

Economical evaluation

Introduction



- An Automotive Manufacturing Study can be developed in several way as well as an architectural opera.
- A manufacturing system must create profit and so in respect to architectural operas, can be
 evaluated in accordance with economical data putting together all the possible factors in order to
 give to the leadership the possibility to decide the best for the Company.
- The main task of Planning, Strategies, Engineering (product and manufacturing) is to propose alternative solutions, creating different scenarios with the widest opening and investigate each of these with a rigorous analysis to ensure the identification of all factors.
- In case some factors cannot be quantified economically, they will be highlighted at the end of the result inside others intangible parameters.
- The method used to compare different scenarios is universally called "Business Case". In the actual daily work, there is not only one methodology of Business Case but a conceptual model is applied each time to the contingent needs.

Business case



- Execute a Business case means:
 - Segregate a part of Company including all the factors, product, plants, investment, cost, people, logistics and other that are in some way impacted by the study. The rest of the Company is considered invariant and is not considered. The segregated area can be a region or simply a plant or a line of the plant.
 - Define, for each scenario, the product portfolio with related cost and revenues, if any, and develop it in the next years (from 3 to 10) in order to compare the economical results.
 - Consider the effect of inflation or at least the financial cost of the business, including the WCC(weighted cost of capital).

Types of applications

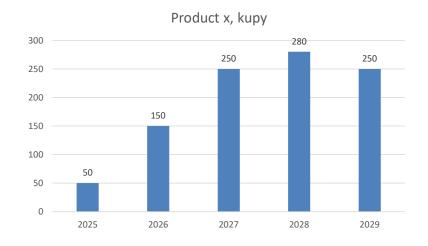


- There are different type of studies that can be analyzed with a Business case. The main are:
 - **Business unit** In this case we evaluate an independent business unit in a separate legal entity as a JV in which the financial sustainability is under analysis considering the revenues according to the contract and the costs according to the selected scenario.
 - **New initiative (product or capacity)** The analysis is limited to the cost development considering the sales independent by the solution defined. In this specific case the comparison is done between the Discounted cash flow of each scenario.
 - Make or buy To define if a production is better internal or external, investment and variable cost only are compared in the two cases.

Time effect



- A great importance in a Business case is given to the timing of a business.
- Let's assume a new product initiative with the demand profile we see aside.
- The investment will be done one or two years before the SOP that is in 2025.
- So, there will be some expenditures in 2023 some in 2024 and finally the completion in 2025.
 Hopefully, the production will start and get benefit from 2025 onward.



- Financial Science tells us that, with a 10% WCC, 100€ expended in 2023 worth 110 actualized in 2024 and 121 in 2025. The same for the benefit: considering the actualization in 2023, starting from 2025 they will impact only for 81% the final result and following even less.
- Taking into account that the full capacity will be saturated only in 2027, to be profitable we need to minimize investment or to create a great margin.



The full set of parameters

• The full set of parameters that concurs to build a Business case is defined by the following template that considers the input requested for each product and for each year of the plan.

	Portfolio	Revenues	Investment	Cash flow	
			Building and utilities	Transformation cost	
For each product			Machinery and equipment	Direct material	
For each product, for each year	Volumes	Sale price	Plant recurring invstment	NPV	
Tor each year			Vendor tooling	(Outbound)	
			R&D		

- Before reaching the evaluation, it is necessary to make some intermediate steps that are different in the different studies: E.g., for a BU it is important evaluate the investment recovery by product and sum to the other cost. For an initiative it is enough evaluate the total cost per year multiplying the volumes for the total cost per unit, year per year according to the financial evolution.
- In the same way transformation cost can be function of manpower and other input that can be explicitly mentioned in the BC. All these can be built as pre- or post-process tools.





mand							Investment												Cost											
duct	2023	2024	2025	2026	20	27 20	Product	2023 2024 2025	2026	2027	2028	2029	203	30 20	31 2)32 T	otal		Product	2023 202	4 202	5 202	6 202	2028	202	29 203	0 203	203	2 Tot	al
							M&E												TC											
Pr 1							Pr 1										0		Pr 1										0	
	Re	venue	S				Pr2										0		Pr2											
Pr2	Pi	oduct	202	202	24 2	025 2	Pr 3										0		Pr 3	Inbound										
r 3							Pr 4	Vendor Tooling											Pr 4	Pr 1										
r 4		Pr 1					Pr 5	Pr 1											Pr 5											
5		Pr2					Pr 6	Pr2											Pr 6	Pr2										
6	_						Pr 7	Pr 3											Pr 7	Pr 3										
7		Pr 3					Pr 8	Pr 4											Pr 8	Pr 4										
		Pr 4						Pr 5											FIO	Pr 5										
8		Pr 5					B&U	Pr 6											DNAC	Pr 6										
		Pr 6					Pr 1	Pr 7 Pr 8											DMC	Pr 7										
		Pr 7					Pr2	PIS											Pr 1	Pr 8										
							Pr 3	R&D											Pr2											
		Pr 8					Pr 4	Pr 1											Pr 3	Total										
							Pr 5	Pr2											Pr 4	Pr 1	0	0	0	0	0	0	0	0	0	0
							Pr 6	Pr 3											Pr 5	Pr2	0	0	0	0	0	0	0	0	0	0
							Pr 7	Pr 4											Pr 6	Pr 3	0	0	0	0	0	0	0	0	0	0
							Pr 8	Pr 5											Pr 7	Pr 4	0	0	0	0	0	0	0	0	0	0
							110	Pr 6											Pr 8	Pr 5	0	0	0	0	0	0	0	0	0	0
								Pr 7											U	Pr 6	0	0	0	0	0	0	0	0	0	0
								Pr 8											0	Pr 7	0	0	0	0	0	0	0	0	0	0
								Total												Pr 8	0	0	0	0	0	0	0	0	0	0
								Pr1	0	0	0	0	0	0	0	0	0	0	0	PIO	U	U	U	U	U	U	U	U	U	U
								Pr2	0	0	0	0	0	0	0	0	0	0	0											
								Pr3	0	0	0	0	0	0	0	0	0	0	0											
								Pr4	0	0	0	0	0	0	0	0	0	0	0											
								Pr5	0	0	0	0	0	0	0	0	0	0	0											
								Pr6	0	0	0	0	0	0	0	0	0	0	0											
								Pr7	0	0	0	0	0	0	0	0	0	0	0											
								Pr8	0	0	0	0	0	0	0	0	0	0	0											

Make or buy



In the make or buy business case, the simplest one, we normally have:

- Demand per year
- Investment make
- Internal transformation cost
- Vendor tooling buy
- Buy price
- To evaluate the goodness of the make proposal the NPV at the end of the demand is compared with the total investment actualized to the first year. It must reach the target given by the Company standard
- The ratio between the two is called make profitability:

$$Profitability\% = \frac{NPV}{Investment} * 100$$

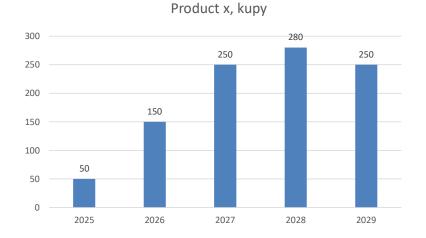
Exercise Make or buy: input



In the make or buy business case we need to define

- Demand per year (see aside)
- Investment make = 3 M€ of which 20%in 2024, 60% in 2025, 20% in 2026
- Internal transformation cost= 15€
- Vendor tooling buy= 350 k€ in 2026
- Buy price= 28€
- The target of profitability given by the Company as 2023 standard

Company as 2023 standard
$$\frac{NPV}{Investment} * 100 = 350\%$$





Results

		Formulas	2024	2025	2026	2027	2028	2029	total
INPUT									
Volumes	kupy		0	50	150	250	280	250	980
Make Investment	M€		0,60	1,80	0,60				3,00
Cost (€)	15								
Vendor tooling	M€				0,35				0,35
Price (€)	28								
WACC	10%								
OUTPUT									
Actualization at 2024		=(1-WACC)**(n-1)	1,00	0,90	0,81	0,73	0,66	0,59	4,69
Actualized investment		=ACT*Make Inv	0,60	1,62	0,49	0,00	0,00	0,00	2,71
Actualized total costs		=Cost*Vol*ACT	0,00	0,68	1,82	2,73	2,76	2,21	10,20
Actualized VT		=ACT*VT	0,00	0,00	0,28	0,00	0,00	0,00	0,28
Actualized prices		=Price*Vol*ACT	0,00	1,26	3,40	5,10	5,14	4,13	19,04
Discounted cash flow		=ACT(Vt+Price-Inv-Cost)	-0,60	-1,04	1,38	2,37	2,39	1,92	6,42
NPV		=Cumulated DCF	-0,60	-1,64	-0,26	2,11	4,50	6,42	
Total actualized investment		=Cumulated INV	0,60	2,22	2,42	2,42	2,42	2,42	
Profitability	265%	=Cum DCF/Cum Inv							