

# THE IMPACT OF COSTING METHODS ON PROFITABILITY OF ENTERPRISES OPERATING IN THE EMBROIDERY INDUSTRY

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## ABSTRACT

Determining the optimum operating mode of the equipment is a necessary condition but not sufficient in order to maximize the profit. The present study aims at identifying a method for making efficient the economic activity, starting from the optimum operating mode of the equipment, which has been the subject of a previous study. The results of the studies performed on Happy embroidery machine led us to the need to identify a method of cost calculation allowing a proper allocation of costs on the product. The method proposed to be used allows that all activities needed for making a product could be identified and the afferent expenses for their implementation can be calculated and predicted with a greater accuracy than by using traditional methods of cost measurement. The ABC (Activity Based Costing) method implies the calculation method and the cost analysis, but can also be seen as a tool to measure the company performance.

**Keywords:** Cost optimization, Activity Based Costing method, monitoring costs, profit, product, Embroidery machine.

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## INTRODUCTION

Measurement of costs for products and services can be accomplished using several methods of grouping and allocating the costs, methods which lead to diverse results with direct impact on company profitability. The current paper aims to demonstrate the impact of using different methods of measuring the costs, through a case study on a company in the textile industry, more specifically, in embroidery.

In economic literature and also in practice there are several cost calculation methods from which we decided to use the most suitable for our case: absorption cost on order method and ABC method. Absorption costing is a traditional system of costing which arose in enterprises when most enterprises made a smaller range of products and overheads represented a smaller proportion of costs. Although overheads are allocated to production, the basis is by

volume only rather than looking at the underlying true cost activity. Volume bases might include labour hours or machine hours. Therefore it appears that ABC might be a more suitable basis for apportioning costs in a modern manufacturing system. There are several reasons why this might be and these are as follows:

- Absorption costing uses volume as a basis for cost allocation: therefore it tends to allocate too great a proportion of overheads to high volume products and too small to low volume products;
- ABC used several bases or cost drivers to apportion overheads and as such will more closely link overhead apportionment to the causes of overhead costs;
- ABC also enables a good understanding of what drives overhead costs as it accumulates a good deal of data for analysis. Therefore ABC can be used as an information

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source for budget planning based an activity rather than incremental budgeting;

- ABC also establishes a long run product cost.

Absorption costing represents a longstanding costing system used by companies with a small product range and a reduced share of operational costs in the total costs. While general costs are product oriented, it is the production volume that represents the focus at the expense of the activity cost. It is likely that the volume bases also comprise personnel and equipment work hours and thus, in a modern system of production, the activity based costing method seems more adequate for costs allocation. A series of reasons can be notes, such as:

- Absorption costing has volume at the core of apportioning costs and it hence runs the risk of lending too much of the operational cost to production of high volume in the detriment of that of reduced volume;
- Using a series of cost determiners or bases to allocate general costs, the activity based costing is very likely to connect these to their very causes;
- Disposing of a lot of information, the ABC method is one that can provide accurate apprehension of the sources of the operational costs and that is why this method is a database of much use when replacing incremental budgeting with activity based budgeting;
- it is by activity based costing as well, that the cost of a product on a long term can be calculated.

In a competitive environment, enterprises must be able to asses product profitability realistically. ABC can facilitate a good understanding for enterprises such as Admer of what drives overhead costs. This enable better decision making. The complexity of the business has increased, with wider product ranges, shorter product life cycles and more complex procesees. ABC recognises this complexity with its multiple cost drivers and so provides an adaptable tool for Admer to use by highlighting the activities that generate costs. The companies in competitive environments have to master the way of properly evaluating profitability. ABC shall provide a correct dimensioning of costs for the company, triggering a more suitable process of making decisions. We are witnesses of a development in business sophistication: more sophisticated production processes, broader ranges of products and reduced lifespan of the product. This complexity and the distinct determiners of costs that it brings about are integrated in the ABC method which can thus represent a utensil of much versatility when it comes to outline cost generating undertakings.

The specific of aenterprise must be carefully analyzed before choosing one of these methods, which is why the current case study started from a previous technical study conducted on the Confidex enterprise.

The results of the previous study conducted on the Happy embroidery machine(1) consisted in determining the optimal operating mode, the conditions in which the quality of the embroidery and the productivity are increased, and the machine's reliability will be maintained at a high level. Data collection regarding vibrations was carried out with transducers which captured the vibration spectra and turned

them into electrical impulses which were sent to the data collection system. Based on the assessed vibration parameter, the transducers can evaluate vibration amplitudes, speeds or accelerations.

After collecting the data from the embroidery machine and transferring it on the PC on which the Data Explorer application is running, it was time for the fault detection and diagnosis stage.

The frequency range for this collections were selected to cover the entire field of manifestation of any defects, not only those related to the cause of the embroidery machine stopping. After choosing the working method, the operating modes were established from 300-1000 stitches / minute.

Following the spectral analysis, it was determined that:

The operating mode of 300 stitches/min it was noticed that the spectral components are relatively low and the vibration velocity amplitude has the lowest value. The disadvantage of this operating mode consists in the low productivity.

The operating mode of 700 stitches/min is considered the *optimal operating mode* because compared to the other operating modes at 800, 900, and 1000 stitches/min, the amplitudes of global vibrations have the lowest values, resulting in a relatively high productivity which leads to an improved reliability of the machine compared to its operating at 800-1000 stitches/min in other working modes.

The operating modes of 800 stitches/min and 900 stitches/min are not recommended in nay way due to high amplitudes of the vibrations which lead to a significant decrease of the machine's reliability.

Assuming that by applying the optimum operating modes of embroidery machine the needles, thread and machine wear mechanisms are reduced, and thus the production cost is reduced too. In these circumstances we need to consider using a cost calculating method that allows a better distribution of expenditure by product.

Over the years, there have been a number of empirical studies that have shown a direct link between the economic growth, the level of investment and the labor productivity on national markets, whereas in recent decades the emphasis has been on researching this link on the international market. The study regarding the interdependence of these factors is necessary in guiding companies to calculate costs and allocate the cost elements on products they have on national and international market.

The cost optimization solution is increasingly debated in the economic theory (2), (3) as the basis for multiplying the results of the technological progress and when assessing the role of competition in the process of the economic growth. Cost analysis methods have been the subject of many studies (4), (5). The economic performance is tracked in the activities of any company and can be obtained by proper cost sizing (6), (7). M. Porter analyses the competitive advantage supported by performance and economic efficiency(8).

The ultimate goal of any economic activity, regardless its nature, is the profit, and for obtaining best results, it is essential to know and use the instrument called *cost* of the work. The complexity of the economic activity turns the determination of the cost into a challenge for any manager.

## MATERIAL AND METHOD

The enterprise under consideration presents all the characteristics of an enterprise in the embroidery industry, which makes it suitable for the intended purpose of this study. One of the reasons for choosing this enterprise is that the enterprise was preparing a promotion campaign for the products supplied, a campaign supposed to focus on the most profitable products. Part of this process was achieved through the technical study previously presented, a study that determined the optimal usage of the equipment – the embroidery machine. Using different methods of cost calculation for the same historical data registered in the enterprise accounting, a different classification of products is obtained depending on profitability, as demonstrated below.

The methods chosen are relevant to the category they belong to and are suitable for the enterprise's activity, on the one hand the method on orders (from the category of traditional methods), on the other hand the ABC method (from the modern methods).

Under the current situation, the service providing enterprise carries out 3 products - different models of embroidery (flowers model, geometry model, cartoon model). In January 2015 the company has had three orders (one order for each model).

Regarding the organization chart, the company has 5 directly productive employees and 2 indirectly productive employees (the marketing manager and the production manager).

The overheads arise from the following expenses: spare parts for machinery, capital depreciation, indirect salaries, electricity, water, gas, environment, advertising, the hall rent and are worth 17777.77 euro.

## RESULTS AND DISCUSSION

Currently the Confidex enterprise Classic Absorption Cost Method based on production orders to calculate costs; a spreadsheet file - Excel (the basis for achieving the tables in

Excel is actually the specifics of each method) was used for the calculation.

The Classic Absorption Cost Method based on production orders applies to businesses with individual and serial production. In these enterprises, the finished product is obtained by mixing the previously manufactured parts as independent parties. The order cost is calculated after the order is finished regardless of the length of time that it runs.

The synthetic method of costing for a command is:

$$C_t = \sum_{t=1}^t \left( \sum_{d=1}^n C_{hd} + \sum_{i=1}^m C_{hi} \right)$$

where:

$C_t$  – total cost of the order;

$s$  – production facilities for running the order;

$C_{hd}$  – direct expenses for facilities for an item of inventory;

$d$  – inventory items for direct expenses;

$C_{hi}$  – overheads for facilities for an item of inventory;

$i$  – overheads items.

*The strengths* of using the Classic Absorption Cost Method based on production orders is that: it ensures maximum identification of direct expenses, a good location of overheads, which ultimately help to establish a fair cost for products or derived works; determining the unfinished production at the end of the month is carried out by the appropriate method, its value representing the amount of expenditure incurred by the commands that are under manufacturing.

*The weaknesses* of using Classic Absorption Cost Method, based on production orders are that at the end of an inventory period the real costs of production are not known if the execution of some orders continues in subsequent periods. In addition, the method does not allow precise determination of the consumption of materials and labor, with the possibility of moving them into the same product

**Table 1.** Profitability calculation - Classic Absorption Cost Method based on production orders

	Flowers Model	Geometry Model	Cartoon Model	TOTAL
Quantity (no. of orders)	4850	7310	3850	
Direct material expenses (euro)	467.77	644.44	555.55	1667.77
Direct salary costs (labor) (euro)	4940.22	3526.88	2251.11	10718.22
coefficient mandatory social contributions	0.21	0.21	0.21	
Salary costs + contributions (euro)	5961.36	4255.90	2716.41	12933.68
Total direct expenses (euro)	6429.14	4900.34	3271.97	14601.45
Overheads coefficient	0.44	0.34	0.22	
Overheads (euro)	7827.70	5966.33	3983.74	17777.77
Total expenses (euro)	14256.85	10866.67	7255.71	32379.23
Total costs (euro)	14256.85	10866.67	7255.71	32379.23
Unit costs (euro)	2.94	1.48	1.88	
Selling price (euro)	2.67	1.62	2.22	
Order value (euro)	12933.33	11858.45	8555.55	33347.33
Profit (euro)	-123.51	991.77	1299.84	968.10

from one order to another. Given the fact that the product is the mandatory inventory in the provisional estimate and the order is the one used for tracking and recording production costs, direct comparison of predicted and actual expenditure cannot occur over time; if some products are delivered to the customer before the end of the order, their assessment being made according to the pre-calculated cost, the differences to the actual cost of the products will be charged to the last part of the command. By the calculations, it is concluded that models y and z are supporting the business activity being products executed in terms of profitability. After applying the Classic Absorption Cost Method based on production orders at the enterprise taken into account, the conclusion is that most of the overheads are due to the use of machinery, and not to the material or labor used.

Thus the study aims to improve the company's financial position by reducing costs related to the use of machinery. The proposed method to be used for this purpose will be the ABC (Activity Based Costing) method.

The ABC method allows the company to identify more precisely how and which activity / product yields profit. The ABC method follows the calculation method and the cost analysis, but can be seen as a tool to measure the company performance. The principle behind this method is a better allocation of costs on the product. The concept of the method assumes that it is not products that consume resources, it is activities that do. The starting point in shaping the ABC method is that most of the overheads originate from the design phase of the product. By using the ABC method all activities necessary to achieve a product or service can be identified, the expenses of their achievement can be calculated and predicted with greater accuracy than by using traditional methods of accounting.

The traditional costing methodology can create significant differences in the final product costs. The differences are due to the way expenses are allocated and they may affect the final price of exits and also can lead to wrong management decisions.

**Strengths:**

- serving mainly the management decisions regarding allocation of resources;
- monitoring costs for each activity and ensuring the accuracy of data on such costs;
- optimal allocation of available resources within the company;
- increasing efficiency in budgetary planning;
- managing operating production costs resulting from tracking them and not from allotting them, but according to the cause-effect relationships;
- empowering decision-makers concerning the costs, especially for support activities;
- better management of launching costs of new products or those regarding changes to existing products.

According to the ABC method, direct labour, and direct materials respectively must remain the same, and the depreciation is determined by the number of stitching.

For each of the three models running we will consider the number of stitches executed for the model and the cost driver for the model (calculated at optimum operating level of the embroidery machine - 700 stitches/min) as follows:

Thus, the *flower model* proves to be the most profitable one; by using the ABC method, the fixed costs to be distributed on this model are much lower than when using the traditional method (Classic Absorption Cost Method based on production orders) proving the high profitability of this model and indicating that larger orders should be accepted in this model.

The *cartoon model*, which was considered to be the most profitable by the company using the classical method proved to be the one causing losses to the current selling price. Under these circumstances, the company should renegotiate the price or find another method to achieve the model or even to abandon it if it is not able to purchase another type of embroidery machine capable of carrying out this model.

**Table 2.** Profitability calculation- ABC costing method

	Flower Model	Geometry Model	Cartoon Model	TOTAL
Number of stitching	300	700	1000	
Cost driver (minutes) / Product	12	13	26	
Total cost driver (minutes)	129334	21	22245	56296
Quantity	4850	7310	3850	
Material expenses(euro)	467.78	644.44	555.55	1667.77
Direct salary expenses(euro)	1021.14	729.01	465.30	2215.45
Direct expenses(euro)	6429.14	4900.34	3271.97	14601.45
Overheads coefficient	0.23	0.37	0.40	
Overheads(euro)	4084.26	6668.86	7024.65	17777.77
Total expenses(euro)	10513.41	11569.20	10297.06	32379.67
Total costs(euro)	10513.41	11569.20	10297.06	32379.67
Unit cost (euro)	2.16	1.58	2.67	
Selling price (euro)	2.66	1.62	2.22	
Order value (euro)	12933.33	11858.44	8555.56	33347.33
Profit (euro)	<b>2419.92</b>	<b>289.24</b>	<b>-1741.07</b>	<b>968.09</b>

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The *geometry model* shows average profitability, its production does not generate losses whereas the running of the embroidery machine is the optimal (700 stitches/min.), so this model can still be obtained in the required amount by ordering.

## CONCLUSIONS

ABC involves the identifications of factors as cost drivers, which drive the costs of an enterprise's major activities. Support overheads are then charged to products on the basis on their usage of an activity. ABC has evolved as a response to the increase in support activities in modern enterprises as well as the falling cost of processing information used in making management decisions. Modern enterprises typically use shorter production runs and so the proportion of overhead costs to total costs has risen. Activity based costing supposes to recognize cost determining factors, dimensioning general expenses that are next distributed to production. Development of ABC was a reaction to the growth of auxiliary activities of present companies and also to the decrease in the price paid by management for the decision making data handling. Shorter cycles of production are typical for nowadays companies and this implies a higher share of general costs in the total costs.

The ABC method provides more conclusive information for analysis and substantiation of investment profitability. The given example offers a clear picture of how the company may give up a profitable product for a product less profitable which probably would have resulted in a financial loss and even would cause the company bankruptcy for the simple fact that it has not used the appropriate method for sizing and cost calculation.

To avoid possible errors in forecasting and calculating costs, the Confidex enterprise considers purchasing an application to facilitate this process - the PC (post calculation). The application assumes the automatic download of data used in other applications which enables automatic assignment and accurate costing and with greater ease. The procedure for cost calculation is based on using algorithms for flows in transport networks in the graph theory and the expenses grouping is on items calculation defined according to the nature of expenses (raw materials, wages etc.). If production reporting is a pre-calculated price, the accounting records of the price difference (between production value and the cost of the obtained production) will be generated automatically.

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