

BALANCE SHEET METHOD OF ACCOUNTING AND ENERGY CONSERVATION LAW

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Summary of scientific paper.

The laws of economics were considered by scientists in the dialectic for centuries. During its formation there were a lot of orthodox scientific schools united by a common idea concerning the development and models of operation. For a long time economists all over the world worked hard to understand the patterns of economic and social processes, derive and explain the economic laws using knowledge and experience acquired by men.

The aim of the article is to explore the possibilities of application methods used in the knowledge of the natural sciences to economic doctrines that are suitable to explain the essence of accounting. The task of the study is to develop a method of practical application of the methods of physics to the study of economics, identifying the relationship between conceptual apparatus of accounting and physics.

Keywords: econophysics, balance method, accounting, modeling.

Introduction. The basic categories of physics and economics are analyzed. The study is conducted by studying the law of energy conservation and balance method, the basic common and different features between economic and physical conceptual apparatus are determined.

Body of scientific paper. We know that most economic formulations, axioms, judgments and categories including such as work, money, prices, finance, income are a type of formalized, probabilistic and common, those which are clearly called similar that resist direct, accurate, correct, single, their unambiguous interpretation. This, in our opinion, however, does not take away their meaning and does not prevent their common use. Economic laws or patterns of a particular period in the development and historical hierarchy of a certain country, are primarily qualitative in nature and are treated fairly general. We believe that the use of theoretical positions of economics which it achieved during the evolutionary development of productive forces and production relations, in reality is associated with a number of difficulties and requires professionalism. Therefore, here all means are suitable, if you like – available elements of physics, chemistry, astronomy, and other sciences and certainly in-depth knowledge and practices. Full economy is not easy to comprehend even with the help of economics, but avoiding obviously deceptive, false, distorted ideas, obvious inaccuracies is possible and necessary. For this reason at least you should not take apparent at first sight for the final truth; we must deeply understand the character and nature of events [5].

Until recently, the economy was attributed only to the social sciences, as people who take a direct part in it have an obvious impact on the majority of its processes. To solve them you need verbal description or simple math skills. And taking into account individual factors, some natural sciences can also be attributed to the category of “social sciences” because personnel have the same effect on the pace of public life. Meanwhile logic arising in natural sciences can be clarified by words as well as can be presented using formulas. In consequence of these observations there were many issues about economic facts, their interpretation and methods of investigation. With the pace of scientific schools’ development and the formation of scientific thought the need of motivation and high-quality advice for processes and principles only intensified and that is the foundation of the economy. Accepted available methods of research of scientific thought did not give such confidence and validity, so scientists began looking for modern approaches to work up the economy and its problems. Formation of new doctrines and strategies that would allow answering to the requests and solving economic problems allowed spilling to new research directions and trends.

I would like to join the scientific opinions of Professor R. Haylbroner: “Economists are the first to agree that we should not wait for forecasts from their subject that would in any way

approach by their accuracy to those that are provided by technical science, medicine or astronomy ...Moreover, functions that describe economic behaviour, as opposed to those that describe the “behaviour” of stars or particles bear the imprint of the expression of will or the interpretation. It is connected with this uncertainty of all social theories; because change of expectations under the influence of signals that are registered nowhere except in the head of the economic agent, it can even change the sign of behavioral functions to the opposite” [4, 5].

So, the economy in its present explanation is, on the one hand, the science of numbers, calculation, computation, numerical indicators that are defined with varying degrees of authenticity, on the other hand, the science of hypotheses, judgments, the suspicion assumptions, hypothetical views, opinions, statements. Hence, it is difficult to attribute to the exact sciences and wait for return relevant results.

For the first time econophysics as a science was introduced in scientific literature in the mid-90s of the twentieth century by the American physicist H. Eugene Stanley. Econophysics is a science that applies the methodology of the research of physical phenomena to the analysis of the economy and economic processes. A wide use of the term “econophysics” acquired in 1997 after the symposium organized by Imre Kondor and János Kertész, held in Budapest. The development of such trend is associated with the physicists coming to the science who proposed a new approach to solving economic issues.

As we already mentioned above, the basis of the conceptual apparatus of economics was a verbal method and not physical and mathematical models. Let us try to give economic laws a formalized form. To do this, we apply the categories of physics compared to the supporting categories of the economy. The results of the research will be arranged in table 1. Primary categories of physics – mass, path and time are compared with such economic categories as: the cost in monetary expression, quantity of products in physical units and time. With their help we will obtain secondary categories without the necessity of their proof.

Table1

Certain categories of physics and economics

<i>Supporting indicators of physical research</i>	<i>Supporting indicators of economic research</i>	<i>Calculated indicators</i>
Mass of the physical body – m	The cost in monetary expression – K	Speed: $v=S/t$
Path – S		Acceleration: $a=v/t$
Time – t	Quantity of products in physical units – N	Productivity: $P=K/t$
	Time – t	Economic acceleration: $R=P/t$
		Price: K/N

As you can see from Table 1, the quantitative categories are in the economy, which means that you need to use certain indexes for their transfer into the physical formalized shape. The use of formalized conceptual apparatus will radically change the process of modeling of economic laws and systems, introduce the use of new approaches to the economic modeling course.

Even from the beginning of existence of human civilization management is always associated with human knowledge. Man creates knowledge, controls them, uses them and transfers into the future. Knowledge management is a certain scientific research in the sciences about management that are closely related to the computer science and the theory of artificial intelligence (Figure 1).

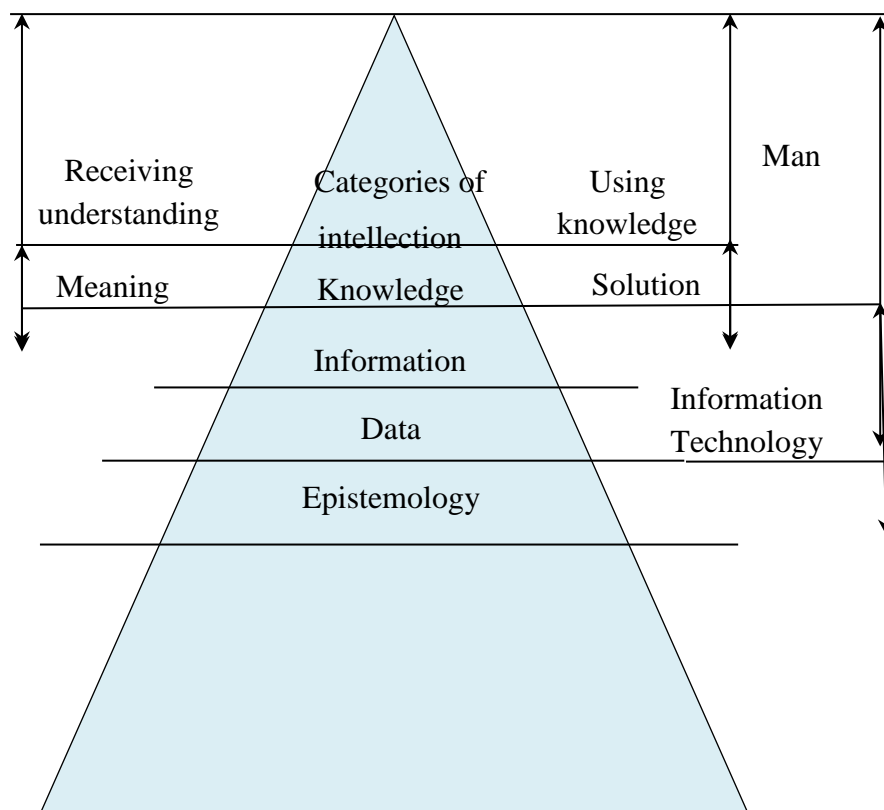


Figure 1. The theory of knowledge during the process of creation and use of human knowledge

Undoubtedly accounting as an independent economic science is practical social human activity. It collects, classifies and groups the facts of economic activity, and therefore is an information base that is used to run the business. First and foremost, today accounting is a complex set of knowledge, intelligence and human consciousness system of measuring, recording, collecting, processing, analyzing and presenting data on assets, capital and liabilities of the enterprise under the influence of economic events [2, p. 21].

Analyzing the above, notes that accounting as a management function is primarily a man's knowledge. Knowledge of technical and managerial personnel, governing management about the state and behavior of assets, capital and liabilities under the influence of economic developments at all levels of the hierarchy of the enterprise. It is impossible not to identify the business processes as objects of accounting, namely: the process of creating the entity, the process of its activities (procurement, production and sales) and the process of termination of its activities as an entity. Economic events that affect the state and behavior of assets, capital and liabilities occur exactly during these processes.

Information hierarchy of the state and behavior of assets, capital and liabilities of the enterprise – data, information, human knowledge and management process is formed on the basis of this knowledge influenced by economic developments. In addition, each level adds some features to the previous level and based on it

Information hierarchy of the state and behavior of assets, capital and liabilities of the enterprise – data, information, the human knowledge, management process are formed on the basis of this knowledge influenced by economic developments. In addition, each level adds some features to the previous level and based on it.

The majority of scientists and economists argue that the problems caused by certain processes can effectively decide if the time they predict. Forecasting is a management function that provides economic society. Accounting process and its organization is one of the most important tools.

At first glance, the accounting has nothing to do with the natural sciences, particularly physics, but if you examine the issue in a broader sense, we can see that accounting system basically has the same background as the physical processes occurring in nature every day.

Explanation for this may serve as one of the fundamental laws of physics – the law of energy conservation. Its meaning is that energy is stored in a closed system that is converted from one form to another, but does not disappear. Full mechanical energy stored in the system equals the sum of the potential and kinetic energy. It can be displayed using the following formula:

$$E = E_{poten.} + E_{kin.} \quad (1)$$

where E – complete energy; $E_{poten.}$ – potential energy; $E_{kin.}$ – kinetic energy.
The same law can be displayed as follows:

$$E_{poten.} + E_{kin.} = const$$

Try to move the principle of operation of this law to the level of accounting. Economic activity for each enterprise is a continuous process in which assets and capital are moving from one form to another.

This may be simply reflected by the general known formula of capital circulation:

$$M - G - M' \quad (3)$$

Capital cycle is the movement of industrial capital in production sphere and circulation, during which it gets three functional forms (monetary, productive, commodity) and passes through three stages (exchange – production – exchange). The movement of industrial capital is expressed in the formula: the goods obtained by circulation of capital are different from the goods purchased at the first stage by quality, shape and higher cost.

Continuity of circulation provides that the capital without delay moves from one functional form to another and simultaneously exists in all three forms. Continuous repetition of the cycle of capital forms turnover of capital.

This means that the assets in the manufacturing process provide capital appreciation while maintaining their value in a newly created product. Regarding the accounting as management function, we can see that the basis of its construction serves this same closed system in the light of reflection of economic operations by double entry on the accounts and summary of information with using the balance sheet method.

It is known that the balance method has two variations. One of them is balance sheet method that allows observing the change in the effective rate by identifying and considering the influence of the latter factor. This method is the most leading of levers that used in the planning of the enterprise activity, as it allows to operate not only financial performance and assess their dynamics, but also carry out the same analytical procedures with the indicators in natural its expression.

The balance method is used in accounting in practice in Ukraine to display summary information on accounts of accounting and in financial reporting.

The following algorithm is used in determining the final result for the reporting period on an active account:

1) facts of business operations are registered for a month by debit and credit of such account;

2) at the end of the reporting period summarize the debit and credit of active accounts;

3) then the balance at the end of the reporting period is defined on the respective active account. The balance on this account is determined as follows: turnover on debit are added to the balance at the beginning of the period on account that are analyzed, and credit turnovers are deducted. The process for determining the final balance (balance) during the reporting period on a single active account can be displayed using the following formula:

$$B_{end.as.} = B_{beg.as.} + T_{deb.} - T_{cr.} \quad (4)$$

Such algorithm is used for calculating the final balance on the passive account. The only difference is that credit turnovers are added to the initial balance on the passive account ($B_{cr.}$) and debit turnovers are deducted. This algorithm is reflected in the following form:

$$B_{end.pas.} = B_{cr. beg.} + T_{cr.} - T_{deb.} \quad (5)$$

According to the results of the conducted calculations on active and passive accounts is balance sheet over a period, where there is a basic rule of balance, such as enterprise assets equal to passives of the enterprise.

The same pattern is observed in one of five main annual financial report forms, such as Form №1 “Balance” (“Statement on Financial Position”). This form of reporting is a document of tabular form, which consists of two parts. The first of which contains information about the assets of the enterprise – “Assets”, which consists of the following sections:

1. Non-current assets.
2. Current assets.
3. Non-current assets kept for sale and disposal groups.

Equity capital and sources of its formation, liabilities and other passives are displayed in the passive part. Information on passives in this reporting form is grouped into the following sections:

1. Equity capital.
2. Long-term obligations and provision.
3. Current liabilities and provision.
4. Liabilities associated with non-current assets held for sale and disposal groups.

Such distribution allows forming a clear picture of the company's resources and shows the consistency and continuity of the movement of enterprise resources in a closed system just like the energy that drives the physical processes in everyday life.

To summarize our ongoing work, we use the Table 2.

The main differences of balance sheet method from the law of energy conservation is that energy is constant in a closed system, i.e. constant, and we cannot directly observe the process of flow or the creation of new energy in a confined space. As for accounting, we can refine the process for new resources and their disposal. This gives us an opportunity to observe the continuity of the accounting process and its isolation, despite the fact that there are constant changes of resources in this system.

Table 2

Comparative analysis of the balance sheet method and energy conservation law

Main indicators	
Balance sheet method (active account): - Balance at the beginning – B_{begin} . - Revenues – T_{cr} . - Disposals – T_{deb} . Balance at the end – B_{end}	Energy conservation law: - Complete energy – E - Potential energy – E_{poten} . - Kinetic energy – E_{kin} .
- $B_{begin} + T_{deb} = B_{end} + T_{cr}$.	$E_{poten} + E_{kin} = const$
Balance sheet method (passive account): - Balance at the beginning – B_{begin} . - Revenues – T_{cr} . - Disposals – T_{deb} . - Balance at the end – B_{end}	Energy conservation law: - Complete energy – E - Potential energy – E_{poten} . - Kinetic energy – E_{kin} .
$B_{begin} + T_{deb} = B_{end} + T_{cr}$.	$E_{poten} + E_{kin} = const$

The above comparative analysis made it possible to conduct scientific exploration of opportunities for using the methods of physical research inherent to the law of energy conservation of development and substantiation of theoretical positions of accounting, as functions of management and economic science. We have the opinion that the accounting is economic science as a field of knowledge and practical human activity (profession).

Conclusion of scientific paper. It is doubtless that there is an approach that anyone who starts to study accounting or deepen their knowledge in it; you must understand that we cannot demand or expect from this science what it cannot give in principle, because of its nature.

Accounting as a science and the field of practical human activity gets new impetus for working out their theoretical foundations and applied conditions for use in the process of social development. Its content is determined in the light of the challenges that are before it, and the functions that it performs.

Econophysics as a doctrine is one of the promising areas of economic development and economic modeling of business processes today. It is necessary to coordinate the basic concepts and categories of physics and economics for the effective use of this science.

You can also notice that econophysics impact on the functioning of the economy and its processes are quite positive, because its use enables us to explore more precisely all economic processes, to conduct qualitative economic analysis of the enterprise activity.

As seen from the above, the balance sheet method in theoretical terms complies with the law of energy conservation. Therefore, in our opinion, implementation and development of this area of science as econophysics will be able to improve and enhance the theoretical basis of accounting.

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