VARIABLE AND FIXED COSTS IN COMPANY MANAGEMENT

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ABSTRACT: The cost absorbs all the expenses of production for a company at a certain level of the activity. For eliminating the influence of the fixed costs's absorbtion and for a better supervision of other causes of digressions, the managers can apply the method of rational imputation of the fixed costs. The managers should, in some cases, take into consideration the total costs and not the unit costs. Variable costs, fixed costs and unit costs should be taken into consideration at all times. When managers decide on the products to be manufactured, they have to know how the income and expenses vary along with the changes in the production volume. That is why they have to separate the fixed and the variable costs. The identification of a variable or fixed cost helps the manager to forecast the total costs and to take the decisions based on an existent situation.

It is a well known fact that variable costs (C_v) and fixed costs (C_f) are two cost categories connected to the activity volume. The variable costs are a function (f) of the volume of the activity (Q) expressed by the relation $C_v = f(Q)$, and the fixed costs are considered expenses of the period, $C_f = f(t)$.

The variability of this type of expenses is not identical for all the cost categories. Direct costs are variable, in direct proportion to the volume of the productivity, in all cases. The other variable costs depend on the production volume, but their evolution is not in a direct proportion to the production, but with other factors connected to the production, such as:

- the productive energetic inputs are variable based on the volume of the functioning hours of the machines and installations and on the electricity cost per hour;
- the volume of the expenses with moulds and matrices depends on the number of usages, on their life span and their unit cost;
- the maintenance cost depends on the number of the overdue operations and on the maintenance cost etc.

The conduct of the variable costs in contrast with the modification of the volume of the activity, meaning the modification of the percentage of the costs from the current period (Q_1) and that of reference (Q_0) and the modification of the percentage of the volume of the activity for the same periods, can be expressed by the variability index (I_V). So, from the point of view of the variability index the costs can be: proportional, progressive, decreasing (under-proportional), regressive and flexible. For the decreasing costs, we can determine, for example, their effect on the profit of the entity (E_{CVp}), as follows:

$$E_{CVp} = C_{V0} \times \left(\frac{Q_1}{Q_0} - 1 \right) \times (1 - I_V)$$

In the case of the fixed costs, the variability index (I_V) is zero. For the total of the costs, the fixed ones have a variable nature under the aspect of their weight. This way, an increase in the

volume of the activity does not influence the total of the fixed costs; their value is reduced only on unit, as a decrease of the physical volume of the activity attracts an increase of the fixed costs on unit. Moreover, starting from the idea that the unit cost is determined by referring all costs to the total volume of the production, work and services (PWS), by grouping the expenses into variable and fixed expenses, the calculating model of the **unit cost** (ct) or **medium cost**, can be mathematically expressed as:

$$c_t = \frac{C_V + C_f}{Q}$$

The cost absorbs all the production expenses of the entity at a certain level of the activity. When the level of the activity of the entity increases, the unit cost decreases, because the same value of the fixed expenses is distributed to more products, work and services. On the contrary, when the level of the activity decreases, the unit cost increases, because the same value of the fixed expenses is redistributed, this time, to fewer products and services.

The total value of the fixed expenses ascribed to a product unit is inversely proportional to the quantities produced:

$$f(c_t) = \frac{C_f}{Q}$$

To eliminate the influence of the absorption of the fixed expenses by costs and to overlook more easily other causes of deviations, the managers can use the *method of rational charge of the fixed expenses*, taking into consideration the real level of the activity, the production obtained, effectively (Q_r) and a normal level of the activity (Q_n), the normal capacity of the production.

To eliminate the influence of the fixed expenses based on the variability of the volume of the activity, a *multiplier of rational charge (K_R)* is used, calculated this way:

$$K_R = \frac{Q_r}{Q_n}$$

In this case, the charged fixed expenses (C_{fi}) which are taken into consideration for the current period can be determined by balancing the fixed real expenses (C_{fr}) with the multiplier of rational charge:

$$C_{fi} = C_{fr} \times K_R$$

Of course, based on these relations, *the cost of the normal activity (C_{AN})* can be determined or the rational cost as:

$$C_{AN} = C_V + Cf_r \times \frac{Q_r}{Q_n}$$

and by this, furthermore, the difference of charge (D_{IR}), meaning:

$$D_{IR} = C_F - C_{Fr} \times \frac{Q_r}{Q_n}$$

If the level of the activity decreases in comparison with the normal one, the cost of the production which was obtained will be lower than the real expenses of the entity. In conclusion, an overflow of fixed expenses will appear, and they will remain undistributed and which, in fact,

represent *a cost of under-activity* (C_{uact}). In the opposite situation, there will be extra expenses, called *bonus of over-activity* or *gaining of over-activity*.

The cost of the under-activity (C_{uact}) can be determined according to the relation:

$$C_{uact} = C_f \left(1 - \frac{Qr}{Qn}\right)$$

The cost of the under-activity will include the waste product losses.

In time, the fixed expenses can grow exponentially, determined by increases of the production capacity, by investments. There can also be dramatic cost decreases determined by the reduction of the production capacity as a consequence of closing departments or existent capacities.

The managers, in some decisional situations, should take into consideration, first of all, the fixed costs and not the unit ones.

The following three elements must be taken into consideration: the variable costs, the fixed costs and the unit costs.

When the managers take decisions concerning the products that are going to be produced, they have to know how the income and expenses vary in the same time with the changes from the volume of the production. That is why they have to make a difference between the fixed costs and the variable ones.

The identification of the right variable or fixed cost helps the manager to predict the total costs and to take decisions advisedly.

The production cost is the essence of the management of the entity in general and of the financial management in particular, because it reflects the way in which the fundamental objectives of the management and those of the entity's strategy are achieved: the use of the resources, the achievement of the discounted profit, the financial and economic balance, the competitive capacity, the increase of the value of the firm, the image of the firm, its attractiveness, the creational climate, the efficiency and its perspectives.

There is an obvious need to identify the conditioning relations for all the categories of variable expenses in the process of management, in the prediction stage as in the designing, monitoring and control stages.

The costs which are fixed on a short term do not have determinants (inductees, costs generators) on short term, but they may have determinants on a long term.

I.e. The costs connected to the testing of products manufactured in a factory include equipments and the personnel of the testing workshop. These are difficult to change so they remain fixed on a short term, irrespective of the changes in the volume of the production. So the volume of the production in this case is not a determinant of the testing costs on a short term. Of course, on a long term, the entity can increase or decrease the equipments and the personnel of the testing workshop to reflect the necessary level for the next production volumes. So, on a long term, the volume of the production is a determinant of the testing costs.

Another example of cost behaviour refers to the extent in which the costs from a trading company respond to a change in the activity that take place in that entity.

An entity has two possibilities to obtain 500 units of a semi-manufactured product N:
a) to buy it from a supplier;
b) to manufacture it itself.

If the semi-manufactured product is purchased, the firm must pay to the supplier 1200 units. This supply covers the necessary of the entity for a period of three months.

In the second case, the estimated costs (pre-set) to obtain one item of N (the annual production is 2000 units) are presented in the following table, as follows:

No.	Type of cost	The unit value m.u.
1	Raw matter	750
2	Direct wages	250
3	Indirect variable expenses	100
4	Fixed expenses	600
	TOTAL	**1.700**

Comparing the cost of the 500 units from the semi-manufactured product N in the two cases, we obtain the following data:

Table no. 2

No.	Explanations	Value	
		Manufactured	**Purchased**
1	Raw matters	750 x 500 = 375.000	-
2	Direct wages	250 x 500 = 125.000	125.000
3	Indirect variable expenses	100 x 500 = 50.000	-
4	Fixed expenses	600 x 500 = 300.000	300.000
5	Purchase price	-	1.200 x 500 = 600.000
	TOTAL	**850.000**	**1.025.000**

As it can be seen from the table, *the fixed expenses,* which must be covered no matter if the entity purchases the semi-manufactured from outside or it produces it, are irrelevant.

Also, downsizing implies a three months' notice and the company has to cover the expenses for the wages with 125,000 units, irrespective of the decision taken. The wages that are paid also represent an irrelevant cost.

The comparative data concerning the cost of taking the decisions, in the two situations, are as shown:

Table no. 3

No.	Explanations	Value	
		Manufactured	**Purchased**
1	Raw matter	750 x 500 = 375.000	-
2	Indirect variable expenses	100 x 500 = 50.000	
3	Purchase price	-	1.200 x 500 = 600.000
	TOTAL	**425.000**	**600.000**

On a short term (three months), as shown in the above situation, *the option of producing 500 items of semi-manufactured products is cheaper by 175000 units than the option of purchasing. In conclusion, it represents the best solution on a short term.*
If the manager had had to estimate the cost of the decision before the entity would have ever produced the semi-manufactured product N, than the cost of the decision would have included the expenses with the direct wages but also the fixed expenses. In this case, the option to purchase them would be preferred.

Because the decisional processes on a short term are issued from the ones on a long term, we will extend the time horizon from the above example to five years.

So, we assume that in the option of the purchase, the entity negotiated a contract on long term with the supplier to 1200 units of semi-manufactured product, with the delivery of 2000 units a year.

When producing the product N, the expenses with the direct wages with a value of 500,000 units (250x 2000) and the fixed expenses of 1,200,000 units (600x2000) a year, the costs of the decision must be taken into consideration.

Thus, purchased or manufactured, the entity must pay the 125,000 either way, which are irrelevant costs representing the value of the wages for the three months.

At the same time, the sum of 2,400,000 units represents the value of the fixed expenses for two years which are irrelevant costs because, if the change of the productivity capacity can be achieved in only two years, these expenses will be made no matter if the entity produces or purchases the semi-manufactured product. Also, the usage in other interests of the production capacity could be possible only after two years.

Under these circumstances comparing the costs of the two situations, the data from the table below are obtained:

Table no. 4

| No. | Explanations | Value | |
		Manufactured	Purchased
1	Costs according to the decision to produce: (425.000/500 units) x (5 years x 2.000)	8.500.000	-
2	Costs according to a differentiate manual labour: (500.000/year x 5 years) – 125.000	2.375.000	-
3	Fixed differentiated costs: (1.200.000/year x 5 years) – 2.400.000	3.600.000	-
4	Purchase price 5 years x 2.000 units/year x 1.200 units	-	12.000.000
	TOTAL	**14.475.000**	**12.000.000**

As seen in this comparative sheet which bases the decision on a long term, part of the expenses with the wages and from the fixed expenses become relevant costs. Thus, we can conclude that *the option of purchasing the semi-manufactured product N from the supplier is the best choice on a long term.*

Understanding the cost behaviour structures and the ability to predict cost behaviour in a certain situation are essential for planning, decision taking and managing the activity and also it demands an understanding of the relations input-output, between the used resources and the obtained results.

The difference between the incomes (CA) and the variable expenses (C_v) form the so called gross-margin, which should cover the fixed expenses (conventional-constant) and the expected profit.

$$CA – C_v = \textbf{gross-margin}$$

The variable expenses can be predicted on the whole, but also on activities and some even on products and services as a simple relation:

$$C_{V_p} = CA_p \cdot \frac{Cv_0}{CA_0}$$

where:

Cv_p = variable predicted expenses;

$CA_{p,0}$ = the predicted trade turnover, in the reference period;

C_{v0} = the variable expenses in the reference period.

For the variable expenses, which are direct costs, the prediction can be made as a total, but also on products, on the nature of the costs (raw materials, manual labour etc.) and even on parts and sub-assemblies, according to the relation:

$$C_{vp} = \Sigma q_p \cdot ct_{v0}$$

where:

q_p = the physical volume of the scheduled production (on the whole or on products, sub-assemblies, parts etc.)

ct_{v0} = variable unitary expenses achieved during the reference period.

The fixed costs (conventional-constant) are administrative and management expenses of the departments and entities and also the maintenance expenses and the function of the fixed assets from the departments and to the level of the entity.

This type of expenses does not have a direct connection to the volume of the activity, it does not have a productive nature, but it originates in other organizing and functioning parameters of the entity, such as the organizing scheme to the level of the entity and its internal structures, the volume, the structure, the depreciation etc of the fixed assets with an administrative nature etc. The volume of these expenses is determined by the nature of the expenses, based on normative expenses and expense budgets.

The variable expenses are recovered in the same time with the sale of the products. Therefore, the sale price the consumed capitals are recovered and retraced with such costs. The reduction of the variable expenses, usually by redesigning, increases the expected profit.

The fixed expenses (conventional-constant) can be entirely recovered only if the entity achieves a minimum covering volume of activity.

The variable expenses will include only those that the entity considers achieved by the obtaining of the productivity, the execution of the work or of the programmed services providing.

When sales are made, the income can be best guessed. In case the sales are constant, the fixed total costs and the variable unit costs do not modify, the volume of the production varies.

In practice, knowing all the aspects that are demanded by the fixed expenses represents a special importance for the mobilization of the internal reserves and also for the elaboration of the technical-economic studies for underlying the productive investments.

Knowing the cost behaviour in its entire theoretical and practical complexity is a basic instrument for managers and it is used to increase the economic performance of the entity.

It can be said that an increase of the physical volume of the production determines an increase of the total cost. But to a decrease of the volume of the production in a certain proportion, the costs decrease in a lower measure than they increased when the volume of the production rose in the respective proportion.

It is very important, from this point of view, **a classification of the variable and fixed costs.**

The variable costs allow a variable calculation of a **margin on the variable cost**, for each product, through the deduction of the variable cost from the turnover of the entity.

The size of the margin of the variable cost is a precious information and the manager can use as **a support of the decision to offer or not some products, meaning to increase the sales**

that are profitable and to suppress (abandon) those that are unprofitable (those for which the margin of the variable cost is negative).

Other developments of this classification divide the costs in: **variable costs, fixed specific (direct) costs and fixed common (indirect) costs**. This will allow determining a **margin of the variable cost** and also **one of the specific costs.**

The margins called on "specific costs" indicate how the products/services contribute to cover the fixed common costs. By using this calculus a better analysis of rehabilitating the different products is ensured but also to avoid some bad decisions that may be taken based on complete costs.

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