RATIONAL IMPUTATION OF THE STRUCTURE EXPENSES

A. TRIFAN[1] C. ANTON[1]

Abstract: The cost of production absorbs expenses which behave differently in relation to the activity level (variable expenses), whatever the level of activity (fixed or structure expenses) is. The influence of these two categories of expenses is felt on the unitary cost. Cost variation is determined only by changes in activity, because the same fixed costs will be distributed to a greater or smaller number of products. Therefore, if the activity level increases, the unitary cost tends to fall and vice versa, if the activity level decreases, the unitary cost tends to increase. To avoid the inconvenience of the unitary cost variation when the activity level changes, a cost above the normal activity was decided to be set. Moreover, this is the one that determines the rational cost of the manufactured product unit.

Key words: activity level, rational imputation, sub-activity cost.

1. Premises of the use of rational imputation

As a tool of economic calculation and management control, the actual total cost is often ineffective, if not dangerous, for the forecasting management and as a basis for calculating the sale price. The information it provides cover**s** heterogeneous realities.

The total cost, whilst incorporating all expenses, cannot escape the consequences of the way the fixed costs behave. Thus, depending on the activity level, the total cost calculated per month is different, an identification and separation of the causes of these variations being impossible.

Is it a merely mathematical consequence of the way the fixed costs behave or are there other causes that need to attract our attention and may require management operations?

For this, a technique was developed, allowing us to eliminate the influence of absorption of the fixed costs on the total cost, thus providing an easier possibility of surveillance of other possible causes of "slippage". This technique is called rational imputation, known in the literature also as the rational imputation method as some authors call it.

The practical use of this technique requires the determination, in advance, of the level to which it applies – for each activity centre or entity, as a whole and the definition of the normal activity (the normal production capacity).

Determining the normal activity level (the normal production capacity) is a key but very difficult, issue. To establish the normal activity levels, the following should be taken into consideration: the production volume, the hours of operation of the equipment, the utilization degree of the production capacity or other factors.

The Romanian accounting rules governing the organization of the management accounting state that, 'the

---

[1] Department of Finance, Accounting and Economic Theory, *Transilvania* University of Braşov.

normal capacity of production represents the production expected to be achieved on average over a number of periods in normal conditions, taking into account the loss of capacity resulting from the planned maintenance of the equipment'[4].

The normal activity level (normal production capacity) is not an easy concept to define. However, theoretically, we can distinguish *between* two types of capabilities:
- the theoretical capacity, appropriate for a continuous use and at a steady rate of all facilities and equipment belonging to an entity;
- the real capacity, determined by reducing the theoretical capacity with the related times of the inevitable disruptions (repairs, commissioning, absences, holidays, inventories).

The meaning given to those two types of capabilities can be the basis for a first conclusion, namely that the actual, real capacity is lower than the theoretical one, but equal with a normal capacity of production. In addition, it must take into account the possible volume of sales. In this situation, the normal capacity may be lower than the real capacity itself.

The determination of the normal capacity can be achieved in two ways:
- determining the necessary production to meet the sales volume for a period. This production corresponds to the use of a real capacity, which will be considered the normal production capacity (it varies from one period to another);
- determining the production achieved by the sales volume for several periods and to level fluctuations. This production corresponds to the use of the real capacity which is the normal capacity. In this case, the normal capacity is constant.

We can not equate the normal activity with the real one, except for the stage of planning (budgetary) costs.

We present below an example which shows that the fluctuations of the volume of production lead to a variation in cost per unit of product, namely:

In an entity, the P product is produced in a production centre set for a normal activity of 2000 units. The variable expenses per unit of product manufactured are 20 u.m. and the total fixed expenses are of 20000 u.m. If the level of activity from one period to another fluctuates being of 2300 units, 1800 units respectively, the unitary cost is calculated as follows:

The unitary cost varying due to changes of the physical volume of output   Table 1

Activity	2000 u.	2300 u.	1800 u.
Variable expenses	2000 x 20 = 40000 u.m.	2300 x 20 = 46000 u.m.	1800 x 20 = 36000 u.m.
Fixed expenses	20000 u.m.	20000 u.m.	20000 u.m.
Total expenses of production	60000 u.m.	66000 u.m.	56000 u.m.
Unitary cost	30.00 u.m./u.	28.69 u.m./u.	31.11 u.m./u.

A production increased by 300 units over normal leads to a reduction in the unitary cost, while, if there was a production of 1800 units, the unitary cost increased. The finding is simple: the variable expenses are those whose size evolves in proportion with the covered production. When the

production drops, the unitary cost increases (31.11 um/u) and vice versa, when the production increases, the unitary cost decreases (28.69 um/u). The explanation for this phenomenon lies in the presence of the fixed expenses, which have a relatively constant level, regardless of the

fluctuations in the production volume. Consequently, the total fixed expenses belonging to a product unit is inversely proportional to the quantities produced. They lead to an increase in costs in the case of a reduction of production and vice versa.

2. The rational imputation technique

To enable, on the one hand, the calculation of a cost "corrected" with the variations in activity and, on the other hand, to assess the implications of these variations on the entity's results, the rational imputation is to "vary" the level of the incorporated structure expenses into the full cost depending on the level of activity.

To this end, after the separation of the fixed costs from the total one, occurs the estimation of the rational imputation coefficients as a ratio between the real (actual) work and the activity level, according to the relation:

$$CIR = \text{real activity (RA)} : \text{normal activity (NA)} \tag{1}$$

The calculated coefficients apply to the real fixed expenses to determine the party absorbed by the cost, according to the relation:

$$ChF_i = ChF_r \cdot CIR \tag{2}$$

where:

ChF_i – imputed fixed expenses (absorbed by the cost);
ChF_r – real fixed expenses.

Using the notations from the previous relations, the formula for calculating the cost of normal activities (Can) or for the cost of rational imputation, will be:

$$Can = ChV + ChF_i \tag{3}$$

Taking the data from Table 1 and applying the rational imputation technique we obtain the results presented in the following table.

The rational imputation of the fixed expenses   Table 2

Activity	2000 u. CIR = 1	2300 u. CIR = 1.15		1800 u. CIR = 0.9	
		Imputed expenses	Differences from imputation	Imputed expenses	Differences from imputation
Variable expenses	40000	46000	-	36000	-
Fixed expenses	20000	23000 (20000 x 1.15)	- 3000 (20000 -23000)	18000 (20000 x0.9)	2000 (20000 -18000)
Total of the production expenses rationally imputed	60000	69000	- 3000	54000	2000
Unitary cost of rational imputation	30.00	30.00		30.00	

As shown, the practice of the rational imputation allowed us to eliminate the influence of the activity level and the unitary cost was maintained at the normal activity level, i.e. 30 um/u. Also, the differences of the rational imputation were calculated.

The differences from the imputation in plus or in minus may occur either in the form of the sub-activity cost or the technical unemployment one (extra fixed expenses that remain undistributed), or as

Csa = ChF x (1 - RA/NA)   (4)

According to Order no. 1826 of the Ministry of Public Finances for the approval of Mentions on some organizational and management measures

Rf$_{chp}$ = Rf x (1 - RA/NA)   (5)
where:
Rf$_{chp}$ - fixed unallocated overhead recognized as an expenses of the period.

Using the data from the previous table, the fixed unallocated overhead registers the following level:

Rf$_{chp}$ = 20000 x (1 – 1800/2000) = 20000 x (1 – 0,9) = 2000 u.m.

an over-activity premium (extra allocated expenses).

The sub-activity cost (Csa) can be determined by the formula:

of the management accounting, the concept of sub-activity cost was replaced with the concept of fixed unallocated overhead. The relation of calculation is as follows:

In conclusion, the practice of rational imputation does not change the real level of the fixed expenses, but only that part of them which is included in costs.

3. Methods of analysing the sub-activity cost

Nowadays just a small number of Romanian entities use rational imputation, although it has been shown that this technique eliminates the workload changes within the unitary cost. As shown in the paper, the technique itself does not change the content or methodology for determining the cost and involves only the performance of some additional calculations, namely:
- determining the normal capacity and normal activity for each activity centre;
- calculating the rational imputation coefficients for each activity centre;
- imputation of the indirect expenses, highlighting distinctly the variable ones and the fixed ones, based on a "distribution panel";
- determining the differences from imputation in plus or in minus (they

may appear on a separate column of the distribution panel of the indirect expenses).

It is worth mentioning that at the auxiliary centres whose activity can not be measured, the rational imputation coefficients will be determined taking into account the centres using their services.

The sub-activity cost is useful in management analysing. This led to the development of some methods that analyse and determine costs, namely [3]: the method of the annex tables by nature of expenses, the method of centre analyses tables, and the method of distribution column duplication.

a. The method of the annex tables by nature of expenses assumes that for each kind of expense a table of analysis is produced, including the rational imputation calculations and the obtained results are distributed in a table analysing the attributed expenses.

To illustrate the application of the method, we assume the existence of an entity which has two basic sections (01 and 02), a maintenance and repair workshop

and a related services section. In the period to which we refer to, the real activity of the centres was produced as follows: section 01 – 70%, section 02 – 110%, the maintenance and repair workshop – 70% and the related services section – 50%. The activities performed by the auxiliary sections were distributed as follows: the

maintenance and repair workshop: 60% to section 01 and 40% to section 02; the related services section: 70% to section 01 and 30% to section 02.

During the reporting period the following production expenses were recorded:

- expenses on consumables (variable expenses) – total   40000 u.m.
    of which: - at section 01   15000 u.m.
               - at section 02   10000 u.m.
               - at the maintenance and repair workshop   5000 u.m.
               - at the related services section   10000 u.m.
- expenses on direct manual labour (variable expenses) – total   30000 u.m.
    of which: - at section 01   15000 u.m.
               - at section 02   8000 u.m.
               - at the maintenance and repair workshop   2000 u.m.
               - at the related services section   5000 u.m.
- expenses on the indirectly productive staff and the management
(fixed expenses) – total   32000 u.m.
   of which: - at section 01   12000 u.m.
             - at section 02   14000 u.m.
             - at the maintenance and repair workshop   2000 u.m.
             - at the related services section   4000 u.m.

The table of rational imputation of staff expenses   Table 3

Centre	Expenses			CIR	ChF_i	Total of imputed expenses	Differences from imputation	
	Total	ChV	ChF				-	+
The maintenance and repair workshop	4000	2000	2000	0.7	1400	3400	-	600
The related services section	9000	5000	4000	0.5	2000	7000	-	2000
Section 01	27000	15000	12000	0.7	8400	23400	-	3600
Section 02	22000	8000	14000	1.1	15400	23400	1400	-
Total	62000	30000	32000	-	27200	57200	1400	6200

Table of analysing the imputed expenses   Table 4

Specification	Expenses		The maintenance and repair workshop	The related services section	Section 01	Section 02	Differences from imputation	
	ChV	ChF					-	+
Expenses on consumables	40000	-	5000	10000	15000	10000	-	-
Expenses on staff	30000	32000	3400	7000	23400	23400	1400	6200
Total	70000	32000	8400	17000	38400	33400	1400	6200

b. The method of centre analyses tables assumes that for each of them to draw a table of analysis thus achieving a clear picture, both for calculations and for management.

Based on the data from the previous example, we will illustrate how to draw the tables of centre analysis. Thus:

Table of analysing the maintenance and repair workshop   Table 5

Specification	Total	Fixed expenses	Variable expenses to impute	Sub-activity cost
Totals after primary distribution	9000	2000	7000	-
Imputation of fixed expenses (CIR = 0.7)	-	- 1400	1400	600
Total	-	600	8400	600

Table of analysing the related services section   Table 6

Specification	Total	Fixed expenses	Variable expenses to impute	Sub-activity cost
Totals after primary distribution	19000	4000	15000	-
Imputation of fixed expenses (CIR = 0.5)	-	- 2000	2000	2000
Total	-	2000	17000	2000

Table of analysing section 01 Table 7

Specification	Total	Fixed expenses	Variable expenses to impute	Sub-activity cost
Totals after primary distribution	42000	12000	30000	-
Secondary distribution	-	-	-	-
60 % the maintenance and repair workshop	-	-	5040	-
70 % the related services section	-	-	11900	-
Total after secondary distribution	-	12000	46940	-
Imputation of fixed expenses (CIR = 0.7)	-	- 8400	8400	3600
Total	-	3600	55340	3600

Table of analysing section 02 Table 8

Specification	Total	Fixed expenses	Variable expenses to impute	Bonus for over-activity
Totals after primary distribution	32000	14000	18000	-
Secondary distribution	-	-	-	-
40 % the maintenance and repair workshop	-	-	3360	-
30 % the related services section	-	-	5100	-
Total after secondary distribution	-	-	26460	-
Imputation of fixed expenses (CIR = 1.1)	-	- 15400	15400	- 1400
Total	-	1400	41860	- 1400

c. The method of distribution column duplication allows us to create a table of expenses collection and distribution for variable costs and for fixed costs separately. The clearing of the services of the auxiliary centres takes place only after the fixed expenses were rationally imputed.

In order not to upload so much the volume of this paper we will not give examples for this method.

4. Conclusions

Lying within the area of control management and determining responsibilities, we agree with the view according to which the rational imputation is, rather, an improvement and a complement brought to the methods of the absorption costing type calculation (full costing). It allows the attribution to the total cost of only a fraction of the fixed (structure) costs, corresponding to an activity level estimated as normal. Compared to a real total cost, it ensures the set up of a rational cost that includes the volume of the variable expenses corresponding to the real volume and the share of the structure expenses associated to the activity level considered normal.

Also, by evaluating and isolating the effects of changes/variations in the activity levels, rational imputation ensures

fictitiously the unchanged conservation of the output influence on the total cost.

References

1. Budugan, D., Georgescu, I., Berheci, I., Beţianu, L.: *Management Accounting*. Publishing House CECCAR, Bucureşti. 2007.
2. Epuran, M., Băbăiţă, V., Grosu, C.: *Control and management accounting*. Publishing House Economică, Bucureşti. 1999.
3. Raulet, Ch. et Ch.: *Comptabilité de Gestion*. 2e édition, Vuibert, Paris. 2000.
4. Order no. 1826 of the Ministry of Public Finances for the approval of *Mentions on some organizational and management measures of the management accounting,* published in the Official Gazette of Romania, Part I, no. 23/12.01.2004.
5. Order no. 3.055/2009 of the Ministry of Public Finances for the approval of the *Accounting Regulations in accordance with the European Directives,* Official Gazette of Romania, Part I, no. 766 bis/10.11.2009.