CALCULATION OF ENTERPRISE COSTS BY MEANS OF THE PHASE CALCULATION METHOD

DIMA FLORIN-CONSTANTIN
"CONSTANTIN BRÂNCOVEANU" UNIVERSITY OF PITEŞTI, F.F.A. PITEŞTI,
dimaflorin_constantin@yahoo.com

Abstract: *Production cost calculation involves complex issues having as starting point the acquisition cost of raw materials and consumables, as well as their processing cost.*
This article is based on the fact that the object of calculation is made up of the products and phases that they go through in the manufacturing process. Production costs are recorded in accounts opened monthly for each phase, so that at the end of the reporting period, by totalling all costs, in the last stage of production we obtain the actual unit cost of the end product.
Depending on the specificity of the technological process, the production process is divided into calculation phases. This separation on manufacturing phases enables the establishment of the production performance phases and enables the intervention, both economically and technically, within the manufacturing cycle for a detailed analysis.
The phase cost calculation method is used within entities with mass production or with large series, where the technological process has a relatively homogeneous character, and the end product is obtained from the processing of raw materials in successive phases.

Keywords: *production cost, phase calculation method, manufacturing phase, calculation phase, unit cost*

JEL classification: M41 - Accounting

INTRODUCTION

Technical progress, through the degree of mechanisation and automation of production, has led to the continuous improvement of calculation procedures and techniques by formulating models of cost calculation appropriate to the improvement stage of production technology.

In cost calculation there are two major concepts of calculating them, namely the full cost concept and the partial cost concept.

The phase calculation method is based on the full cost concept and it involves carrying out the works related to its establishment according to the principle scheme specific to absorber calculation methods.

LITERATURE REVIEW

Choosing the cost calculation method within an entity is done taking into account the expenditure generating factors such as [Cârstea Gh., Călin, O., 1980, pp. 61-64]:

- specificity of the manufacturing technology, which determines the division of entities into two categories: homogeneous production and heterogeneous production;
- type of production and its organisation, which groups the entities into three categories: with individual production, with series production and with mass production;

- size of the entity, which establishes the general organisation method and collection of production costs and cost calculation, namely in a centralised way and in a decentralized way.
- organisational structure of the entity;
- organisation of the production process;
- technical progress;
- type of the production process.

The full cost concept requires that the unit cost of the product covers the total of the costs generated by obtaining it, respectively of the direct and indirect ones [Epuran M. and others, 1999, p. 227].

Direct costs are defined as those that can be directly attributed to the different products that have given rise to them right in the moment of their performance, and indirect costs are defined as those which cannot be identified and assigned directly to each product, since they regard the whole production of a department [Călin O., Cârstea Gh., 2002, p. 30].

Full costs are obtained by incorporating all operating expenses and can take two forms: full traditional costs and full economic costs. In the accounting theory and practice we often make the distinction between the accounting cost and the economic cost [Diaconu, I., and others, 1997, p. 14].

RESEARCH METHODOLOGY

In writing this article I have started from the fundamental differences that exist in the structure of the production cost between the two concepts: the full or integral costs concept and the partial or proportionate costs concept. From the range of methods of full or integral costs calculation, the phase method is analysed.

I have started from the objective of the direct-costing method, which is the establishment of the unit cost, and I have analysed the two versions in which it presents itself, namely:

- the version with semi-manufactured elements;
- The version without semi-manufactured elements.

OBJECTIVE OF THE PHASE COST CALCULATION METHOD

The production cost calculation phase is the technical-economic expression of the production phase, characterised by a certain specificity of formation or calculation, analysis and cost control.

Between the manufacturing and calculation phases there is a direct connection given by the fact that manufacturing stages, as production sites, are at the same time places generating expenditure and therefore each stage of manufacture may also be a calculation phase.

Nevertheless, not always do the manufacturing phases overlap with the calculation phases, a situation in which several production phases make up a single calculation phase. This situation occurs when within the same production department there are several manufacturing phases that can perform simultaneously the role of calculation phases, since there is not the possibility to delineate the production costs at this level.

The calculation phases are numerically encoded and the symbols are part of all the documents concerning the consumption and production in the respective phase. The primary documents are issued in advance according to the production and costs schedule, identifying on phases the direct expenditure (consumption of raw materials, of direct materials, electricity, water, steam and other technological utilities, direct salaries and social contributions on them, etc.) and some indirect costs (such as maintenance and

operation of machinery costs). For these there are no longer made calculations for distribution on stages, they are taken directly in the cost of products. The other production costs that are maintained at the category of the indirect ones are distributed on phases by the process of supplementing or by that of specific weight.

The actual unit cost is calculated by simple division if from the respective stage we obtain a homogeneous production, but if the production obtained is a heterogeneous one, it is necessary to know the type of products obtained (coupled, simultaneous, associated, secondary), applying one of the following processes: quantitative process, deducting the value of secondary products, quantitative equivalence of the products, equivalence indices procedure.

For the collection of direct costs in the delineated phases, the collector account of the spending of the core activity develops on analytical elements for each calculation phase, on calculation items and on cost carriers. The collection accounts for indirect expenditure collect this type of spending on different analytical elements for each calculation phase separately.

Applying the phase cost calculation method within economic entities work involves the following the steps listed below, namely:

- establishing and delineating the cost calculation phases;
- collecting the direct expenditure on calculation phases and the indirect ones on homogeneous sections;
- allocation of indirect costs between two or more end-products obtained in the same phase of the calculation;
- calculating the unit cost of internal semi-manufactured elements on calculation phases;
- establishing the costs associated with the production in progress;
- calculation of the cost per unit of product.

Applying the phases method implies, however, taking into account the particularities of the technological process, of the characteristics of the type of production and of the organisation of production in the economic entity. Due to them, the general pattern of phase cost calculation can be developed in two versions, namely: the version with semi-manufactured elements and the version without semi-manufactured elements.

THE SEMI-MANUFACTURED ELEMENTS PHASE METHOD

The method is used in the entities that manufacture a relatively small number of products, within technological processes where the semi-manufactured products obtained from the various phases are not consumed immediately and fully in the very next phase, intervening as such their storage and managing handling. The version is also used when from the same semi-manufactured product we obtain more products or when part of the semi-manufactured elements is intended for sale. This option involves calculating the cost of each semi-manufactured element in part taking into account both the cost of the semi-manufactured element from the previous phase and the direct and indirect costs generated by that phase. The cost of the semi-manufactured product obtained in a production phase is transferred to the next calculation phase.

From an accounting perspective there occurs the translocation of the expenses from one phase to another. To calculate the cost of the semi-manufactured products analytical elements must be opened for each calculation phase, in which the expenses for each semi-manufactured element are recorded and for each expense element or calculation item which, in the same structure, is translocated into the next calculation phase. In this version of the method there appears as characteristic the recording of the cost of the semi-manufactured product after each calculation phase. The consumption of the semi-manufactured product obtained represents an expense for the next phases,

reflected in various expense elements that make up the cost of the semi-manufactured element consumed, plus the direct and indirect costs of the reference phase for establishing a new cost of the new semi-manufactured product.

The actual unit cost of the semi-manufactured element obtained at each manufacture phase can be established as follows:

$$C_{uf} = C_{u\,f\text{-}1} + \frac{\sum Ch_{df} + \sum Ch_{if}}{Q_{Sf}}$$

in which:

C_{uf} = unit cost of the semi-manufactured element in the manufacturing phase f ($f = \overline{1,t}$);
Ch_{df} = elements or categories of direct costs incurred in phase f;
Ch_{if} = elements or categories of indirect costs incurred in phase f;
Q_{Sf} = quantity of semi-manufactured elements obtained in the manufacturing phase f.

To illustrate the calculation method, I shall consider the case of S.C. Alfa S.R.L. which manufactures a particular product which, until completion, goes through three manufacturing phases that also represent the calculation phase. There are semi-manufactured elements from each phase. The information is presented below:

Calculation phase	**Costs of phases** (lei)	**Quantity** (kg)		**Undetermined production**		**Specific consumption**
		Incoming	**Outgoing**	**Quantities** (pieces)	**Value** (lei)	
1	20,000/4	-	7,500/10	-	2,000/4	-
2	16,000/3	6,000/8	4,000/5	1,000/2	1,600/3	1,20:1
3	1,280/1	3,650/5	3,000/4	500/1.0	200/1	1,00:1

Calculation of unit cost when the entity applies the semi-manufactured method on phases:

$$C_{f1} = \frac{40{,}000 \text{ lei} - 4{,}000 \text{ lei}}{10{,}000 \text{ buc.}} = 3{,}60 \text{ lei/piece.}$$

$$C_{f2} = \frac{30{,}000 \text{ lei} + (8{,}000 \text{ pieces} - 2{,}000 \text{ pieces}) \times 3{,}60 - 3.000 \text{ lei}}{5{,}000 \text{ peieces}} = 9{,}72 \text{ lei/}\textit{pieces}$$

$$C_{f3} = \frac{10{,}000 \text{ lei} + (5{,}000 \text{ pieces} - 1{,}000 \text{ pieces}) \times 9{,}72 \text{ lei/pieces} - 1{,}000 \text{ lei}}{4{,}000 \text{ pieces}} = 11{,}97 \text{ lei/}\textit{pieces}$$

This calculation can also be accomplished by the use of the specific consumption (what quantity of the semi-manufactured product from phase "n-1" is needed in order to obtain a semi-manufactured product in phase "n"):

$$C_{f1} = \frac{40{,}000 \text{ lei} - 4{,}000 \text{ lei}}{10{,}000 \text{ pieces}} = 3{,}60 \text{ lei/piece}$$

$$C_{f2} = 1{,}20 \times 3{,}60 \text{ lei/piece} + \frac{30{,}000 \text{ lei} - 3{,}000 \text{ lei}}{5{,}000 \text{ pieces}} = 9{,}72 \text{ lei/}\textit{piece}$$

$$C_{f3} = 1{,}00 \times 9{,}72 \text{lei/piece} + \frac{10{,}000 \text{ lei} - 1{,}000 \text{ lei}}{4{,}000 \text{ piece}} = 11{,}97 \text{ lei/}\textit{piece}$$

THE PHASE METHOD WITHOUT SEMI-MANUFACTURED ELEMENTS

The phase method without semi-manufactured elements is used when it is not necessary to establish the cost of semi-manufactured products after each calculation phase, but only for the end-product resulting after the last processing phase. It is

assumed that from all calculation phases previous to the last phase there are not semi-manufactured products, but only production in progress, passing from one processing phase to another, without intermediate storage or, if it occurs, it is done for a short period of time and it does not require intermediate costs.

The version involves tracking the direct and indirect costs of processing for each calculation phase and establishing the cost of the phase only based on these expenses without transferring the cost of the semi-manufactured products from one phase to another. The production costs are extra-accounting sums at the end of the cost calculation for the production that has undergone the last manufacturing phase, materialised into an end-product. The cost of the end-product is obtained by adding the costs of all phases of the production process from the start to the end of production.

$$C_u = \frac{M + \sum Ch_{df} + \sum Ch_{if}}{Q}$$

in which :

C_u = cost per unit of product;

M = consumption of materials;

Ch_d = elements or categories of direct expenditure in the manufacturing phase f ($f = \overline{1,t}$);

Ch_i = elements or categories of indirect costs in the manufacturing phase f ($f = \overline{1,t}$);

Q = quantity of products obtained.

The previous case is reiterated in the version without semi-manufactured elements which implies that to the unfinished production value of (PN) considered in the previous version we add the value of the semi-manufactured products remained unprocessed in the phase:

F 1: PN = 4,000 lei + 3,000 lei + 1,000 lei = 8,000 lei

F 2: PN = [(10,000 pieces – 8,000 pieces) + 2,000 pieces] × 3,60 lei/piece = 14,400 lei

F 3: PN = [(5,000 pieces – 5,000 pieces) +1,000 pieces] × 9,72 lei/piece = 9,720 lei

Unfinished production value = 8,000 lei + 14,400 lei + 9,720 lei = 32,120 lei

Total costs of phases = 40,000 lei + 30,000 lei + 10,00 lei = 80,000 lei

$$\text{Unit cost} = \frac{80{,}000 \text{ lei} - 32{,}120 \text{ lei}}{4{,}000 \text{ pieces}} = 11{,}97 \text{ lei/piece}$$

CONCLUSIONS

In both versions of the phase cost calculation method, if at the end of a phase there was production in progress, the expenditure related to it is deducted from the total of the production costs of the phase where they occurred. Furthermore, from the manufacturing process there may result two or more main products, simultaneously or coupled, or in addition to the main product there may also be by-products. In this case, it is necessary to use appropriate methods for separating costs from production and on types of products obtained.

The drawback of the version with semi-manufactured products is that when there are many calculation phases and production in progress at the end of the reporting period, the volume of centralisation works of data on production cost calculation of the semi-manufactured product obtained increases.

The downside of the version without semi-manufactured products is that it imposes, in addition to the intermediate phase calculations, also a centralisation of the production costs in all phases of processing, for each end-product obtained.

A development of this research should focus on making a more complex paper that can be achieved by taking into account several methods of calculating absorber costs.

REFERENCES

1. Briciu S., "Contabilitatea managerială. Aspecte teoretice şi practice" [Managerial Accounting. Theoretical and practical aspects], Ed. Economică, Bucureşti, 2006.
2. Briciu, S. et al (2010), "Contabilitatea şi controlul de gestiune: instrumente pentru evaluarea performanţei entităţii" [Accounting and management control: tools for entity performance assessment], Ed. Aeternitas, Alba Iulia.
3. Călin O., Cârstea Gh., "Contabilitatea de gestiune şi calculaţia costurilor" [Management Accounting and Costs Calculation], Ed. Genicod, Bucureşti, 2002.
4. Călin O. ş. a., "Contabilitatea de gestiune şi calculaţia costurilor" [Management Accounting and Cost Calculation], Ed. Tribuna Economică, Bucureşti, 2005.
5. 10. Cârstea Gh., Călin O., "Calculaţia costurilor" [Costs Calculation], Ed.Didactică şi Pedagogică, Bucureşti, 1980.
6. Diaconu I., ş.a., "Costuri, preţuri şi tarife în economia modernă"[Costs, prices and tariffs in the modern economy], Editura Tradiţie, Bucureşti, 1997.
7. Epuran M. ş.a., "Contabilitate şi control de gestiune" [Accounting and Management Control], Ed. Economică, Bucureşti, 1999.
8. Lauzel, P. – "Comptabilité analytique et contrôle de gestion", Paris, 1964.
9. Melyon, G., ş.a., "Comptabilité analytique: principes, tehniques et evolutions", Editions ESKA, Paris, 1994.
10. Needles, B. E. Jr., Anderson, H. R., Caldwell, J. C. (2000), "Principiile de bază ale contabilităţii" [Basic Principles of Accounting], 5th edition, Ed. Arc, Chişinău.
11. Raulet, Ch. et Ch. – "Comptabilité analytique et contrôle de gestion", Dunod, Paris, 1994
12. *** - Accounting Law no. 82/1991, as amended and supplemented subsequently (republished in the Official Gazette no. 454/2008).
13. *** - O.M.F.P. no. 1826/2003 on approving the Specifications on the measures relating to the organisation and management of accounting management (O.G. no. 23/2004).
14. *** - O.M.F.P. no. 3055/2009 for approving the Accounting Regulations in accordance with the European directives (O.G. no. 766 bis/2009).