

## PECULIARITIES AND ADVANTAGES OF THE COST CALCULATION METHOD ACCORDING TO THE TYPES OF ACTIVITIES

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### **Abstract**

*The method of calculating costs according to the types of activities ensures calculating the cost of unit of production more accurately. Based on that, we can improve determination of the product selling price and realization strategy, as well as effectiveness of management and quality of the decision made.*

- When applying this approach, it is better evident what overhead costs are spent for;*
- The approach of calculating cost according to the types of activities recognizes that production overhead costs are not related only to the volume of production and selling;*
- For many companies, production overhead costs represent a significant part of total costs. Therefore, for managing the business properly the management needs the information about what overhead costs are paid for. Control over production overhead costs can be exercised by managing and controlling of cost-driver;*
- Using this approach in a complex business environment allows us to determine actual costs on the product;*
- Calculation of costs according to the types of activities can be used not only when distributing production overhead costs but in case of distributing all types of overhead costs.*

**Keywords:** *Cost of production, calculation of production cost, production overhead costs, assignment rate, cost driver, cost pool, level of activity, types of activity.*

**JEL Classification:** *M40, M41, M49*

### **I. INTRODUCTION**

Regardless of the level of development the society achieves and regardless of the form of public production, generating material wealth will remain the basis of human life. In addition, the components needed for production will remain the same as well. Material wealth is obtained as a result of processing of these components and entrepreneurs receive profit through their realization. The main purpose of economic activity of any firm is to generate maximum profit with minimum expenses. To say in general, the difference between total revenues and costs of a company is its profit. Therefore, it is obvious that the role of managerial accounting in ensuring minimization of costs is significant. Currently, accurate and timely accounting of production costs is considered as one of the most important tasks. It should be noted that it is much easier to assign direct material cost and direct labor cost to unit produced. It is much more difficult to determine production overhead costs to assign to unit produced. These are indirect costs and due to their peculiarities, we do not know how much of these costs is contained in each unit produced. Therefore, we need the method that allows us to distribute production overhead costs evenly among each unit produced.

### **II. GENERAL ANALYSIS**

Full cost calculation is based on the approach that occurrence of production overhead costs is related with the level production. This is because the level of activity in the overhead cost assignment rate can be units produced, man-hours or machine-hours. When the production level increases, all of the three indicators increase. This approach was relevant in the past, because enterprises produced only one or a few types of simple and similar products. For example, in traditional production the share of overhead production costs was less compared to other costs. The share of the production overhead costs like, for example, the cost of machinery depreciation was less in total costs. This was due to the fact that production depended more on human labor and as a result, the share of direct costs exceeded the share of indirect costs. Therefore, in this case, rough calculation of production overhead costs to be assigned to the unit of production was acceptable.

In modern production, the share of production overhead costs exceeds the share of other costs. In particular, nowadays, production has become more dependent on the labor of machinery. As a result, the share of the production overhead costs increased compared to direct costs. Therefore, there occurred a need for more accurate calculation of production overhead costs to be assigned to the unit of production. In addition, the nature

of production has also changed. Currently, most of the companies operate in a highly competitive environment that led to the increase in complexity and variety of products.

When using the traditional systems for calculating the cost of product, correct assessment is made proportionally to volume related resources. Resources include direct material, direct labor, energy and the costs related to the use of machinery.

However, there are many organizational resources for the activities that are not related to the volume. The types of activities that are not related to the volume include supporting activities like loading and unloading of materials, procurement of materials, installing machinery, planning of production, etc.

Accordingly, the traditional methods of calculation of production, which imply that all the activities in the production process are used proportionally to the level of production activity shows wrong cost of product. To illustrate the above, let us consider Case N1 and Case N2.

It is much easier to assign direct material and direct labor costs to the unit of product. "Direct costs" are the sum of all the direct costs.

It is much more difficult to determine production overhead cost to be assigned to the unit of production.

Case N1 - The Full Cost Calculation Method			
The company <b>Alpha</b> produces three types products (A, B, C):			
	„A“	„B“	„C“
Direct labor costs per unit (\$)	0.07	0.14	0.12
Direct material costs per unit (\$)	0.17	0.19	0.16
Quantity of goods actually produced (unit)	500,000	150,000	250,000
Direct man-hour per unit produced	0.001	0.01	0.005
Direct machine-hour per unit produced	0.01	0.01	0.005
Unit selling price (\$)	0.50	0.45	0.43
Annual production overhead costs = \$ 80.000			
= \$ 80.000			

These are indirect costs and due to their peculiarities, we do not know how much of these costs is contained in each unit produced.

Let us calculate the total cost of product unit and profit for each type of product unit by using traditional full cost calculation method. Below we provide the explanation for each figure calculated.

**Solution:**

As we have already mentioned, it is much easier to assign direct material and direct labor costs to the unit produced. It is difficult to assign production overhead costs. We need to assign production overhead costs to the unit produced. Firstly, we need to calculate overhead cost assignment rate (OCAR):

$$OCAR = \frac{\text{Production overhead cost} \quad (\$ 80,000 \text{ in our case})}{\text{Level of activity} \quad (\text{should be selected})}$$

The level of activity should be determined according to the profile of the enterprise. "Alpha" should choose one among the three levels of activity:

The units of goods produced – in our case, it will not be acceptable to use this indicator as “Alpha” produces more than one type of product and it will not be fair to distribute the same value of production overhead costs evenly among all types of products.

Man-hours or machine-hours - it will be fair to distribute production overhead costs according to machine-hours and man-hours spent per unit produced. In this case, we should decide which is more relevant - machine-hours or man-hours. For this purpose, we can discuss or consider the nature of production process. It would be more appropriate if we consider that production is based more on the labor of machines than on human labor, as production of each unit requires more machine-hours than man-hours. Therefore, in our case, machine-hour is a more acceptable level of activity.

Let us calculate overhead cost assignment rate:

$$OCAR = \frac{\$ 80,00 \text{ (production overhead costs)}}{(0.01 \times 500.00) + (0.04 \times 150.00) + (0.02 \times 250.00)} = \frac{\$80,000}{16.000 \text{ hours}} = \$5 \text{ for each machine-hour.}$$

Therefore, we need some kind of method to distribute production overhead costs evenly among each unit produced. All production overhead costs should be assigned to the unit produced according to the relevant basis; for example, according to goods produced, man-hours or machine-hours. The main point of this method is that overhead expenses are related to the volume of goods produced.

Let us distribute the received data to the unit of product.

	„A“	„B“	„C“
Production overhead costs (\$) =	0.05	0.20	0.10
Machine-hour per unit produced x \$5			

Now we can easily complete the task and answer the given question:

	\$	„A“ \$	„B“ \$	„C“
Direct material costs per unit produced		0.17	0.19	0.16
Direct labor costs per unit produced		0.07	0.14	0.12
Production overhead costs per unit produced		0.05	0.20	0.10
<b>Total production costs per unit produced</b>		<b>0.29</b>	<b>0.53</b>	<b>0.38</b>
Unit selling price		0.50	0.45	0.43
<b>Profit/loss per unit produced</b>		<b>0.21</b>	<b>(0.08)</b>	<b>0.05</b>

**The result of the full cost calculation method:**

According to the full cost calculation method, product **A** and product **C** are profit-making products, while product **B is a loss-making product**. The management of a company should discuss the perspective of producing B product in future. The company may make a decision to stop production of this product. However, this decision might be a mistake, as the full cost calculation method sometimes does not allow to assign total production costs to the unit produced properly. Calculation of cost by types of activities might be a more accurate method for calculating total production costs per unit of production and obviously, based on that, a more appropriate decision will be made.

**Most products have individual life cycle**

The main difference between the cost calculation according to the types of activities and the traditional methods of calculation is in overhead costs assignment rate. When assigning overhead costs to products, traditional full cost calculation method uses three bases of assignment (product, man-hours and machine-hours), while cost-driver (e.g. number of orders, number of production lines, number of components, etc.) is used as a bases of assignment by the method of cost calculation according to the types of activities;

The main point of cost calculation according to the types of activities is to use **cost-driver**, which clearly shows the causes of cost increase, such as, the number of orders placed at the supplier for each product. Production overhead costs, whose amount does not increase with its volume but depends on other activities, should be assigned to product based on cost-driver. In case of traditional full cost calculation method, assignment of overhead production costs is relevantly random, due to which, the cost of product is less accurate. Five basic steps are identified when calculating the total production costs per unit produced by using the method of cost calculation according to the types of activities.

**Step 1** - we need to group production overhead costs according to the operations, which cause these costs. In this case, the cost pool represents an operation that consumes some kind of resources and for which overhead costs are separated and assigned. There should be cost-drivers (causes of costs) for each cost pool.

**Step 2** – let us determine cost-drivers for each operation. That means that we should identify what causes the occurrence of the operation.

Cost-driver is a factor that affects the level of cost.

**Step 3** – let us calculate production overhead cost assignment rate for each operation.

Production overhead cost assignment rate is calculated by full cost calculation method like the calculation of production overhead cost assignment rate. However, individual production overhead cost assignment rate is calculated for each operation by correlating the information about the costs of operation and cost-drivers;

**Step 4** – let us assign the costs of operation to the products.

The cost of operation should be assigned to individual types of products;

**Step 5** – let us calculate total production costs and/or profit or loss.

**Case N2 - cost calculation by types of activities**

**The data of the company Alpha:**

	<b>\$</b>	
Cost of processing	<b>5,000</b>	
Cost on components	<b>15,000</b>	
Cost of technical preparation work	<b>30,000</b>	
Packing costs		<b>30,000</b>
Production overhead costs	<b>80,000</b>	

**Data regarding cost-drivers:**

	<b>A</b>	<b>B</b>	<b>C</b>
Machine-hour per unit produced	0.01	0.04	0.02
The number of production lines	3	1	26
The number of components	4	6	20
The number of customer orders	21	4	25

Now, let us calculate total costs per unit of production and profit per unit for each type of product by using the method of cost calculation by the types of activities and explain the meaning of the values received.

**Solution:**

**Step 1:** let us group production overhead costs according to the operations, which cause them to occur.

We have already made such calculation above. We have divided production overhead costs in the amount of 80 thousand USD into four different types of operations (cost pool).

**Step 2:** let us determine cost-driver for each activity. In other words, we have to determine what causes the occurrence of the cost of a definite operation.

<b>Activity</b>	<b>Cost-driver</b>
Cost of machine processing	The number of machine-hours
Cost of processing	The number of components
Cost of technical preparation	The number of production lines
Packing costs	The number of customer orders

**Step 3:** let us calculate production overhead cost assignment rate for each operation.

$$\text{OCAR (cost on components) = } \frac{\$ 5,000 \text{ cost of processing}}{16,000 \text{ machine-hours (Case 1)}} = \mathbf{\$ 0.31 \text{ for each machine.}}$$

$$\text{OCAR (cost on components) = } \frac{\$15.000 \text{ cost on components}}{(4 + 6 + 20) \text{ components}} = \mathbf{\$500 \text{ for each component}}$$

$$\text{OCAR (cost of technical preparation) = } \frac{\$30,000 \text{ cost of technical preparation}}{(3+1+26) \text{ the number of production lines}} = \mathbf{\$1,000 \text{ for each production lines}}$$

$$\text{OCAR (packing costs) = } \frac{\$30,000 \text{ packing costs}}{(21 +4+25) \text{ orders}}$$

**= \$600 for each order**

**Step 4:** let us assign costs of operation to the goods produced.

	A	B	C
<b>Cost of processing (S)</b>			
= $\$0.31 \times$ machine-hours	1,550	1, 860	1,550
<b>Cost on components (5S)</b>			
= $\$500 \times X$ components	2,000	3,000	10,000
<b>Cost of technical preparation work (S)</b>			
= $\$1,000 \times$ the number of production lines	3,000	1,000	26,000
<b>Packing costs (S)</b>			
$\$600 \times$ the number of orders	12,600	2,400	15,000
<b>Total production overhead costs (S)</b>	<b>19,150</b>	<b>8,260</b>	<b>52,550</b>
The number of units produced	500,000	150,000	250,000 <b>Production</b>
<b>overhead costs per unit produced (S)</b>	<b>0.04</b>	<b>0.06</b>	<b>0.21</b>

**Step 5:** let us calculate total production costs and profit or loss.

	A	B	C
	\$	\$	\$
Direct material costs per unit produced	0.17	0.19	0.16
Direct labor costs per unit produced	0.07	0.14	0.12
Production overhead costs per unit produced	0.04	0.6	0.21
<b>Total production costs per unit produced</b>	<b>0.28</b>	<b>0.39</b>	<b>0.49</b>
Unit selling price	0.50	0.45	0.43
Profit/loss per unit produced	0.22	0. 06	( 0.06)

**The result of calculation of costs according to the types of activities**

Now, let us compare the results of the full cost calculation method and the method of calculating the costs according to the types of activities. As we see, when calculating with this latter method, product **A** is relatively profit-making. However, the results of the products **B** and **C** are quite different – in this case, **B** is a profit-making product and **C** is a loss-making product. The company should make a decision to stop production of not product **B**, but of product **C** as the distribution of production overhead costs according to the types of activities has been calculated more accurately.

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