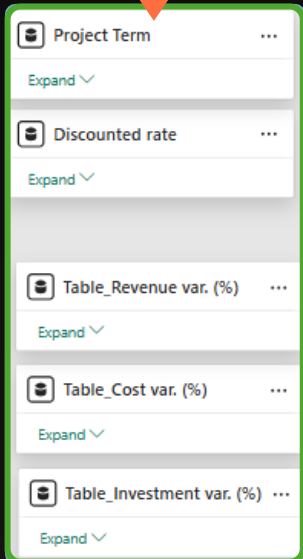
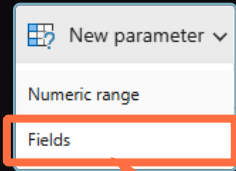
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1

# Explanation of modeling Main architecture...

## About "support tables"



"Support tables" are created by the parameter functionality "fields" to adjust project inputs: project term, discounted rate, revenue, cost and investment.

Project Input

Project Term (Year)

Discounted Rate

4

10,0 %

► The chosen duration of the project extends from 2024 til 2027 (4 years) with a "Discounted Rate" of 10,00 %

Revenue var. (%)

Cost var. (%)

Investment var. (%)

0 %

Initial value

730 000,00 €

Changed value

730 000,00 €

Reset

0 %

Initial value

-450 000,00 €

Changed value

-450 000,00 €

Reset

0 %

Initial value

-250 000,00 €

Changed value

-250 000,00 €

Reset

Use case with PowerBI

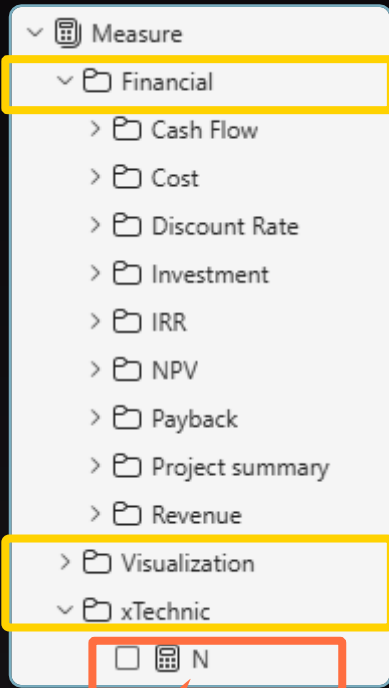
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2

## Details on DAX measures

### About measures organization



All metrics are organized into two main folders:

- Finance: This folder groups metrics by financial theme.
- Visualization: This folder allows you to add metrics to build the visualization.

A third folder "xTechnic" contains a single metric in this project, allowing to obtain the "N" metric relative to the "n value" in the fact table. This metric is the axis for all other metrics.

```
1 N = SUM('Project Data'[N Value])
```

Use case with PowerBI

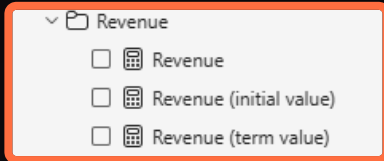
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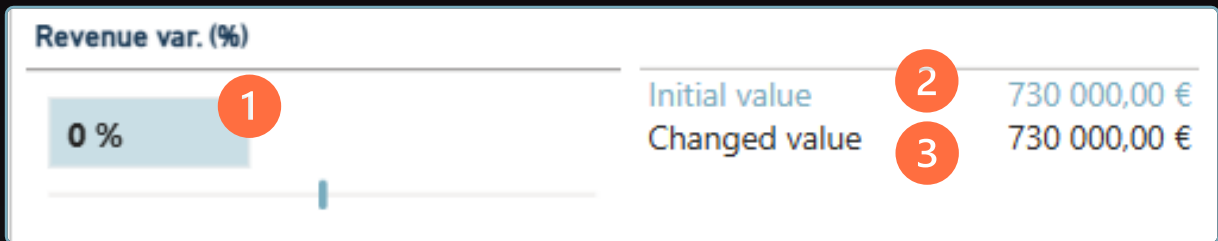
2

## Details on DAX measures Revenue (1/2)

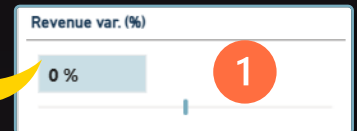


The measures of this folder are also the same for the Cost and Investment folders

Project input box



```
1 Revenue =
2 CALCULATE(
3     [N]*(1+'Table_Revenue var. (%)'[Revenue var. (%) Value]),
4     FILTER('Project Data','Project Data'[Item FI]="Revenue")
5 )
```



This metric create the "Revenue" value and takes into account the adjusted input value of the project input box. This measure will be use for the visualizations.

Use case with PowerBI

"Finance Toolbox"

Profitability of a project



2

## Details on DAX measures Revenue (2/2)

2

```
1 Revenue (initial value) =  
2 VAR First_Term_Year = [First Year Project]  
3 VAR Last_Term_Year_Selected = [Last Year Term Selected]  
4  
5 RETURN  
6 CALCULATE(  
7     [N],  
8     FILTER('Project_Data', 'Project_Data'[Item_ET]="Revenue"),  
9     DimDate[Year]>= First_Term_Year && DimDate[Year] <= Last_Term_Year_Selected)
```

Initial value	730 000,00 €
---------------	--------------

Term of the  
project

This metric DOES NOT take into account the adjusted input value from the project input box, but calculates revenue during the term of the project. It will be useful to calculate the "initial value" of the project's revenue before any adjustments.

3

```
1 Revenue (term value) =  
2 VAR First_Term_Year = [First Year Project]  
3 VAR Last_Term_Year_Selected = [Last Year Term Selected]  
4  
5 RETURN  
6 CALCULATE([Revenue],  
7     DimDate[Year]>= First_Term_Year && DimDate[Year] <= Last_Term_Year_Selected)
```

Changed value	730 000,00 €
---------------	--------------

Term of the  
project

This metric take into account the adjusted input value from the project input box, but calculates revenue during the term of the project. It will be useful to calculate the "changed value" of the project's revenue after adjustments.

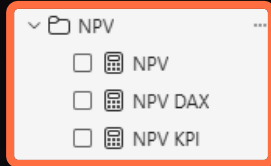
Use case with PowerBI

"Finance Toolbox"

Profitability of a project

2

## Details on DAX measures NPV (Net Present Value)



```
1 NPV DAX =
2 XNPV('Project Data',
3     [Discounted Cash Flow (DCF)],
4     'Project Data'[Year],
5     [Discounted Cash Flow (DCF)])
```

In this project, I'm not using the native "XNPV" function to calculate the NPV. I created it purely for learning purposes.

I prefer to use a cumulative DAX pattern to obtain a value for each year.

```
1 NPV =
2 -- NPV (Net Present Value) = Cumulative Discounted Cash flow
3 VAR Selected_Year = SELECTEDVALUE(DimDate[Year])
4
5 RETURN
6 IF(Selected_Year<=[Last Year BP],
7     CALCULATE(
8         SUMX('Project Data',[Discounted Cash Flow (DCF)]),
9         DimDate[Year]<=Selected_Year
10    )
11 )
```

Cumulative DAX pattern

```
1 NPV KPI =
2 VAR End_Period = [Last Year Term Selected]
3
4 RETURN
5 CALCULATE(
6     [NPV],
7     DimDate[Year]=End_Period)
```

KPI ROI Project	
4	
Payback (year)	
12,25 %	
IRR	
4 658 €	
NPV	

This metric is created to show the ending value at the project final term, to be displayed for the KPI visualization.

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2

## Financial explanations & DAX measures IRR (Internal Rate of Return)



Creating such a calculation in PowerBI or Excel is complex, because for each project period, you need to calculate which rate gives a zero value for the NPV. Fortunately, there is the "XIRR" function.

```
1 IRR =  
2 VAR First_Term_Year = [First Year Project]  
3 VAR Last_Term_Year_Selected = [Last Year Term Selected]  
4  
5 RETURN  
6 CALCULATE(  
7     XIRR('Project Data',[Free Cash Flow (FCF)], 'Project Data'[Year]),  
8     FILTER(  
9         DimDate,  
10        DimDate[Year] >= First_Term_Year && DimDate[Year] <= Last_Term_Year_Selected))
```

Term of the project

Use case with PowerBI

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## 2

# Financial explanations & DAX measures

## Payback Period



✓ Payback

☐ Payback Period

☐ Payback Period (Year)

```

1 Payback Period =
2 VAR Payback_Period_End =
3 year(CALCULATE(
4     MIN('Project Data'[Year]),
5     FILTER(
6         ADDCOLUMNS(
7             'Project Data',
8             "CumulativeCashFlow",
9             CALCULATE(
10                SUMX('Project Data',[Free Cash Flow (FCF)]*[Discount rate]),
11                FILTER(
12                    ALL('Project Data'),
13                    'Project Data'[Year] <= EARLIER('Project Data'[Year])
14                )
15            )
16        ),
17        [CumulativeCashFlow] >= 0
18    )
19 ))
20
21 RETURN Payback_Period_End-[First Year Project]+1
  
```

Cumulative DAX pattern

This formula calculate the first year (line 4) of the Payback Period when the value of the NPV (lines 7 to 13) fill the condition NPV is  $\geq 0$  (line 17).

```
1 Payback Period (Year) = [Payback Period]&" years"
```

This formula allow

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# Profitability of a project

Part 3: Graphic  
Design, UI/UX, and  
Storytelling

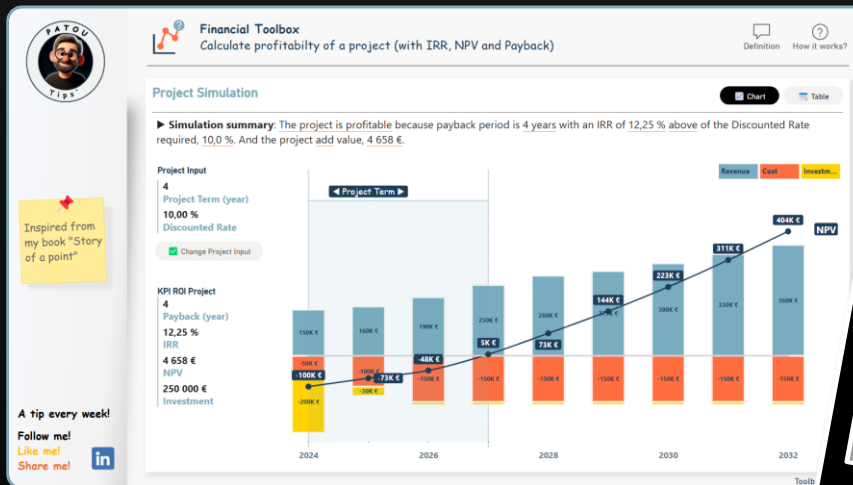


# Graphic Design



📌 In this part I will explain how to create a **color theme for PowerBI**.

How I created a theme around the **"Dark Pastel Blue"** color.



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1

## Find the main colors

→ And the secondary colors

For my book "Story of a point", I took my **inspiration** from the book "Super Graphic" by Tim Leong (June 2013). An amazing book for color research.

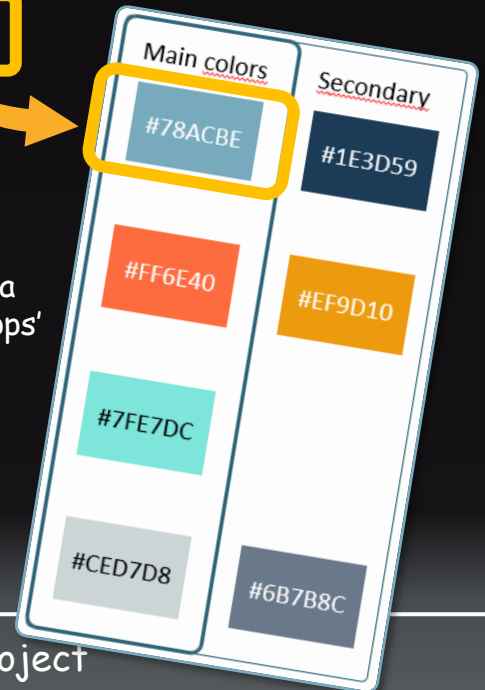
When I find my **main colors**, then I search for the **hexadecimal code** with my smartphone and the "What a color?" mobile application. This application is really usefull to catch the color and the hexadecimal code.

With PowerPoint I test a lot of colors until I find **3 main colors** (but here 4) and **3 secondary colors**. My favorite color for the book theme and for PowerBI files is the color called:

"Dark Pastel Blue (hexadecimal code: #78ACBE).



Get hexadecimal code with "what a color?" mobile apps'



Use case with PowerBI

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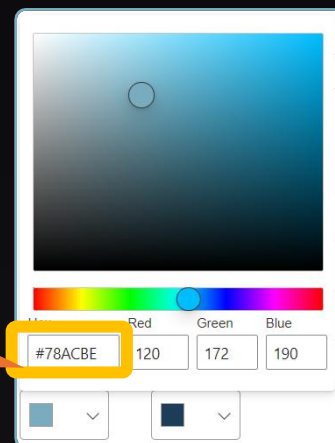
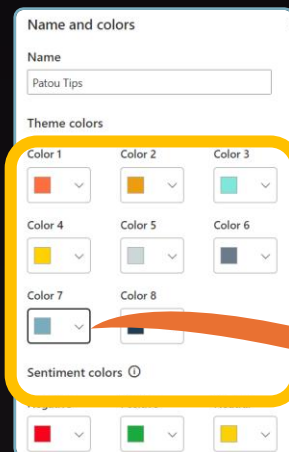
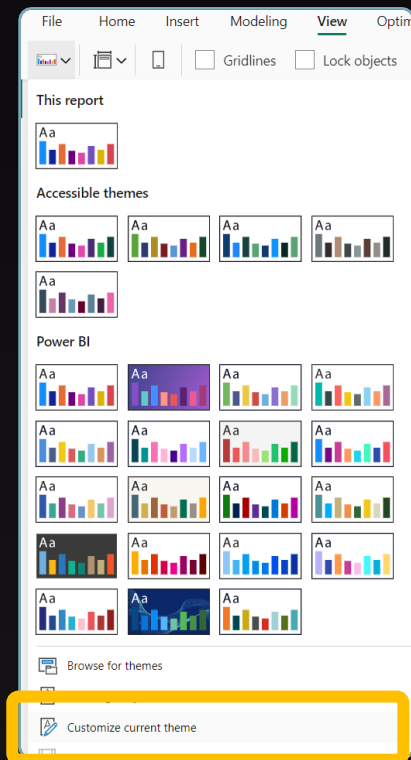
2

## Create colors theme in PowerBI

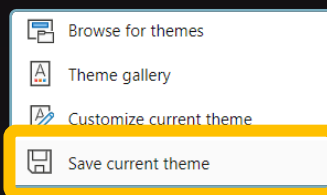


On PowerBI click on  
"Customize current theme"  
Path: View > Themes

Here it's the creation of the 7 colors that I  
choosed before. And I put the hexadecimal  
codes for each colors.



Save your final  
theme, if you  
want to use it for an  
another PowerBi  
project. A json file  
will be create.



Patou Tips Colors.json

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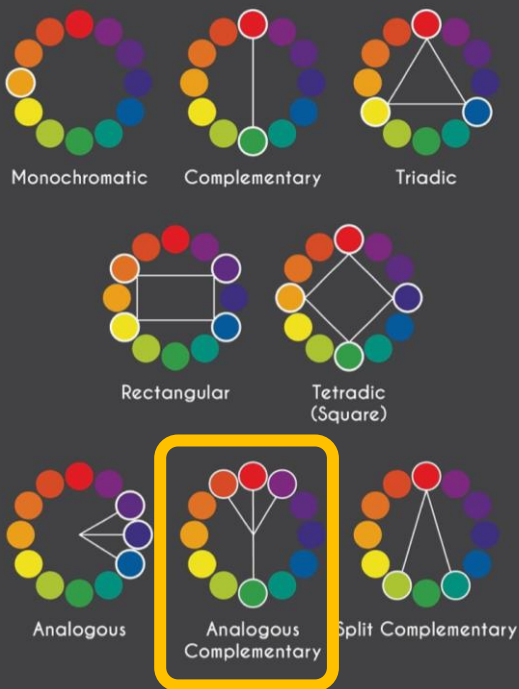
3

## Find the good harmony

→ Try, try, try and try again...



### COLORCOMBINATION



Anything is possible, but often it's better to create your color theme according to color combination rules.

Sometimes, when I find colors, I reopen my project a few days later just to see if the impact or mood I wanted is still the same.

Sometimes I change the theme 4 or 5 times!



The combination that I chose is nearly of the "analogous complementary" harmony.

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# UI / UX



📌 In this part, I will explain how to create a Pop-Up, like "Project Input", which appears when you press a button, and in this Pop-up how to configure "selections" and "bookmarks".

☒ Change Project Input

### Project Input

Project Term (Year)

4

Discounted Rate

10,0 %

► The chosen duration of the project extends from 2024 til 2027 (4 years) with a "Discounted Rate" of 10,00 %

Revenue var. (%)

0 %

Initial value 730 000,00 €

Changed value 730 000,00 €

Reset

Cost var. (%)

0 %

Initial value -450 000,00 €

Changed value -450 000,00 €

Reset

Investment var. (%)

0 %

Initial value -250 000,00 €

Changed value -250 000,00 €

Reset

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## Compose the Pop-Up

Pop-ups are truly one of the best practices for giving your users the freedom to adjust their work. This creates interactivity and interest in a PowerBI project.

### > Menu Insert

**Project Input**

Project Term (Year)	Discounted Rate
4	10,0 %

► The chosen duration of the project extends from 2024 til 2027 (4 years) with a "Discounted Rate" of 10,00 %

Revenue var. (%)	Initial value	Changed value
0 %	730 000,00 €	730 000,00 €

Cost var. (%)	Initial value	Changed value
0 %	-450 000,00 €	-450 000,00 €

Investment var. (%)	Initial value	Changed value
0 %	-250 000,00 €	-250 000,00 €

Reset

Reset

Reset

Use case with PowerBI

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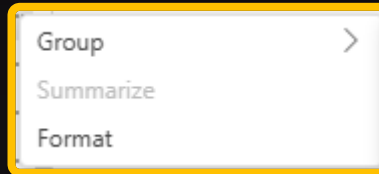
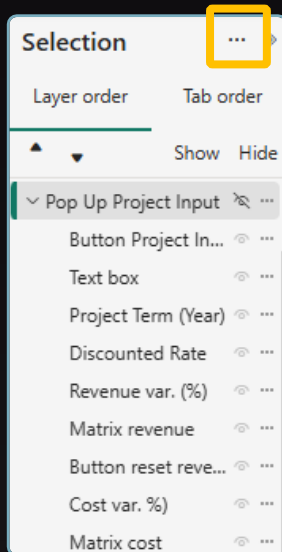
## 2

## Organise objects with "Selection panel"



This step is important to better manage the different objects in your Pop-Up and also to create interactivity with bookmarks (see next page).

In the selection panel, gather all the objects of a Pop-Up into a group



I prefer to group all the objects of a Pop-Up. It will be more easier to work with the bookmarks.

> Here I named it "Pop-Up Project Input"

Use case with PowerBI

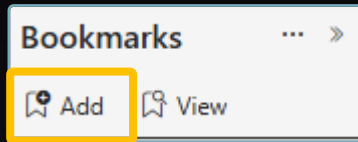
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Profitability of a project

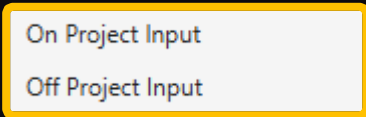


3

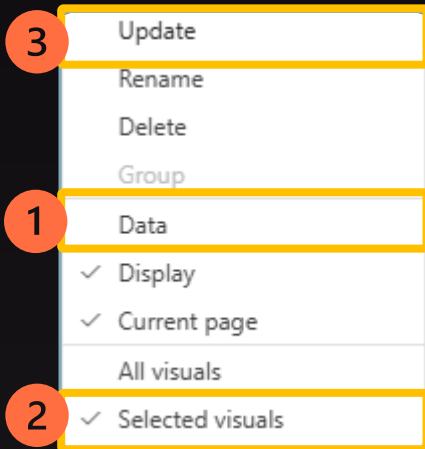
## Create "Bookmarks" for the Pop-Up



In the Bookmarks panel, add two bookmarks:



> Create one to show the pop-up (On) and one to close it (Off).



### For each Bookmark,

Before all, **select the group of object in the selection Pane** (see previous page), then:

- 1 - Unselect "Data"
- 2 - Select "Selected visuals"
- 3 - Then "Update"

Use case with PowerBI

"Finance Toolbox"

Profitability of a project

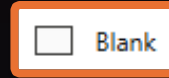
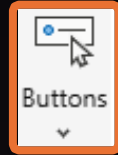


4

## Create buttons and their interactivity

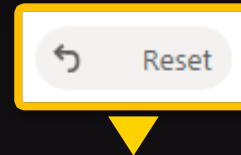
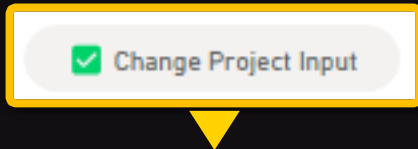
1

Create buttons

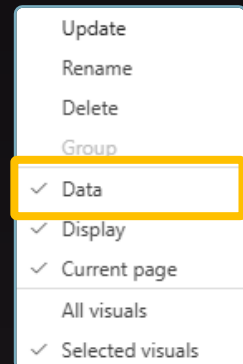
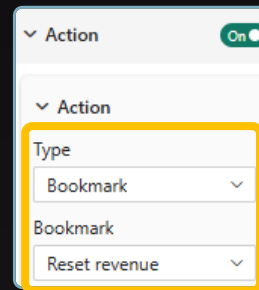
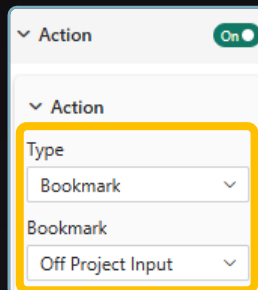
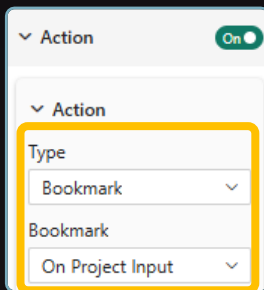


2

Create a bookmark for each button (see previous page) and place the bookmark on the "action" configuration button



Don't forget to put on for "data"



Use case with PowerBI

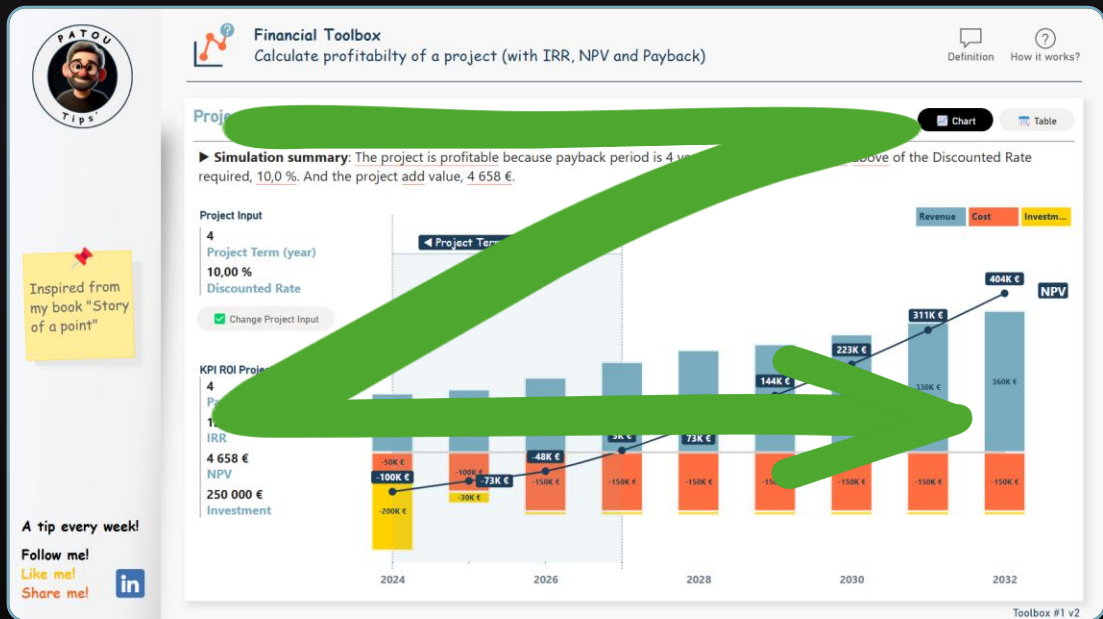
"Finance Toolbox"

Profitability of a project

# Storytelling



📌 In this section, I will explain the organization and prioritization of visuals according to the "Z reading pattern".



Use case with PowerBI

"Finance Toolbox"

Profitability of a project

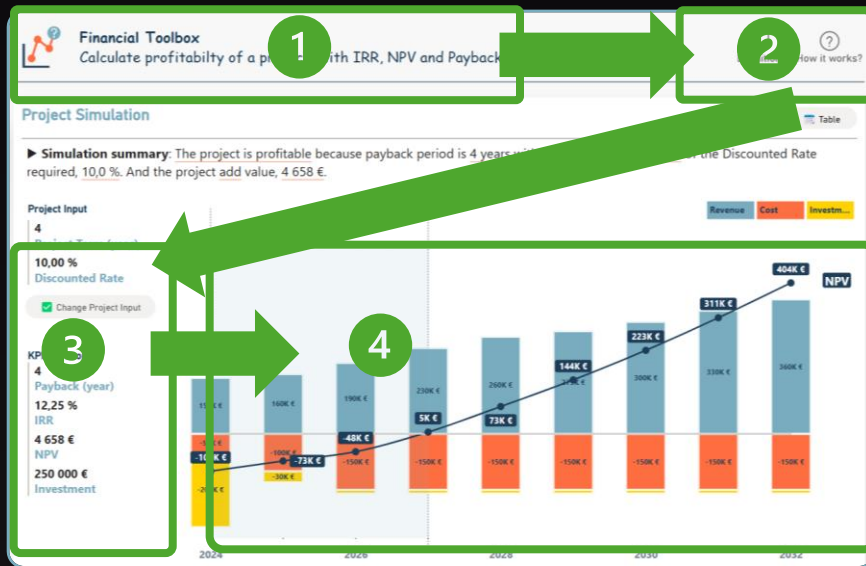




1

## Organization and prioritization with the "Z reading pattern".

The natural reading direction is from left to right and from top to bottom in a "Z" shape.



1 Topic of the project

3 KPI of the project

2 Help and definition

4 Visualization of the project

Use case with PowerBI

"Finance Toolbox"

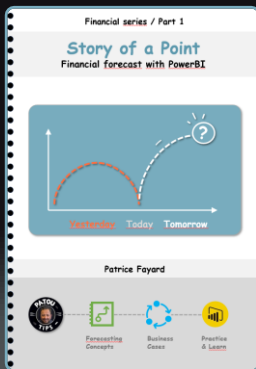
Profitability of a project

Don't forget!  
This isn't the truth, it's just my truth!



## Patou Tips

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