

## **The manifestation of synergy in management and social sciences, and methods for measuring it**

## **La manifestación de la sinergia en las ciencias sociales y de gestión, y los métodos para medirla**

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### **ABSTRACT**

The article suggests the use of a systematic approach in management by using well-known management schools and areas of achievement at the same time. The article touches on the essence of the concept of synergy, and that synergy exists only in such a system that performs its functions. On its basis, a hypothesis has been proposed for identifying synergy, and in the processes themselves a systematic approach has been proposed to identify phenomena such as synergy. It is proposed that the source of synergy might be “entropy”. The author of the article indicates that processes take place in any activity of a human beings and society, such as the humanities, social and economic sciences, which implies the existence of entropy, which is very similar to the theory of transactions and transaction costs. This approach is necessary for the application of budgeting and financial relations for individual entities and as well as the whole state.

**Keywords:** stage of management, systematic approach, synergy

## RESUMEN

El artículo sugiere el uso de un enfoque sistemático en la gestión mediante el uso de escuelas de gestión bien conocidas y áreas de logro al mismo tiempo. El artículo aborda la esencia del concepto de sinergia, y que la sinergia sólo existe en un sistema que cumple sus funciones. Sobre su base, se ha propuesto una hipótesis para identificar la sinergia, y en los propios procesos se ha propuesto un enfoque sistemático para identificar fenómenos como la sinergia. Se propone que la fuente de la sinergia podría ser la «entropía». El autor del artículo indica que los procesos tienen lugar en cualquier actividad de un ser humano y de la sociedad, como las humanidades, las ciencias sociales y económicas, lo que implica la existencia de entropía, que es muy similar a la teoría de las transacciones y los costes de transacción. Este enfoque es necesario para la aplicación de la presupuestación y las relaciones financieras para las entidades individuales y así como el conjunto del Estado.

**Palabras clave:** fase de Gestión, enfoque sistemático, sinergia

## 1 INTRODUCTION

At the present stage of management development, in most scientific literature on economics and management, it is defined as an effective way to achieve the set goal for the organization through the rational use of all available resources. In purpose of this, various methods have been developed and proposed in order to increase the "efficiency" of the organization in the conditions of a market form of management.

So, the founders of the school of scientific management, F. Taylor, spouses F. and L. Gilbert and others believe that the use of such activities as measurements, observation, logic and analysis, using appropriate people appropriate to a particular situation, allows to improve a fairly wide range of operations manual labor, allowing you to use it more efficiently.

The first phase of the scientific management methodology was the analysis of the content of the work and the determination of its basic elements. Which was based on obtaining more detailed information about the work operation that allows eliminating unproductive movements on standard procedures and equipment that increase the efficiency of work at a particular workplace.

The great achievement of this school was the establishment of real production standards, in which it was possible to assess the intensity of the workload of workers. In this case, the employee over fulfillment of these norms provided for additional payment. Thus, this school made the main emphasis in its research on production management. This allowed F. Taylor to formulate well-known principles of labor organization.

Administrative or classical schools of management were seen as a source of increasing efficiency in managing the whole organization. The founder of this school is A. Fayol, who saw the source of increasing the effectiveness of the organization in determining the characteristics and patterns of development of the organization. Representatives of the classical school of management suggested that the creation of universal management principles could lead to success.

These principles affect two aspects: the development of a rational organization management system, which suggests an optimal way of dividing into work groups, such as: production, marketing, finance, etc.; and the construction of an optimal organizational structure for the organization and management of employees, in which A. Fayol formulated 14 management principles that are relevant at the present stage of the development of management science.

The objective reasons for the emergence of the school of the psychology of human relations and social systems were the inability to fully recognize the human factor as the main element of the organization's effectiveness. Thus, this school was based on the achievements of such sciences, the study of which is man and society: psychology and sociology.

All this served the start of the new school of "human relations." The founder of this school is E. Mayo, who discovered that the developed clear operations and high wages do not always lead to higher labor productivity, the employee is not more responsive to pressure from the direct supervisor, but to his colleagues in the group.

The school of human relations emphasized the importance of informal ties between the individual in production. This allowed us to consider such areas as the motives of human activity in the labor process. All this made it possible to develop recommendations for collective decision-making, for the participation of workers in management, and for the ways and methods of continuing education for workers. Also in the field of view of this school were the problems of relations between people in the production process, the delegation of authority of leaders and a number of administrative issues.

The main achievement of this school was the discovery that behind the motives of certain actions of people are not economic incentives, but various needs that cannot be fully or partially satisfied with the help of high wages.

Thus, representatives of the psychological school suggested that if, managers show great concern to their employees, this will lead to the fact that the level of employee

satisfaction will also begin to increase, which, in turn, will lead to increased productivity. All this served the use of such techniques in the management of human relations as: consulting with employees, providing them with more opportunities at work, etc.

The introduction of computer technologies, communications, etc. in the sphere of management, highlighted quantitative approaches to solving managerial problems. There was an increased need for accurate answers to production and economic questions: how to rationally distribute the enterprise's resources (equipment, raw materials, labor, time, finances) in order to achieve the organization's goals. This situation required accurate estimates, which led to the need for mathematical methods for their calculation.

This situation required the development by scientists from different countries of a new area of applied mathematics, the so-called "Methods of research operations. This contributed to the emergence of such a problem as the quantitative justification of managerial decisions made in various sectors of social activity. Such a problem in relation to economic activity was called as economic-mathematical methods.

Economic and mathematical methods have found their practical application in inventory management; resource allocation; mass service; network planning and the search for optimal solutions using linear, nonlinear and dynamic programming methods.

The management schools proposed above substantiate the importance of applying each aspect of the impact on the employee in management, but, in our opinion, they cannot give an objective assessment or measure how the use of any so-called "tools" proposed by various management schools can lead to any systematic the end result. Since objective reality seems to be the existence of the proposed various management theories in aggregate, all concepts of management schools cannot exist separately. We assume that for the further development of management theory, it is necessary to combine all the achievements of the above schools of management and consider their actions together, since all the management tools of the schools presented cannot exist separately in reality.

The organization of all the proposed methods and tools for influencing an employee of different management schools is used in conjunction; each method of influence cannot exist separately. Thus, we can say that it will be much more convenient to apply a systematic approach to management in determining synergy in it.

The word synergy is Greek (sinergeia - cooperation, commonwealth) and denotes a specific variant of the body's response to the action of two or more medicinal substances, characterized by the fact that such an action exceeds the action exerted by each component individually.

The word "synergy" and "synergistic effect" (from the Greek. Sinergos - together acting) in scientific works on economics means as a principle provision for increasing the economic effect as a result of the joint use of individual elements of the system, which may imply connections or merging within the system in practice, such a phenomenon in the economic literature is called emergence.

The discoverer of the phenomenon of synergy as a phenomenon manifesting itself in the system itself is generally accepted by I. Ansoff in the 60s. XX c. The above term for explaining "the phenomenon when income from own use of resources exceeds the sum of income from using the same resources separately, is often called the effect of " $2 + 2 = 5$ ", taking from the natural sciences as biology called it as "synergism".

Synergy is the effect of the interaction of interconnected elements in the system. Hence, synergy is obtained in the form of a synergistic effect within the system itself. This means that the effect obtained by simply expanding the economies of scale at the concentration of production (due to reductions in fixed costs) is incorrectly attributed to synergy. I. Ansoff, explaining the synergy, divided it into two components: cost optimization and productivity improvement.

By objective necessity, we can talk about synergy only if the system performs its own functions designed for it. In the scientific literature, the concept of a system is classified as: simple, open, closed, conservative, dissipative, linear, non-linear, etc.

As we know, there are dozens of different definitions of the concept of "system" in the world. Thus, L. von Bertalanffy defines a system as a complex of interacting components.

He also writes that the system is a set of elements that are in certain relations with each other and with the environment. A system is a set of interconnected elements, separated from the environment and interacting with it as a whole.

Synergy can be represented as a property of a system that arises as a result of the interaction of system elements. This leads to the fact that we can only say that synergy is not characteristic of any system, but takes place in the very processes of interaction of elements within the system. Accordingly, we can say that synergy is due to the existence in the system itself, which arises in the process of interaction of system elements. Therefore, systems do not need to be associated with synergy at all.

The process determines the practical embodiment of the theory into practical applications, which characterizes the phenomenon during the interaction of system

elements, without which it seems impossible to quantify the synergy, respectively the synergistic effect.

The process itself can be scientifically explained in detail by the methodology proposed by IDEF0 (Integrated Definition Function Modeling), authored by Douglas Ross, which was developed in 1973. This methodology was designed to cover the emerging needs for the analysis of heterogeneous methods of interactions of individual processes. This technique describes in more detail and explains the essence of the constituent elements of any process that has received public recognition and is accepted in the United States as federal. Such a methodology revealing the essence and content, as well as clearly explaining the process, can be a source of successful application in various humanitarian and social sciences, such as: political science, psychology, sociology, economics, jurisprudence, etc. Currently, the IDEF0 methodology is widely used by researchers not only in the United States, but throughout the world.

We will try to demonstrate the very essence of the IDEF0 methodology, in it the process is presented as: the process of transition of the trends of the “Input” to “Output” transition, with the influence of the “Management” tool using the tools that are presented as the “Mechanism”. Graphic notation of the process in the modeling system is presented in Fig. 1.

Fig. 1. Standard process diagram

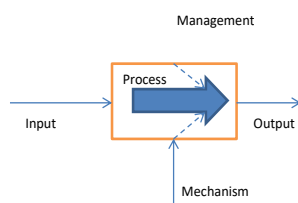


Fig. 1. Standard process diagram

As can be seen in Fig. 1, the process can be represented as a rectangle, the beginning of which is the “Input” arrow from the left, the top is represented by the “Management” arrow, the bottom is represented by the “Mechanism” arrow, the process ends with the “Output” arrow presented to the right. In the presented model, the arrow “Input” means all the initial data in the aggregate included in the process for changing them in it, therefore, “Input” is the initial state of the system itself. Under the arrow called “Output”, you can imagine the converted product, through the interaction of a heterogeneous process leaving. "Management" can be presented as a component of the

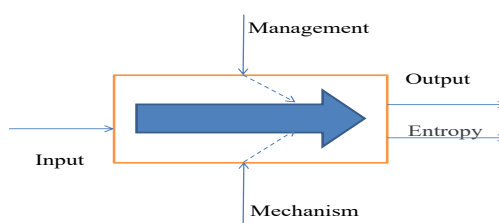
process, representing the human impact on the very interaction of the elements of the system. And finally, under the “Mechanism” arrow, we can mean an instrument of influence by influencing process controls. Mechanisms are those resources that cannot be transferred to the "Output", but create the necessary conditions for the process of transformation (like a catalyst in chemistry). The most important element of the process can be considered the life cycle of the process, which is shown by an arrow in the rectangle. It is in the process of the life cycle that is an algorithm or sequence of effects of process elements with other components and how the transition of the input to the output itself, through the impact of "Management" as a person, and using resources - the "Mechanism".

The transformation of “Input” into the total desired “Output” in society and the economy can be called a process.

Development in the context of the totality of the desired changes in the economy and society, began to be seen as a process.

The special model of the process approach given in our article makes it possible to demonstrate the differentiation of the process itself into its components - subprocesses. The whole set of classified systems can be characterized by the description of one or several processes existing in any system. Objectively, it can be argued that when converting “input” to “output” during the course of the processes that transform them, we can say that there are always any losses in the form of energy or matter in the life cycle and the elements themselves involved in the process. Thus, let us dwell on the losses, which we tried to clearly show as “entropy”, which is an objective indicator that, in our opinion, will help to measure such losses, which are presented in Fig. 2.

Fig. 2. Entropy-based process model



Like “synergy”, the term “entropy” has a Greek origin (en, tropē - rotation, transformation). In 1865, the German physicist first introduced it into scientific circulation, who was subsequently one of the founders of thermodynamics and the

molecular-kinetic theory of heat, Rudolf Clausius. He discovered that all matter has the property of losing energy, i.e. the process of energy absorption by matter is proportional to the state of the "internal property" of the system under study.

Consequently, "entropy" means the objective depreciation of energy as a measure of its loss, "dispersion" into the environment, etc. In our opinion, the "internal property" can be understood as the processes themselves in the tendencies of the interaction of elements in the process of a system. Therefore, it can be stated that "entropy" exists in every component element of the process (input, output, management, mechanism), as well as in the process life cycle itself. For simplicity, we cited it as a parallel exit from the process.

Therefore, it can be asserted with certainty that in objective reality there cannot be processes with a 100% useful action. "Entropy" can be characterized as an additional result of the action of individual elements of the system or a parallel process, which cannot be determined by individual elements of each system.

Thus, "entropy" can exist both on "input", "management", "mechanism" and on the life cycle of the process itself. The appearance of a synergistic effect can be explained by the fact that the "entropy" decreases, i.e. individual elements in the system, in the process of interaction and its life cycle, tend to zero. This, in turn, leads to an increase in an additional useful output - synergy.

So, the objective reality of the law of conservation of energy and mass, says that synergy cannot come from nowhere, which means, in our opinion, it is formed together with "entropy" in the very processes occurring in systems.

Therefore, synergy arises from the utilization of "entropy" by absorbed system elements during their interaction and by the process itself, the elements of which can be "input", "management", "mechanism" and "output". We can conclude that synergy can occur only when utilization of the entropy of jointly acting processes simultaneously and alternately in the system itself.

So, we were able to clearly identify the existence of such a phenomenon as synergy. The problems of synergy manifestations also exist in the so-called humanitarian and social sciences. If we assume that all of the above sciences are related to human activity, which means that society as a whole consists of an individual person, then any human activity is accompanied by economic categories, such as the costs of carrying out activities and income, characterizing the receipt of benefits.

O.V. Rybakova uses the following approach to determining costs: Costs are a cost expression of the value of economic resources when a corporation takes any actions, which science itself is also pursuing management. She also refers to costs as losses, defining it as the costs of the organization that did not generate income or led to losses.

So entropy in the humanities and social sciences, we believe, can be equated with economic categories as costs, presented in the form of cost reduction, while increasing the result, presented in the form of an economic category - income. Since entropy is the absorption of energies by individual elements of the system in the process of their interaction with each other, we can assume this as economic losses in the form of the costs of interaction of the elements of the system, and synergy as the benefits received from such interaction in the form of additional income.

A certain difficulty is presented in the classification of so-called "entropy" costs. For this, we believe that it is necessary to go over to the theory of "transactional" costs proposed by the American economist, Nobel Prize laureate R. Coase, to explain these types of costs. This concept refers to the process of transfer or reproduction of property rights. The term "transaction" is close to this, in which the ownership right is changed or transferred to one or another business entity. In this case, the transaction covers more social and economic phenomena, which should be given using the classification of the transaction proposed by J. Commons, who defined it in three possible forms:

1. bargaining transaction: the transfer of ownership takes place on the basis of a voluntary agreement of the parties, here there is a coincidence of the concepts of "transaction" with a negotiated transaction;

2. managerial transaction: the transfer of ownership occurs in the case of directives of one person and subordination to another, for example, the manager's attitude to the executor;

3. rationing transaction: the transfer of ownership is transferred by a team that is given by a collective body, and submission comes from individuals, a similar relationship is observed between the state and the population;

Transactional costs can be understood, in the aggregate of definitions, as costs in defense of property rights. Also in the scientific literature we can find a definition of transaction costs, as the costs of using the market mechanism or as the costs associated with the conclusion of transactions.

In classical physics, it was believed that when moving objects, the friction force does not significantly affect the result of the movement, but the use of friction force with

an increase in the physical effect on the result has not been invented in science. Thus, we can say that “entropy” has the same meaning as the force of friction, which did not come under the scrutiny of economists. The same assumption is made in non-classical theory, where the movement of economic objects, i.e. ownership rights occurs with zero friction, i.e. free of charge. Thus, we can see that the theory of transaction costs, as it tells of the existence of entropy in social, political and economic relations. But due to the fact that it is not possible to measure these costs, it does not find the popularity of their practical application. On the basis of our hypothesis, entropy occurs during the functioning of the system, both during the interaction of the processes of the system and the course of economic activity itself.

Consider system processes in management. Human economic activity ensures survival in the natural environment, mainly acquires an economic nature, which is the basis and creates the conditions for political, legal, social and managerial human activity.

So using the process of rationalization of available resources in management, the organization achieves an increase in labor productivity, as a result, the number of manufactured products increases at constant production costs. This leads to an increase in income, and subsequently, in profit, all other things being equal. By creating a rational organization management system, the so-called “control costs” are reduced, which also reduces economic losses, which can manifest themselves as production costs, which suggests increasing the company's profitability in the country's financial market. Increasing the atmosphere of an organization's “cosiness” in a individual's work can also increase the organization's “corporate spirit”, leading to an increase in the economies of scale from available resources, which also leads to an increase in profitability and company's reputation, etc. The use of mathematical methods in inventory management; resource allocation; mass service; network planning and the search for optimal solutions by using linear, non-linear and dynamic programming methods, the organization also eliminates downtime, unjustified losses manifesting in additional unforeseen expenses of the organization, which also lead to increased profitability of the organization.

There is a cascade of synergy, in the management concepts above. First, the instruments of the schools of scientific management are used, then the instruments of the classical school, after applying the concepts of the school of human relations. And finally, the application of the achievements of the quantitative school increases all social, political indicators, and the most important they are confirmed by economic indicators.

In nature, such a combination of processes is practically not feasible, it is only possible when managing individual processes by a human based on synergy. For example, managing an orchestra with the help of a person who is a conductor. Achieving consistency in the sound of a huge number of instruments in the form of an orchestra involves reducing the entropy (inaccuracy, inconsistency, errors) of each participant. It can also include coordination of all functional departments of the corporation, which will lead to the above described effect. For this, a synergy process is used, the producer of which is the manager, and according to the established system of plans, he addresses each functional structure, or even each employee, leading to a decrease in entropy in production systems and processes, the result of which is to obtain a synergistic effect - synchronous interaction of all processes production and system elements at the same time.

Thus, all the practical activities of a human being, such as social, political, legal and economic, are associated with obtaining and using synergy, which in any case provides a positive effect and improvements in living conditions. Therefore, we can say that the skillful coordination of all social, political, legal and economic areas of human activity combines, embraces, and can synchronize industrial management. We believe that the synergistic effect is clearly manifested in their joint and joint participation of the individual elements of the system among themselves, which can be estimated by economic categories as costs and profitability.

All economic activities of society are associated with the formation, production and rational use of available resources. Economists equate or see resources in terms of commodity-money relations as money. The transfer of ownership rights, in these conditions, is associated with financial flows, i.e. cash payments are directed to owners of property rights, while owners receive financial responsibility to fulfill their obligations. In this case, the disclosure of synergy issues in the field of budget formation and execution as separate economic entities and the whole state becomes especially relevant.

## **2 CONCLUSION**

Based on the research, the following conclusions were obtained:

1. A hypothesis is proposed, which is based on the concept of a process in management, acting in the system and applying all the concepts of management schools at the same time, because in our opinion, each school is useful and the world is developing not one-sidedly, but comprehensively, and it is necessary to use the achievements of all management schools simultaneously to obtain a synergistic effect.

2. A process approach hypothesis was formed to explain the description as a source of the synergistic effect obtained within the system.

3. All practical human activity is based on certain processes, which means that the process approach introduces a new system of concepts that describes the movement of matter, as well as an explanation of the "postulate" theory of transaction costs based on the latter.

4. Using the developed functional model of processes in nature and the social, political and economic sciences, since processes exist in all of the listed sciences, it allows us to identify synergy and synergistic effect.

5. It is necessary to carry out additional checks of this hypothesis in the budgeting of business entities and a separate state, since the basis of human economic activity at the present stage is commodity-money relations involving financial flows and settlements between them.

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