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The Usage of Technology of the AB-Costing and the Balanced Scorecard in Enterprise's Business-Process Management

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ABSTRACT
The development of the digital economy has intensified competition in world markets and necessitated the need for search for new approaches to information support for enterprise activity management. The way of solving this problem is to organize the system of management accounting by business processes as components of the Value Chain, since the steady increase in the value that the company provides to its customers is crucial and provides a generic characteristic of all its activities. In particular, the article proposes the approach to construction of methodological and organizational support for management accounting based on combination of the AB-costing, which allows to allocate costs on the basis of identification of cause and effect interrelation between inputs and outputs of business processes by the Value Chain, and the Balanced Scorecard, which is designed to model, evaluate and prioritize opportunities to select key success factors in competition based on a thorough understanding of goals, risks, business model and the Value Chain. The proposed approach allows to take into account factors of influence on the results of the enterprise activity in current and future periods.
Keywords: *management accounting, strategic management accounting, Balanced Scorecard, AB-costing, Value Chain, digital economy*

1. INTRODUCTION

Among the directions of the development of the world economy, special attention is drawn to its digitization, which has a comprehensive and lightning character. In particular, during last few years practically all sectors of economic activity have made the transition to digital technologies that have provoked radical changes in the process of functioning of the state, society and business and continue their transformation at a rapid pace.

Taking into account the strengthening of globalization processes in Ukraine and the active integration of our country's economy into the world economy, the decree of the Cabinet of Ministers of Ukraine No. 67-p of January 17, 2018 approved the "Concept of the development of the digital economy and society of Ukraine for 2018-2020" and approved the plan of measures for its implementation, which not only opens up new powerful opportunities for domestic business, but also entails conceptual changes in almost all areas of its activity. In particular, such changes primarily concern the whole system of information support of socio-economic processes, the leading role in which belongs to management accounting, taking into account its ability to collect, process and prepare information on the activity of an entity. This is particularly relevant in light of the entry of domestic enterprises into the global market that is characterized by high dynamism and intensity of competition, which forcing them to seek for new approaches to cost management and reducing the cost of their products (works, services). This, in turn, necessitates the revision of this system in order to bring it into compliance with the new economic conditions.

This article focuses on the assumption that the initial stage of the formation of information management system is to substantiate its effectiveness in achieving strategic goals in order to ensure the growth of value of the enterprise in terms of its business processes. Business processes, characterized by the indicators of achievement of the strategic results, are an important object of strategic, tactical and operational management in the enterprise. The problem is in the need for organization of management accounting by business processes as components of the Value Chain, which steady growth is crucial as it provides a generic characteristic of all activities of the enterprise. We argue that the solution of this problem can be ensured

by the proper construction of methodological and organizational management accounting based on the combination of the AB-costing and the Balanced Scorecard as an information source for business processes management in the enterprise.

1.1. Related Work

According to the logic of the research, we divided the existed work into three categories.

1.1.1. The AB-costing

The AB-costing method or the method of accounting and calculation of costs by process and functional approach was developed by American scholars R. Cooper and R. Kaplan in late 80's. Since then, this method has become widespread in Western countries. However, Ukrainian enterprises started to use it only at the end of 90's. The AB-costing method is also known as costing for business processes that are carried out by the enterprise in order to create value in the form of a particular products, works or services. This method was introduced for the first time in 1987 by R. Cooper and R. Kaplan in the paper "Accounting and management: prospects of research" [1, p. 204-228]. The forerunner of this method was the distribution system of sales costs, introduced in the USA in early 60's of XX century. According to this method, first of all one should group out the overhead costs by the components of business processes. After this, these costs are being allocated among the types of products (works, services) according to cost drivers (distribution bases) that quantitatively characterize the cause-effect between the process and the products, based on the need of the latter for corresponding activities (processes, operations).
The traditional system of calculation involves the approach according to which resources are being distributed either directly to products or at the expense of a conditional distribution base, which is not always correct. Prevailingly, traditional management accounting tools were used to allocate product costs according to accounting objects (calculation items, distribution bases, etc.) and were based on the concept of residual income and autonomy of the enterprise of 60-70s of the 20th century [2]. We must mention that these tools lack estimation of the value of capital for various stakeholders - investor, customer, employee, society; considering the process of creation the value along the Value Chain and the product life cycle; process-oriented and targeted approach to accounting and costing, as well as considering the factors of influence of the market environment.

1.1.2. The Balanced Scorecard

Gradually, the requirements of value-oriented management concerning identification of all possible factors that affect the growth of the value of the business has led to further search for effective tools for their identification and evaluation. In the previous years it was caused only by financial (material) factors (costs, income and financial results). Then one started to include in above-mentioned factors also non-financial (intangible, non-monetary) factors, which identification and evaluation in the capacity of certain indicators remains relevant nowadays.
P. Horvath [5, p. 197] notes in his work that non-financial (intangible, non-monetary) factors affect the value of the capital before financial (material, monetary) ones. Their active management provides steady growth of the value.
According to P. Horvath, groups of nonfinancial factors include image, qualification, quality, motivation. In turn, groups of financial factors include optimization of usage of assets, investment in business expansion and pricing. These factors were named "key success factors in competition" or "potentials of success" [5, p. 197].
Thus, the need for a comprehensive assessment of all the factors influencing the growth of business by the Value Chain, both financial (tangible) and non-financial (intangible) in their consistent interrelation, has led in early 90's of the XX century to the appearance of management accounting concepts known as balanced cards (accounts) or strategic cards. Among them the Balanced Scorecard by D. Norton and R. Kaplan is the most adapted one to strategic management needs. It considers nonfinancial (intangible, non-monetary) factors of creation value of business in organic combination with material factors, which shows how the adopted strategic goals affect the creation of the value of the enterprise.
Thus, the Balanced Scorecard is the system of strategic indicators that are grouped into four perspectives (namely, Finance, Customers, Internal Business Processes, Learning and Growth) and reflects realization of the strategic goals of the enterprise, which are the result of identification of key success factors in competition or "potentials of success" in the Value Chain [6, p. 18-36].

1.1.3. The Value Chain

The Value Chain is a sequence of different processes (types of activity, operations, functions) that form the value for consumers (customers). It was investigated for the first time by M. Porter in 1985 [3, p. 47].
Thus, according to M. Porter, the Value Chain was created from the point of view of the main and auxiliary activities of the enterprise and includes: design, production, market research, delivery of goods and after-sales service [4, p. 47].
Later, M. Porter's Value Chain was modified by D. Norton and R. Kaplan in terms of interconnected internal business processes that create value for customers.
Thus, the Value Chain in early works by R. Kaplan and D. Norton is considered as internal business processes that create and provide value propositions to customers and include: innovation process, operational process and post-sales service process [7, 8].

The innovation process consists of such elements: identification and usage of ideas and opportunities (market research and consumer preferences, search for ideas and their usage); designing and development of innovations; promotion of innovation on the market [8, p. 74].
The operational process consists of elements of supply, production and sales.
The Post-sales Service business process consists of servicing customers and guaranteeing environmental protection requirements [8, p. 78].
In later works, the Post-sales Service business process has been expanded. It has changed its tasks. Instead, one has created a separate business process Customer Management (Consumer Relations). It also partly took over the functions of the process Sales from the Operational business process as it narrowed the content of this business process to the distribution of the finished product among customers [6].
Also, the Value Chain was supplemented by Legislative (Regulatory) and Social business processes. Innovation business process was supplemented by research projects and developments portfolio management (project portfolio).
In addition, considering that the Operational business process is the main one in creating value, it was supplemented by the process Risk management [6].

1.2. Our Contribution

This paper presents the approach to improving the information support for the management system of the enterprise that operates in conditions of digital economy.
Our contribution includes substantiation the need for organization of management accounting by business processes as an integral part of the Value Chain and the proposal to achieve this by means of combination of the AB-costing and the Balanced Scorecard.
In particular, the use of the AB-costing provides more accurate identification of the cost of production and the value of each internal business process as the part of the Value Chain, in order to figure out the factors that influence the value growth of the business. In turn, the business process cost, identified by means of the AB-costing, enables the use of the Balanced Scorecard technology in order to determine the effectiveness of internal business processes along the Value Chain according to indicators of achievement of strategic results.
The feasibility of applying the approach proposed in this paper was proved on the example of sales business processes.

1.3. Paper Structure

The rest of the paper is organized as follows. Section 2 introduces the preliminaries used in this paper which include information concerning the AB-costing, the Balanced Scorecard and their interrelation with the Value Chain cost management.
Section 3 presents information concerning the usage of technology of the AB-costing and the Balanced Scorecard in enterprise`s business-process management.
Finally, Section 4 concludes the paper and presents direction for future research.

2. INTERRELATION OF THE AB-COSTING AND THE BALANCED SCORECARD WITH THE VALUE CHAIN

The usage of the AB-costing allows both more accurate determination of the cost of production, which is important in the context of increasing competition, and diversify costs in terms of processes that create it, thereby managing costs according to the Value Chain.
Thus, in the process of functional management, the targeted influence on certain material factors of value creation is done. It allows to increase the value of individual types of business and of the enterprise as a whole.
The material factors, influencing the creation of value, traditionally include the enterprise`s costs, in relation to which the influence of instruments of traditional (operational) management accounting has been done, aimed at the production sphere and assessment of its effectiveness.
Therefore, the AB-costing method is actively used for more accurate determination both the cost of the product (work, services) and the value of individual business processes that create the value of business in the context of the Value Chain in order to manage the latter in efficient way. And hence, this method is quite rightly related to the system of value-oriented strategic management accounting.
In this context it is necessary to emphasize that all material factors, known as financial and monetary ones, are the result of traditional (financial and management) accounting of domestic model both in monetary and in natural estimation.
Therefore, the possibility of using the AB-costing in the process of creation of the value of business is entirely possible for determination of both the cost of production (through the allocation of overhead production costs) and the determination of full value of the product (by allocation of sales and administrative overhead costs). As well as the value of each internal business process as a component of the Value Chain in order to identify those factors that affect the growth of the value of the business.
The Balanced Scorecard also uses the Value Chain, which includes internal business processes as its structural components.
Thus, according to the Balanced Scorecard, in order to assess the creation of value of the enterprise along the Value Chain, one should identify the following internal business processes:
- Innovative,

- Operational,
- Customer Management (Consumer Relations),
- Social and Legislative (Regulatory).

These internal business-processes are the main ones, as they create value. All other business processes are auxiliary (both those that ensure the functioning of the enterprise and those that constitute the processes of managing its activities (which according to the current methodology of national accounting belong to administrative costs)), and do not create value of business directly, but contribute to its creation.

3. TECHNOLOGY OF THE AB-COSTING AND THE BALANCED SCORECARD IN ENTERPRISE`S BUSINESS-PROCESS MANAGEMENT

According to the AB-costing method, costs as material (financial, monetary) factors of value creation depend on different factors and are the result of different cause-effect relationship of resource consumption along the Value Chain.

This implies the expediency of considering costs in the context of 4 types of operations according to the way of their participation in the process of manufacturing product, where objects of costing are product, batch, order, enterprise. Namely, a single operation or participation in the output of a product unit - the object of costing is the product. Batch operation or participation in the production of a batch of products - the object of costing is the batch. Group operation or participation in the production and (or) implementation of the kit of products - the object of costing is the order. General operation or participation in the production of the entire product line - the object of costing is the enterprise.

We propose to include next issues in the specified above types of operations by the objects of costing: for the Operational business processes (Supply, Production and Distribution of Finished Products Among Customers) - the product and the product batch; for business processes Customer Management - ordering; for the Innovation business process and the Social and Legislative (Regulatory) business process - Enterprise.

The first two groups of processes (operations) correlate with costs that can be allocated from business processes to a particular product sequentially through the drivers (distribution bases). Costs for general activity cannot be accurately allocated to the product, and therefore in case of necessity they are allocated by means of the developed algorithms in accordance with adequate quantitative measures.

Thus, overhead costs per unit output are allocated from a particular business process through the system of drivers (distribution bases). For example, the driver of the batch operation (participation in the production of a batch of products - the object of costing is a batch) - is the number of transportation (for the Supply business processes). The number of adjustments and the number of product quality checks (for the Production business-process). The quantity of storage time of finished products in stock and quantity of deliveries to buyer (for such business process as Distribution of Finished Products Among Customers).

According to the Balanced Scorecard, one considers elements of value as strategic indicators of financial and non-financial nature in correlation of four perspectives - Finance, Learning and Growth, Customers and Internal Business Processes.

It is generally acknowledged that the Balanced Scorecard consists mainly of financial indicators of value creation (strategic performance indicators), which are disclosed for each component of the internal business process (the Value Chain) in terms of Finance, Customers and Internal Business Processes perspectives. The Learning and Growth perspective discloses only non-financial indicators of value creation (strategic indicators for results achievement). Customers perspective discloses financial and non-financial indicators at the same time.

The availability of financial indicators according to the components of internal business processes (the Value Chain) of the Balanced Scorecard allows to use it in combination with the system of cost accounting and calculation by the type of activity (AB-Costing).

Such economists as R. Cooper and R. Kaplan [9, 10] described the interaction between these two systems. They noted that cost management systems (namely, AB-costing), by the Value Chain, were integrated with the systems of strategic indicators of effectiveness of financial and non-financial character (in particular with the Balanced Scorecard), transforming the last ones into the system of the strategic management accounting.

Thus, the Balanced Scorecard is adapted to modelling, evaluation and prioritization of opportunities of selection of key success factors in competition (success potentials) based on the detailed understanding of goals, risks, business model and the Value Chain (internal business processes) by means of building of the balanced system of financial and non-financial indicators.

AB-costing allows one to allocate costs basing on identification of the cause-and-effect correlation between inputs and outputs of business processes by the Value Chain. That is, by financial indicators according to internal business processes.

Thus, the AB-costing is the best system for the selection of financial strategic indicators in the capacity of success factors in competition (potentials of success) according to the Balanced Scorecard among the set of current cost indicators, which were obtained on the basis of accounting and costing systems in the context of the Value Chain (internal business processes).

That is why, the usage of the AB-costing method in terms of identifying the components of internal business processes as the Value Chain (where the business process is considered as a series of interrelated and interdependent processes that are connected through the exchange of their output results) is important.

It is a well-known fact that according to functional basis, costs are divided into production and non-production costs. If the costs can be directly allocated to the product,

then they are direct according to the National Accounting Standard 16 “Costs” [11].

Non-production costs include all other costs that do not directly participate in the production process but provide management and marketing of the finished product. Such costs include administrative and marketing expenses. These costs are indirect, non-productive and constant as they are independent of production over a period of time.

In case of presence of significant indirect costs and consumption of resources the associated cash outflow does not change in proportion to the volume of production. Considering this, inclusion of such costs in the cost of production (work, services) gives erroneous information that by means of managing the volume of production and product line one can control these costs.

According to the AB-costing, costs for the process are allocated to the product by means of measuring a factor, known as a distribution base, that reflects the amount of resources consumed by this process during the production of each product. Such a factor for overhead costs is the quantitative volume of the output (product) of a particular process they create or its measurer.

Thus, accounting and costing of the business process Customer Management and such element of the Operating business process as Distribution of Finished Products Among Customers (it is important to note that quantitative volume of output is its factor), should be performed in order to determine their internal and external consumer. For these business processes their customers are at the same time customers for the entire enterprise. In other cases, business process customers are internal customers from other business processes.

The output of each process is determined on the basis of the needs of the consuming business process. In case of the business process Customer Management, it is determined on the basis of the volume of sales in natural meter as opposed to the business processes Production and Distribution of Finished Products Among Customers as their result is the volume of manufactured products (in natural meter).

Ideally, the definitions of the output of these business processes are completely the same. But in fact, the volume of manufactured products is always greater than the volume of products sold.

That is why the distribution of costs for sale for business processes Customer Management must be done according to the volume of sales, unlike the business process Production and Distribution of Finished Products Among Customers where the distribution of indirect production costs (overheads) is done according to the volume of production. For this purpose, one must calculate the rate of the meter spent on the production volume or product sale by its types.

The meter is the quantitative volume of the output (product, productivity) of each component of the business process which serves as a factor (base) for the distribution of the resources (costs) consumed by it, or for the other business process or for the finished products.

Considering that the business process Production - is the most investigated one in scientific and practical literature, as well as its complete dependence on a specific type of technological process, we used the AB-costing method on the example of Sales business process. Namely, the business process Distribution of Finished Products Among Customers (the component of the Operational business process) in the context of the elements of storage of finished products and delivery of finished products; the business process Customer Management in the context of the elements of choice and winning the target customer, retaining and developing business with customers [6]. Cost accounting of these business processes is done as sales costs according to the national accounting system.

The business process Distribution of Finished Products Among Customers, in the context of the elements of storage of finished products and delivery of finished products (which were defined by the authors of the Balanced Scorecard), we specified by the next operations: saving finished products, obtaining sales orders, delivery to customers (obtaining permits, contracting for transportation, insurance, etc.), registration of shipping and payment documents.

The business process Customer Management, in the context of the elements of choice and winning of the target customer, we specified by the next operations - product advertising, customer search, contracting (preparation, evaluation, signing); retaining and development of business with customers we specified by the next operations - encouraging of distributors and wholesalers, driving sales and promoting products.

The general model and cost allocation algorithm for the determination of cost of these business processes and allocating these costs to the cost of production consists of the following steps.

At the first stage we group the costs that are recorded in the account 93 “Sales costs” [12] according to items that can be attributed directly to each element of these business processes by operations for the determination of their value: wages, social insurance, costs for materials, costs for telephone calls and subscription fees, costs for processing information on electronic media, depreciation of equipment, furniture etc., depreciation of premises, maintenance costs for equipment, furniture and premises.

At the second stage, we analyze what employees are doing and choose the operations that are involved in a particular process by which adequate allocation factors can be found. Such factors, as already noted, are best suited to measurers of the quantitative outputs of operations. Thus, measures of these operations are - contracts, acts, freight bills, etc. For example, the measure of the output of a contracting operation is the number of contracts concluded; transportation operations - freight bill.

At the third stage, one should define the workload in number of hours needed for the fulfillment of quantitative measures of outputs of each operation. It is done by means of determination of the average time for their execution and multiplying by the number of such measurer.

Determination of the workload of employees for performing the operations is done on the basis of testing and interviewing employees, photographing the working day, describing the operations that employees are engaged

in, determining the measure of the operation, its volume and time needed for their execution.

In order to establish the full-time equivalent of workers, the workload by operation must be divided by the average rate of hours of work over the actual period that is being calculated (thus, the annual rate of hours per employee is 2000 hours).

After determination of the workload for each process and the equivalent of the full-time according to the quantifier of the output (product), it is possible to allocate cost items for each operation.

At the fourth stage, the distribution of analytical groups of direct costs and allocated costs of other processes according to items for each operation of the certain process is carried out in order to determine their cost. Thus, the allocation of wage costs is done by the total amount of wages of employees of the same qualification (category of position) in accordance with their assigned operations. The allocation of wage costs and other costs has the distinction that is connected with the principle of "only workers of certain qualifications have the right to perform relevant operations". And all other costs (rent, maintenance costs for equipment and premises, material costs) do not depend on qualification of employees and are the same for processes grouped into one business process. They can be allocated on a proportional basis depending on the hours of fulfilment of quantitative volume of measurer of the output of the process.

At the fifth stage one can calculate the rate of the measurer for the allocation of costs for the quantitative volume of the output (product). That is, the cost items by each process and its operations are divided by the corresponding quantitative volume of the output (product). Such rate can be determined both by the aggregate of all cost items for their further allocation to products sold, and separately by each item of the process in order to control deviations.

At the sixth stage, one does the reallocation of cost of operations, processes that are common to that business processes which include them. Thus, the sum of costs by the elements of this operation is divided by the full employment equivalent of the entire business process, minus the full employment equivalent of this operation and multiplying the amount received by the full employment equivalent of each operation of this business process.

At the seventh stage one must determine the factors by which the processes of a given business process can be allocated by the number of products sold in the calculated period for the business process Customer Management and by the number of manufactured products for the business process Distribution of Finished Products Among Customers.

For this purpose, one selects such measurers of quantitative volume of output result of operations of certain business processes by which the allocation can be done. The last one is done according to the method of physical observation or establishing a causal connection between these operations and manufactured or sold products.

If it is not possible to establish such connection for individual operations by means of specified methods, the allocation is done by an acceptable connection, that is, by the most suitable quantitative indicator for this allocation.

It is desirable to determine such quantitative indicators depending on the intensity of costs of a certain nature, namely in case of:

- material consumption of operations - by the amount of consumed material resources;
- labor intensity (labor-output ratio) - by the number of hours worked;
- capital intensity (capital-output ratio) - by the number of hours of equipment operation and etc.

At the eighth stage, the costs for operations of a particular business process are allocated to the quantity of the manufactured or sold products by means of the established quantitative volume measures of the processes or the most appropriate indicators that were established for them.

It is clear that for each type of the business process, the allocation of their value to manufactured or sold products has different factors - the measures of the quantitative volume of outputs (products) of processes or the most appropriate quantitative indicators.

The cost of business processes that was determined this way, with the usage of the AB-costing allows to apply the technology of the Balanced Scorecard in order to determine the efficiency of internal business processes along the Value Chain according to indicators of achievement of strategic results. Namely, to determine the value of these business processes and to take full advantage of other accounting indicators in cost and natural estimation.

Thus, basing on the study of the works of the authors of the Balanced Scorecard, for the Sales business process - Distribution of Finished Products Among Customers (a component of the Operation business process) and Customer Management - we propose such strategic indicators in terms of next perspectives:

- Finance,
- Customers,
- Internal Business Processes,
- Learning and Growth (table 1) [6-8].

Table 1 Typical strategic indicators in perspectives of the Balanced Scorecard

Finance	Customers	Internal Business Processes	Learning and Growth
Operational business-processes Element – Distribution of Finished Products Among Customers			
The turnover rate, Free cash flow, The ratio of net discounted income to investment, % of intime payment, Increase in share in the customer's business, Revenue from attracting new customers, Costs for the process	Competitive prices, Cost price, Profitability, % of Returns and Complaints, % on-time delivery,	Costs for storage, Low-cost sales channels, % on-time deliveries, Number of complaints, % of bad receivables, % of outstanding orders	% of employees trained in quality management techniques, Number of highly qualified employees, % of offers accepted, % of offer improvements
Business-processes **Customer Management**			
Revenue from new customers, Share of involvement in the customer's business, Customer`s profitability, % of non-profit customers, Costs for process	% of satisfied customers, % of loyal customers, % of business growth due to recommendations	Number of strategic customers, Number of polls, % of consumer market leaders, Number of customers using advertising, Number of premium customers, Level of service, Number of products per 1 customer	Staff preparedness, Key employees turnover, Application of knowledge management system, % of personal goals

4. CONCLUSION

Digitalization of the economy not just only opened up new opportunities for business, but also gave an impetus to increase of the global competition. This caused the need for conceptual changes in approaches to organization of management accounting as an important component of the information management system of the enterprise management, as critical importance belongs both to effective cost management in order to reduce the cost of production, and the ability to model, evaluate and prioritize opportunities for choosing key factors in competition based on a thorough understanding of goals, risks, business model and the Value Chain.

In order to solve this problem, we proposed the model of management accounting, which is based on the combined usage of technology of the AB-costing and the Balanced Scorecard in enterprise`s business-process management. The proposed approach allows to calculate the cost of the business processes and to determine the effectiveness of internal business processes by the Value Chain according to indicators of achievement of strategic results.

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