

## THE BINOMIAL OF MODERN MANAGEMENT ACCOUNTING: ADVANCED PRODUCTION TECHNOLOGIES – ADVANCED COST CALCULATION METHODS

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**Abstract.** *The binomial advanced production technologies – advanced cost calculation methods, proves a successful one, orienting the economic entity to the client, knowing very well the clients' needs, the price they are ready to pay for a product, and the delivery time, but imposes as well the development of excellent collaboration relations both on the level of all the departments of the entity and with its external actors, i.e. providers, suppliers etc. The aim of this paper is to underline the necessity to rethink and reorganize the manufacturing management accounting in the metallurgical industry of Romania.*

**Keywords:** target costing, flexible manufacturing systems, total quality control, just in time manufacturing systems.

**JEL classification:** M41

### 1. Introduction

According to the present economic environment, a primordial objective of management accounting is the possibility to estimate the total costs for providing a product, which determines the need to develop and implement new management accounting systems, having, beside the classical aim, namely quantifying the immediate results, also other aims such as: observing the future profits, abandoning the products that do not generate profit, determining optimal sales prices, increasing productiveness, orientation toward the client etc [4]. The technological advance and the reorientation of the economic units toward the client's needs and claims and the provision on the market of products with an optimal price-quality ratio compared to the competitors involves the need to implement new advanced management accounting systems such as: Target

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Costing, ABC, ABM, Kaizen. The present scientific research focuses on the advanced calculation method known as "Target Costing".

The economic units' implementation of manufacturing technologies such as: automated manufacturing technologies, computer-assisted manufacturing & design methods, flexible manufacturing systems, total quality control, robotics, materials planning systems and just-in-time manufacturing systems substantially modifies the way products are manufactured and one can note a need to implement some advanced cost calculation methods on the level of management accounting, because the traditional methods and the evolved methods, in this new context, become deceiving and even inadequate [4].

Once implemented, these advanced manufacturing technologies generate for the economic unit a series of benefits, such as:

- i) development of the capacity of the economic entity to produce varied and high-quality goods at low costs, which determines the increase of the clients' satisfaction;
- ii) the innovation process is supported, which determines an increase in the flexibility of the manufacturing process and a decrease of the time needed to realize the product.

## **2. Scientific research context**

The research context of the metallurgical industry on the European level presents the European Union as the second largest steel producer worldwide, with a production of more than 177 million tons of steel per year, representing 11% of the global production [7].

It is known that the European iron and steel sector is nowadays in a very difficult situation. The present economic crisis has led to a significant decrease of the manufacturing activity and of the associated steel demand, which remains 27% under the levels prior to the crisis. As a consequence, several production units have been closed or have restrained their production, with corresponding job cuts, namely up to 40,000 jobs during the last few years. The European metallurgical industry is faced with the simultaneous effects of the low demands and of the over-capacity of production on a globalized steel market and with high energy prices; the iron and steel industry needs to invest to adapt itself to the ecological economy and to manufacture innovating products.

The research context of Romania presents the metallurgical industry as privatized in a proportion of 100%, and the weight of the foreign capital is of about 80%. [4]

The iron and steel industry of Romania is an important branch for the national economy, being a multiplier of: raw added value, industrial production, jobs,

generator of taxes and contributions, etc. On the level of the year 2012, it realized: about 2% of the steel production of the European Union and contributed to the realization of the macroeconomic indicators of the country, namely: about 8% of the industrial production, 11% of the export, 22,500 employees at the end of the year. Although the main companies of the metallurgical industry have been restructured technologically, financially and socially, the international economic-financial context, namely the diminution of the constructions market throughout the European Union, the increase of the energy tariffs, the growth of the raw matters prices, the devaluation of the national currency etc. have affected directly the economic-financial results of the companies working in this domain whose profit/loss accounts are negative. In this entire context, the emergence of the modern cost sizing and calculation methods has come as an objective need in the economic units' attempt of obtaining a competitive advantage compared to their competitors.

The great companies, generally from the economically advanced countries, have built and adopted their strategies imposing the new manufacturing organization and cost analysis methods able to directly contribute to the increase of the turnover and profit, to the reduction of the manufacturing cycles and costs. The great technological and organizational changes occurred during the last two decennia have particularly disturbed the manufacturing domain. The evolutions of the demand and offer, of the technologies and of the competition have given birth to a special set of problems related to the production both in point of objectives and strategies, and in relation to the organizational options.

### **3. Research methodology**

Any scientific research starts from a perspective regarding an objective chosen to be researched [1]. In this scientific research, we started by formulating the following hypothesis: the information generated by the work “The binomial of modern management accounting: advanced production technologies – advanced cost calculation methods” is an important resource in the context of the use of the Target Cost Method in the economic units of the metallurgical industry.

Seeing that in the economic units, decisions rely on the information provided, which reflects the objective realization, at a certain moment, the couple information-decision is part of the positivist version. Regarding the future construction of a use of the Target Cost Method based on virtual information, the correlations and the practical interaction of the subject with the object being researched will situate the scientific research in the constructivist trend.

After the epistemological positioning mentioned, namely the positivist vision, we have set out to establish the work methodology, initially based on theoretical

documentation and then on empirical research. The theoretical documentation relies on bibliographic sources and information provided by the informational-accounting system.

#### **4. Critical analysis of the classical cost-calculation methods**

Seeing that the economic units of the metallurgical industry of Romania use the classical cost-calculation methods, we shall highlight the existence of a series of disadvantages influencing the quality of the information regarding the cost per product, the responsibilities and the operative control of the production costs, such as:

- ✓ It does not always assure an exact calculation of the cost per product, as a consequence of the repartition of the indirect expenses using conventional criteria. The classical methods (global, on orders, on stages), being calculation methods of an absorbing type, rely on the classification of the expenses - according to the way of repartition in the cost of the products - into direct and indirect. The cost of the goods is made up of direct costs and a share of the indirect costs distributed in the cost of the goods based on repartition keys. The choice of these repartition keys is one of the problems management accounting has been faced with. The use of random distribution keys in the context of an increase of the weight of the indirect expenses in the total of the company expenses often leads to inexact results and this happens due to the fact that often the causal relation between the repartition key used and the expense realized is overlooked.
- ✓ Most economic units use, for the repartition of the indirect expenses of a section, repartition keys related to the direct manpower. This leads to an overestimation of the costs of certain products and an underestimation of the costs of others. The use of the direct manpower for the repartition, for instance, of the machine assemblage and regulation costs leads to obtaining higher costs for the products with more direct manpower and lower costs for the products with less direct manpower, yet the machine assemblage and regulation activity requires the same effort regardless of the cost of the direct manpower. This triggers the effect of cost subsidizing, in which the costs of a product produce an effect on another product, making the latter less profitable than it really is [5]. At the same time, by choosing this repartition basis, the managers' attention is often turned to the management of the expenses for direct manpower, not to the control of the indirect expenses.

- ✓ The classical methods are oriented toward the past, offering information concerning the previous accounting periods, without giving much attention to forecasts. The complete actual cost of the products is obtained after the whole production process has been completed and all the expenses related to its development have taken place, giving a marked historical character to the information provided, which makes it possible to use it only for the future.
- ✓ The historical character of the information provided by the methods mentioned makes the regulation of the production process impossible to be realized operatively during its development, and consequently the role of this information in substantiating short-term decisions is very low. When a decision based on costs has to be made before concluding the manufacturing process, it is possible for the information offered by these not to be oportune, becoming tardy. In the economic practice, however, it is precisely these decisions that are the most numerous, although on the way they are substantiated directly depends the efficiency of the activity developed. Thus, the information provided by these methods can be used in the long-term management process, the manufacturing processes it refers to being already concluded [2].
- ✓ The classical methods do not take into account the variation of the expenses in relation to the modification of the activity volume. Being oriented mainly towards the calculation of the integral cost per unit, they focus mainly on the grouping of the production and sales expenses into direct and indirect, which does not allow analyzing them in relation to the production volume. Yet, from an economic perspective, the costs are analyzed in correlation with the production volume, which imposes the use, in their calculation, of the grouping of the production expenses into variable and fixed. The lack of a classification of the expenses into variable and fixed lies at the basis of the erroneous decisions made based on the complete costs.

The information offered by the classical methods lose some of their pertinence given the increasing weight of the indirect expenses in the total of the company expenses and the high cost of the information collection and processing and control.

The set of disadvantages of the management accounting system and the cost calculation system using classical methods can be gradually eliminated as the interest of the decision-makers for pertinent information grows and by means of the passage towards advanced production technologies and advanced cost-

calculation methods, which aim to provide much more complete information for the manufacturing cost determination.

## **5. Advanced production technologies**

Starting from the present context, namely the situation of the metallurgical industry both on the European level and in Romania, which is going through a continual restructuring process and the occurrence of the need to innovate and rethink the production processes in order to realize products that are competitive on the world market, adapted to the consumers' needs, both as price and as quality and able to counteract the effect of China's massive production of metallurgical products, we shall highlight the importance of the introduction of advanced manufacturing technologies. Out of these technologies, at present the best known are: Computer-Aided Manufacturing, Production Management Systems – Just In Time and Materials Requirement Planning, Non-Polluting Manufacturing Technologies, Total Quality Control.

Advanced manufacturing technologies, once implemented in the framework of the economic units of the metallurgical industry can generate both the reorganization of management accounting and the modification of the organizational culture of the entity, becoming impetuously necessary to prequalify the personnel and change its collective mentality. At the same time, advanced manufacturing technologies generate: i) an increase of the capacity of the economic units to produce goods of a clearly higher quality than the present ones, at low costs, which will determine the meeting of the consumers' needs; ii) a continual stimulation of the innovation process, which will lead to the increase of the flexibility of the economic entity in the management of a large array of products with a relatively short life-cycle and at low costs; iii) an efficient control on the manufacturing processes, implicitly the reduction of the time for the preparation of the equipments and of the number of scrap products.

The application of Computer-Aided Manufacturing in the metallurgical industry supposes the use of computers to realize the programming of the production and the control of the production equipments. Production programming according to the necessity of the economic unit generates advantages such as [2]: higher product quality, less scrap products, less time used to prepare the equipments and realize an efficient control of the production manufactured.

The production management system – Just In Time relies on a production level generated by the demand and an orientation of the stock level toward zero. Such a system is characterized by: the reduction of the time needed to prepare the equipments, the production and the delivery of the orders, a reduction of the

activities that do not generate added value, and an increase in quality for both the materials and the raw matters bought and of the products throughout the entire manufacturing process; it determines an active involvement of the personnel, a redesign of both the manufacturing lines and of the way of realization of the manufacturing control. The fact of having stocks tending to zero generates savings in point of depositing costs, management costs and space costs.

Materials Requirement Planning leads to computerized planning and control of the information with the precise aim of maintaining the production flow uniform. Such a system aims to make efficient: the orders of raw matter and sub-parts bought from providers, the manufacturing programming, the assemblage of the products, and the work planning and programming.

Non-polluting manufacturing technologies represent a present and necessary trend supposing the adaptation and reorganization of the entire economic unit, by stimulating the innovation process and the creation of tools and machines with zero polluting emissions. This makes it possible to seize the need to develop in the economic units some research departments to develop and implement non-polluting technologies, which represent the future of the economic entity, namely the economic unit with zero emissions, or the eco-unit.

Total Quality Control is a system imposing a single quality level that can be accepted, namely quality with zero defects. The logic of this system involves its application starting from the supply of raw matters and materials, continuing with the product design, the manufacturing engineering and the fabrication and the subsequent checking of the finite products. Once implemented, the system generates advantages both in the short term, such as the decrease of the total production costs, and long-term advantages, such as the avoidance of certain costs related to detecting, remaking and repairing the products after they have been sold.

## **6. “Target-Costing” - an advanced cost-calculation method**

The need to implement advanced manufacturing technologies and to give up on the classical cost calculation methods imposes management accounting for the production of the metallurgical industry, and the evolution towards the implementation of advanced cost calculation methods, such as: Target-Costing, Kaizen etc.

The present research makes a detailed presentation of the advanced calculation method called Target-Costing, which is a cost-management tool allowing a reduction of the total cost of a product during its entire life-cycle, due to the integration of a close relation between the departments of: manufacturing, research-development, marketing, accounting and quality. The Target-Costing

Method orients the company towards the market, assures a dynamic management of the costs even since the design stage by the development of a strategic relation between the departments of the company and factors that are external to it, also delineating a relation of self-control, cooperation and motivation of the whole personnel [5].

Conditions for the implementation of the Target-Costing Method [6]: i) cost-efficient manufacturing plans represent the foundation of profitability; ii) the source of profit is represented by the intellectual effort pertaining to the processes of: planning, design and production sales; iii) the coordination of the intellectual effort relies on the improvement of the product design specifications; iv) any expense is related to the generation of profit; v) cost-related information needs to be generated so as to show the profit sources; vi) cost expertise must exist throughout the pre-production stages, and the design should aim to realize the target cost.

The objectives of the Target-Costing Method are the following [3]:

- i) it orients the economic entities and their management to the market;
- ii) it supports the cost management during the initial product design stages;
- iii) it imposes the management of the dynamic costs, because target costs are constantly reevaluated;
- iv) it involves improvements in terms of motivation, because behaviours are directly influenced by the constraints appeared on the market.

In order to attain its objectives, the Target-Costing Method relies on the following principles [1]:

- ✓ Determining the target cost: a system using Target-Costing determines the target cost by taking out of the sales price the profit margin desired. The price is controlled by the market, and the target profit is determined by the financial needs of the economic unit. The target cost relies on two sub-principles: the sales price defines the product and the profit plans (these plans are analyzed frequently so that the economic unit may produce only those products meeting the profit margin); the Target-Costing system is characterized by competitiveness, intelligence and analysis (an understanding of the evolution of the sales price can offer information on changes and threats from competitors).
- ✓ Concentration on the client: the clients' needs in point of quality, cost and delivery time represent an important orientation in a system based on Target-Costing. It is absolutely essential for the economic unit to understand the

clients' needs and know the services offered by its competitors to meet the client's expectations.

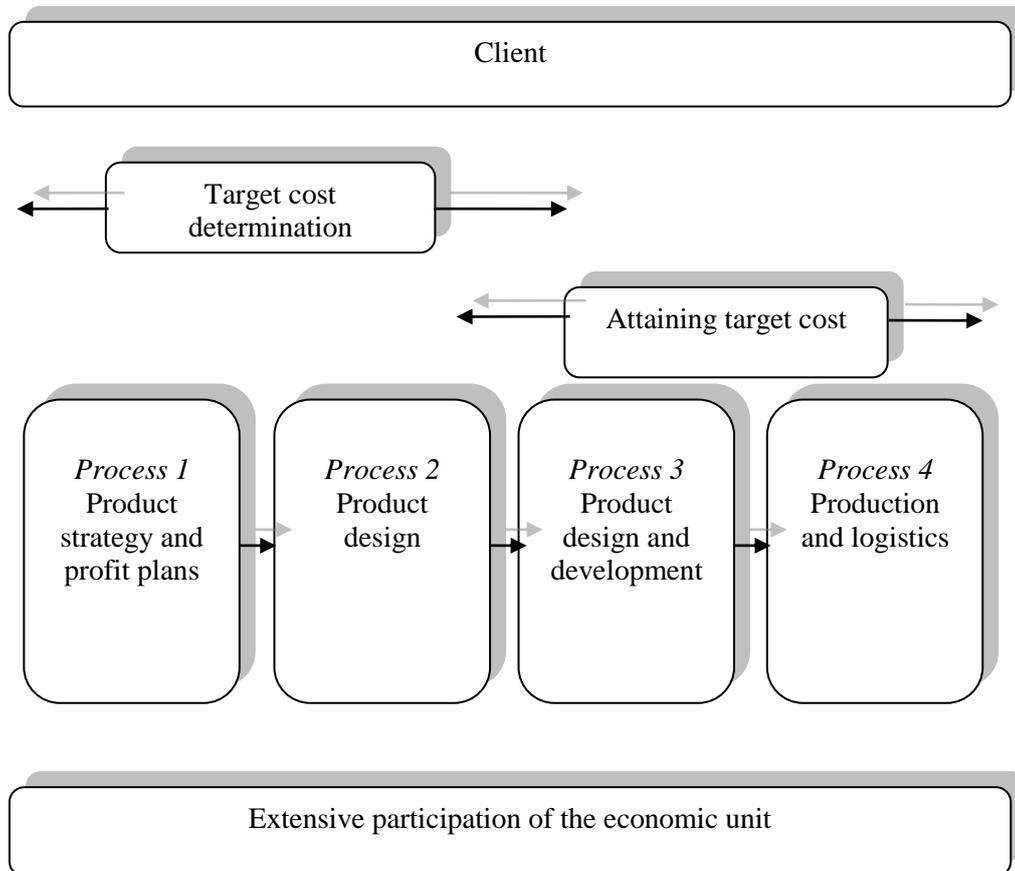
- ✓ Focus on design: the Target-Costing system considers product design a key process for cost management. Determining the design of a product requires a longer period of time because what is wanted is to eliminate the time and cost generated by the modification subsequent to the launching of a product design on the market. The Target-Costing system imposes a change in both the engineers' mentality, who need to pay attention to both the cost of the product and the technology necessary for its production and design. At the same time, in the design determination process are involved all the departments of the economic unit to examine the prototype, so that the product may be changed before entering the production process;
- ✓ Active involvement of the internal and external environment actors of the economic unit: the Target-Costing system uses information from both the internal environment of the economic unit, from the level of all the departments (engineering, production, sales, marketing, accounting, supplies, service), and the external environment information coming from clients, providers, suppliers etc..
- ✓ Orientation of the product life-cycle: the Target-Costing Method considers all the costs related to the holding of a product during its operation period (sales price, operation costs, maintenance and repairs, cost for discarding it). The aim is to minimize the costs of the product life-cycle, both for the consumer and for the producer. From the perspective of the consumer, the orientation to the product life-cycle means minimizing the costs related to its holding, use, maintenance and discarding. From the producer's perspective, this supposes the minimization of the costs related to design, production, marketing, distribution and service.
- ✓ Constitution of a value chain: the Target-Costing system relies on relations developed in the long run, mutual benefits with the providers and other members of the value chain such as: suppliers and recyclers.

The main activities undertaken when using the Target-Costing Method are [6]:

- i) planning the target cost and profit;
- ii) confirming the target cost and profit and allotting to the main parts of the product;
- iii) supporting and promoting the target cost and profit activities by their inclusion in the departments of the company in charge of the production: planning, development, manufacturing design and preparation;

- iv) the realization of the target cost and profit is possible by the cooperation of all the company departments;
- v) the evaluation of the activities involved by the Target-Costing Method permits a continual improvement.

The implementation of the Target-Costing Method in the economic units can be structured under the form of processes as follows:



*Fig. 3.1. The Target-Costing Method (source: processing after: Ansari, S.L., Bell, J.E., Target Costing. The Next Frontier in Strategic Cost Management, Irwin, USA, 1997, p.180)*

## Conclusions

The present business environment, characterized by competitiveness, fast technological changes, differentiated demand, both in point of volume and of quality and scrap diminution imposes to the economic units of the metallurgical industry the need of fast anticipation of the business environment changes, a continual technological improvement, an attentive supervision of the clients' needs and also a permanent emancipation of the organizational culture both on the individual and on the collective level.

For this reason, we emphasize the need to rethink and reorganize the manufacturing management accounting for the metallurgical industry in Romania, starting from the implementation of advanced production technologies that, in the long run, help the economic units develop a high-quality and varied production of goods, at lower costs, simultaneously determining an increased client satisfaction, while by the continual stimulation of the research-innovation process is triggered an increased flexibility of the manufacturing process and implicitly a reduction of the product execution time.

The set of advanced technologies presented constitutes the basis for a rethinking and a coherent and optimal reorganization of the economic units of the metallurgical industry, because it stimulates and prepares all the activities of the production chain, namely acquisitions – product design – production engineering – manufacturing –finite products control and delivery, and transformation of the collective and individual mentality of the labour force, present on all the hierarchic levels of the economic unit.

Simultaneously to the implementation of these advanced production technologies, the management accounting of the metallurgical industry must give up on the use of the classical cost calculation methods and implement an advanced cost calculation method such as Target-Costing. This orients the whole activity of the economic unit and its management in relation to the market, determines a costs management even since the early product design stages, imposes a continual improvement of the employees' motivation and leads to the creation of developed relations in the long run with all the members of the value chain, both internal and external.

The binomial advanced production technologies – advanced cost calculation methods proves a successful one, orienting the economic entity to the client, knowing very well the needs, the price the clients are ready to pay for a product, and the delivery time, but imposes as well the development of excellent collaboration relations both on the level of all the departments of the entity and with its external actors, i.e. providers, suppliers etc..

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