

## MANAGEMENT OF A VIABLE ENTERPRISE ON THE BASIS OF THE APPROACH TO MANAGEMENT OF A «LIVING» ORGANIZATION AND THE CONCEPT OF VIABLE SYSTEMS

I. Fedotova, O. Shersheniuk, M. Prokopenko, I. Britchenko, R. Vazov

### ABSTRACT

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The innovative vector of development is a modern approach to production, sales of services, etc., their adaptation to current societal requirements. It is provided by the transformation of scientific research and development, other scientific and technological achievements into a new or improved product, introduced to the market, into an updated or improved technological process, used in practice. Consequently, approaches to enterprise management are also transformed into modern realities and acquire shades of innovative approaches. Effective management is necessary to ensure the viability of enterprises, and new tools, methods and approaches to management are especially important here. The aim of the article is to develop theoretical provisions for the formation of a viability management system based on the concept of viable systems and the approach to managing an organization as a «living» system. The work identifies that effective viability management requires the creation of an organizational structure in an enterprise that will function as a «living organism». The representation of the enterprise system in the form of a living organism is considered. To form a holistic system of an enterprise, the systems of the human body are considered in more detail and the corresponding systems of the enterprise are determined. A set of functional subsystems of an enterprise by analogy with the systems of a living organism, the activity of which is interdependent, which ensures the stability of the «living organism» of the enterprise to the influence of external conditions has been formed. It has been determined, that in order to fully maintain the viability of an enterprise, it is necessary to study not only the «physical body» of the enterprise as a set of functional subsystems, but also its «soul» – corporate culture, which must be developed on the basis of paradigms of sustainable development and social responsibility.

### KEYWORDS

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Viable system, «living» organization, functional subsystem, management system, model, operating element, metasystem, biological system, economic system.

### 5.1 MANAGEMENT OF A VIABLE ENTERPRISE IN THE CONTEXT OF THE MANAGEMENT SYSTEM OF A «LIVING» ORGANIZATION

One of the most effective approaches to building an enterprise management system is the concept of a viable system of a firm. The multilevel recursive viable model of the enterprise management system, which is built on the basis of the concept of viable systems, has been improved. The object

in the management of a viable system is a set of basic systems of an enterprise, which are defined by analogy with the biological system. This model of the system is proposed as fundamental for the construction of other types of systems, which allows to form a management system at each level of recursion, ie the corresponding systems of an enterprise. The model allows the top management of an enterprise to generate, coordinate and adjust decisions on the functioning of the enterprise.

In the current economic crisis, caused by the coronavirus pandemic, the problem of ensuring the viability of enterprises is relevant, emphasizing the need to use new approaches to enterprise management. The coronavirus pandemic has broken the usual links between producers and consumers around the world and has made major changes in the business of transport and logistics companies. The spread of COVID-19 and the intensification of the coronavirus crisis have dealt a severe blow to global logistics and the supply chain of raw materials and finished products. This has put a large number of trucking companies in Ukraine and the world on the brink of extinction. From the point of view of management, the viability of enterprises in unstable conditions should provide effective management. Therefore, road transport companies need to look for new approaches to management. Perception of the new, adaptation to change and reasonable prediction of future development become the most important factors in the viability of enterprises as complex systems. Effective management is needed to ensure the viability of road transport enterprises, and new management tools, methods and approaches are especially important here.

Effective viability management requires the creation of an organizational structure in an enterprise that will function as a «living organism». Thus, the author A. Talalaev [1] determined that the management of an organization from the standpoint of living systems should be based on the principles of existence of living systems at different hierarchical levels of the organization, as well as cybernetic, structural-functional, systemic and informational approaches.

In his study, A. De Gius [2] contrasts the values of a «living» organization, the basic goals of which are to survive and succeed in the long run, maintaining the spirit of collectivism based on common values, openness to the outside world, willingness to accept new people and creative ideas, which allows you to better adapt to changing working conditions in the market, to patterns of a usual «economic» enterprise, whose priorities are determined solely by financial and economic indicators. It is the approach to managing a «living» organization that will allow modern managers to cope with crisis situations.

## 5.2 THE BASIC FOUNDATION OF A VIABLE ENTERPRISE MANAGEMENT SYSTEM

In the past, the view of organizations as mechanistic formations led to increased production and success. But the mechanistic style of leadership creates problems with organizational adjustment. The need to plan all changes and impose them leads to bureaucratic backwardness, ignoring collective learning and development, the inability to survive in today's complex information-oriented and turbulent environment. The speed and complexity of the business environment force companies to

take a different approach. In his work, A. De Gius [3] studied large corporations that existed for over a hundred years, which have managed to survive radical changes and continue to thrive without losing their unique identity. The author [3] concluded that they were helped in this by the fact that they were all inherently flexible and easily adapted to changes in the environment, similar to the behavior of living beings. Thus, businesses that want to thrive must be able to adapt to changing conditions, just as living organisms evolve in response to changes in the environment.

The concept of organizations as living systems is not new. The analogy between an enterprise and living organisms has already been considered in [2–15]. Much work, especially in the field of systems thinking, has brought this perspective into the spotlight. By studying biological models of human physiology, we can gain understanding and generate new ideas for business management. But S. Beer approached this question most thoroughly in his works «Brain of the firm» [16, 17] and «Heart of the enterprise» [18]. In order to understand the principles of viability, as a model S. Beer chose systems, known as viable, the author examined in detail how the human body is built and how it is controlled by its nervous system. The author took as a basis the work of the human nervous system, which regulates all other body systems, and compared it with the management system of a firm. S. Beer considers the human brain as a viable system. By analogy with the human system, S. Beer identified five management systems. But the author paid most attention to only one of the body's systems, and other systems considered superficially. Among scientists there were attempts to compare the organs or systems of the human body with departments, strategic business units or other structures of the organization [19–21], or certain body systems with economic processes [22]. The main disadvantage of these studies is the lack of systematicity, because some bodies are compared with departments of an organization, some with systems or functions. But most authors [2, 7–14] considered not so much the structure as the principles, on which the functioning of a «living organization» or organizational development is based. Thus, we can conclude that the representation of the enterprise system in the form of a living organism has many aspects, many of which are practically not taken into account in modern economics.

Traditionally, activities of an enterprise are considered through the organizational structure of management. Based on the analysis of the works of M. Khammer, Dzh. Champi, T. Boidell, A. Beklemishev [23–25], it can be concluded, that currently the functional approach to management, based on a hierarchical organizational structure of management, which is the distribution of functions between units, is traditional for enterprises. The disadvantages of this approach are: the complexity of linking individual tasks in the technology of production of goods or services; lack of a common vision of the results of their work in performers of certain functions; the complexity of interaction between performers of related functions; lack of responsibility for the final results of an enterprise; conflicts of interest between different departments; lack of customer focus and high overhead. This requires the development of an enterprise management system based on the application of not only functional but also other approaches to management.

One of the most effective approaches to building an enterprise management system is the concept of a viable system by Stafford Beer [16]. S. Beer described a model of a viable system in the

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form of a neurocybernetic model, the prototype of which was the architecture of the human central nervous system where in the normal state is the autonomous work of units and only in extreme circumstances «dictatorship of the center» is switched on. S. Beer proved the expediency of the proposed model based on the elementary laws and principles of cybernetics.

A significant number of works of scientists is devoted to the formation of a viable enterprise management system from the point of view of the concept of viable systems [26–31]. However, despite the prevalence of this approach [6, 32–35], it should be noted, that the concept of viable systems is abstracted from practical activities of specific enterprises, which significantly complicates its application.

Given the dynamism of the external environment, special attention should be paid to building a viable management system of a self-organizing road transport enterprise. Complications of management functions and tasks, democratization of relations, availability of information, knowledge-intensive technologies and the speed of technological change reveal the shortcomings of hierarchical structures. They lack dynamism and imbalance – the main signs of self-organization. The response time to changes is longer than the time of manifestation of the consequences of these changes and the interval between successive changes. Delayed reaction is the death of any organism and any organization.

In a typical hierarchical system, the task is divided into many small components, by individual specialists, who solve them in isolation from the whole task, and top management then connects and evaluates the contribution of each. Tasks, rights and responsibilities of all participants are defined and known, interaction is provided only vertically. S. Beer's model of a viable system [16] is a compromise option. However, the classical concept of viable systems has a number of shortcomings: the distribution of management functions between the subsystems of economic entities does not correspond to the organizational structure of real enterprises; the system of information flows of an enterprise cannot fully correspond to the information channels of the human nervous system; the use of the functional approach does not correspond to the trends of research in the field of enterprise development, because in economically developed countries process and system approaches to management are dominant. Therefore, when forming a model of RTE management based on the concept of viable systems, it is advisable to proceed from the basic business processes of an enterprise, ie to use process management.

### 5.3 FORMATION OF A VIABLE ENTERPRISE MANAGEMENT SYSTEM BASED ON THE APPROACH TO THE MANAGEMENT OF A «LIVING» ORGANIZATION AND THE CONCEPT OF VIABLE SYSTEMS

Viability is a synthetic feature of an enterprise of the highest level of commonality, as the level of viability of the enterprise accumulates the action of all factors, influencing its functioning [36]. Since viability is a synthetic trait, and ability itself in the theory of viability is understood as a possibility of a certain activity, as a possibility to achieve a certain result in this activity, viability as the

ability to generate acceptable income on the long basis can be considered a superposition of simpler abilities. At the heart of such ideas is the possibility of presenting the process of life (functioning) of an enterprise as a whole in the form of a superposition of simpler processes (activities) [36].

To form a holistic system of enterprise activities, it is necessary to consider in more detail the systems of the human body. The systems of human organs are connected anatomically and functionally and together form a whole human body. An organism is a certain complex or system that reacts as a whole to various changes in the external environment, it is relatively stable, despite the fact that it consists of many organs. Organs, in turn, consist of tissues, tissues – of cells, cells – of molecules. In the body, organs and organ systems occupy a certain position and perform their inherent functions. The mechanisms of neurohumoral regulation are responsible for the coordinated work of all organs and systems, as well as for their interaction. This ensures the body's resistance to external environmental conditions. First, consider the basic systems of the human body and the functions they perform (**Table 5.1**).

Based on the approach to enterprise management as a «living» system, we determine which enterprise systems correspond to the systems of a living organism.

The nervous system consists of the brain and spinal cord, nerves and nerve nodes. It regulates the work of bodies, ensures their coordinated activities and adaptation to environmental conditions. Through the senses, it communicates with the environment. Due to the nervous system, person's mental activity is carried out, his/her behavior is determined. S. Beer [16] has already compared the nervous system with the management system of an enterprise. The control subsystem of strategic management is represented by management bodies (guidance), which perform specific functions of forming a comprehensive strategy for the operation of an enterprise and a strategic plan of its development. The organizational subsystem (strategic management) through the development of the production structure allows the rational use of equipment, labor, information, factory space and labor resources, creates optimal conditions for continuous production, using advanced techniques and methods (flow production, subject-closed areas, traffic of product flows etc.). RPE is managed by creating an organizational and managerial structure – a set of units of the enterprise that are interconnected and interact together, but the purpose of each of them to ensure the implementation of a specific management function: the analysis function is responsible for economic analysis; for the function of accounting and control – accounting; for operational production management – control room; the production service is responsible for the organization of production (if a large amount of equipment is involved in the production process – production and technical); technical service maintains vehicles and technical devices in good technical condition, etc. That is, this subsystem activates and regulates the activities of all departments or divisions of an enterprise.

The integumentary system – consists of skin and mucous membranes. The function of this system is to protect the body from temperature fluctuations, drying, mechanical damage, penetration of pathogenic bacteria. It is this system that is the first to face influences of the external environment.

● **Table 5.1** The basic systems of the human body

<b>System/apparatus</b>	<b>Organs</b>	<b>Fuctions</b>
Nervous system	brain and spinal cord, nerves, nerve nodes, receptors	communication with the external environment, coordination of the work of organs, response to signals, coming from the external environment or from internal organs
Musculoskeletal (motor) system	skeletal bones and muscles	support, movement, protection, determination of the shape and size of the body, energy processing
Circulatory (cardio-vascular) system	heart and vessels	power, transport, protection, regulation
Lymphatic system	lymphatic vessels and nodes	additional drainage system
Digestive System	intestinal tube (mouth, esophagus, stomach, small and large intestines) and digestive glands, liver, gallbladder	grinding, movement, chemical treatment of food, absorption of nutrients, removal of undigested residues
Respiratory system	airways or respiratory tract (nasal and oral cavity, trachea, bronchi) and alveolar lungs	gas exchange, intake of oxygen, excretion of carbon dioxide and gaseous metabolic products
Urinary system	kidneys, ureters, bladder, urethra	excretion of metabolic products maintenance of water-salt balance in the body, regulation of blood pressure
Integumentary system	skin and skin (exocrine) glands	protection against mechanical damage, UV rays, penetration of foreign bodies; excretion of metabolic products; thermo-regulation
Sensory system	sense organs – eyes, ears, nose, etc.	perceive various kinds of stimuli and convert them into nerve impulses
Endocrine system	endocrine glands (pituitary gland, thyroid gland, adrenal glands, pancreas, gonads)	regulation of organs, metabolism, affect all life processes, affect organs and nerves
Reproductive system	gonads and excretory ducts	reproduction
Immune system	immune organs (bone marrow, thymus, lymph nodes, spleen)	protection against foreign bodies, infectious agents (bacteria, viruses, protozoa); destruction of altered cells, tumors, etc.

Source: generated by the author based on data [37–40]

From the standpoint of the systems approach, the most appropriate is the marketing subsystem, which seeks to build relationships within an organization (in the interests of creating value, demanded by consumers), as well as with other organizations, including suppliers, distribution channels, intermediaries and shareholders. Just this subsystem in the process of activity performs representative functions, forms the image of an enterprise and actively interacts with the subjects of external and internal environments. The marketing subsystem actively integrates the relevant components: sales policy management; product policy management; pricing policy management;

marketing communications management; commodity portfolio management; innovation management in product and sales policies and others. The efficiency of management of the marketing subsystem of an enterprise depends on the harmonious interaction of these components.

The musculoskeletal system consists of the skeleton and the muscles, attached to it. It allows a person to perform complex work, move, stand, protects internal organs from damage. From the point of view of an enterprise, the most appropriate is the technical and technological subsystem. The technical subsystem is an interconnected, interdependent set of equipment (machines and groups of machines, mechanisms, tools, production lines), which is located in an agreed proportional state and has the purpose of solving a specific problem. Coordination is to equalize the capacity of the main production process (respectively equipment), which serves the main and auxiliary operation processes. It is less mobile than other subsystems and is slower to adapt to changes in the environment. The mobility of the technical subsystem is determined by both the physical wear and tear of the equipment and its obsolescence. The technological subsystem is a set of rules, which specifies the sequence of operations and production processes, during which products are created with certain parameters and quality. The technological subsystem requires strict compliance with these rules at all stages of production. The main task of management in the technological subsystem is the detailed development of technology, its further improvement if necessary and systematic control over the quality of work throughout its duration. Technological subsystems include advanced means of converting input elements (raw materials, capital, information, etc.) into output (services, goods, staff satisfaction, profits, development of new markets, etc.). It, in comparison with the technical subsystem, is more flexible, more susceptible to influences, more quickly adapts to changes, made by technical progress in production. The complex of technical and technological subsystem of RTE includes a set of rolling stock that carries out the transportation process, and units (shops, sections, zones, etc.), whose activities are aimed at storing rolling stock and perform a set of necessary repair and prophylactic work to maintain and partially restore its working capacity.

The digestive system consists of the digestive tract and digestive glands. The functions of the digestive system are the digestion of food and the absorption of nutrients into the blood. That is, this system receives nutrients and converts them into energy. The most appropriate in an enterprise is the production subsystem, which covers all actions that result in goods, services, offered by the enterprise in certain markets. Without this function, a company can not exist. The production system is created and operates, taking into account the strategy of production activities, which, in turn, is one of the functional strategies of an organization. In RTE it is a system of providing transportation services. The operation service or commercial service is responsible for the organization and execution of transportation of goods and passengers at RTE. For the proper organization of transportation, the market of transport services is first studied, taking into account the assessment of customer needs, and then contracts for transportation are concluded with consignors and consignees.

The circulatory system consists of the heart and blood vessels. This system provides the organs of our body with nutrients and oxygen, removes from them carbon dioxide and other unnecessary products of life, performs the protective function, participating in the immune system.

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The most appropriate system in an enterprise, which manages various flows of resources, is the logistics subsystem. It combines all areas of activity, related to the passage of material flows from producer to consumer, into a single set of actions, called a complex of logistics. The mechanism of action of economic laws is manifested in an enterprise in the process of movement of its funds in monetary, production and commodity forms. The transfer of enterprise resources is the material basis of socio-economic and technical-technological activities at the enterprise. Logistics policy is based on two factors – the minimum amount of logistics costs and the desired level of logistics service, and the goal of the logistics management subsystem is to achieve a balance between these two components, beneficial to both a material flow generator and a consumer. The stages of procurement, production and marketing are united in a joint process by the logistics subsystem of an enterprise. It also includes integrated and strategic logistics, logistics of resource provision. One of the tasks of the logistics subsystem is also the organization of the logistics service and warehouse, which perform an important function not only in the normal course of the production process, but also increase the share of costs for maintenance and creation of resources, needed for basic production, while ensuring their proper storage, accounting and warehousing, replenishment and use.

The lymphatic system is formed by lymph nodes and lymph vessels. It participates in the formation of immunity and maintaining the stability of the internal environment of the body. It plays an important role in metabolism and cleansing of cells and tissues of the body. Sustainability of the internal environment of an enterprise is most supported by the subsystem of staff management (social). The social subsystem is a connection between people at all stages of production. These relations between people are the basis for the existence of production and economic systems. The social subsystem characterizes the use of the human factor in an enterprise, the system of staff policy and motivation of employees. The staff of an enterprise is its main and quite active component, it must solve not only technical and economic problems, but also the task of educating people, improving cultural and educational needs, knowledge and more. Traditionally, the staff management system has the following components: subsystem of staff planning and marketing; staff selection and accounting management subsystem; labor relations management subsystem; subsystem for ensuring normal working conditions; staff development management subsystem; staff behavior management subsystem; social development management subsystem, etc. The combination of these subsystems determines the specifics of an enterprise and is unique to each organization.

The respiratory system consists of the respiratory tract (nasal cavity, nasopharynx, pharynx, larynx, trachea and bronchi) and the respiratory part – the lungs. The function of the respiratory system is to ensure gas exchange between the environment and the body. This is the basis for maintaining the body in the viable state, because for comparison, without water and food the body can survive for several days, and without air – a few minutes. If we transfer the analogy to an enterprise, it is money that provides the exchange with various subjects of the external and internal environment. The financial subsystem is responsible for providing financial resources at the right time and in the right amount. The financial subsystem of any organization enters into relations with the following elements of the internal and external environment: government agencies (mandatory

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sale of export earnings, payment of taxes, etc.); other organizations (payment for goods, supplies of raw materials, other tangible assets, sales, obtaining loans and capital investment, etc.); founders (in the distribution of profits); labor collective (distribution of income and profit, wages, payment of dividends on shares, interest on bonds, etc.). The basis of the financial subsystem is a financial strategy and financial policy of an enterprise, which stimulate the implementation of specific tasks in the relevant areas of its financial activities.

The urinary system is formed by the kidneys, which produce urine, containing harmful metabolic products, and the urinary organs – ureters, bladder and urethra. It is the environmental (environmental management) subsystem of an enterprise is responsible for environmental aspects of operation. The purpose of the subsystem of environmental management is to reduce the values of environmental loads, associated with the operation of an enterprise, while maintaining the volume of products or services. This is a management system of production processes, aimed at achieving a balance between economic and environmental performance of an enterprise.

The reproductive system consists of the gonads, internal and external genitalia. The function of the reproductive system is to ensure the process of childbirth. An analogue of an enterprise should be chosen the system that provides the functions of reproduction and development of the enterprise. The innovation and investment subsystem is responsible for this. An enterprise as a complex dynamic system is in constant development. Most companies have their own research bases (research laboratories, design offices, etc.), which, along with external research and design organizations, conduct research, aimed at further development of production. As a rule, works on technical re-equipment of production are also carried out at enterprises. This is done by the innovation subsystem. During the functioning of the economy on the market basis, the only way to ensure the competitiveness of enterprises is the implementation of innovative development strategies. The investment subsystem of an organization determines the sources of investment financing; evaluates the effectiveness of investment projects, carries out financial investment management and the formation of a portfolio of financial investments.

The endocrine system is formed by endocrine glands, such as the pituitary gland, thyroid gland, adrenal glands and some other glands. They secrete hormones and affect all processes and organs of the body. All subsystems of an enterprise are affected by the quality management system, which is an integral part of the overall management system of the enterprise, which should ensure the stability of the quality of products or services, as well as increase consumer satisfaction. The process of implementing a quality management system includes a range of works. All this can affect various aspects of an enterprise. In addition, the implementation process can also affect the subsystem of logistics, production subsystem, subsystems of strategic management, staff management and many others.

The sensory system consists of receptors, neural conduction pathways and parts of the brain responsible for processing the received signals. The most well-known sensory systems are sight, hearing, touch, taste and smell. It is with the help of the sensory system that a person receives information from the external environment. In an enterprise, this corresponds to the information subsystem, which serves as the source base of all subsystems, using a variety of information as a specific resource

of production. It creates the necessary conditions and prerequisites for making scientifically sound management decisions. In this case, the systematic use of information as a resource is predicted.

Enterprise management is impossible without the creation of an information system (IS), which alternates between information about the state of the internal and external environment of an enterprise, their interaction, accumulates information for statistical, accounting, production, economic, property and other types of analysis, accounting and control of enterprise activities. As components the modern information system contains: a software complex, representing the information technological platform; devices that ensure safety control of the main production processes, etc. at an enterprise; a set of standard programs, such as office software, and special ones, such as devices for monitoring at sites and in services during the production process; router programs, control programs, software for tracking the movement of rolling stock, including online, etc.

The immune system is a system of biological structures and processes of the body that protects it from infections, toxins and malignant cells. That is, it is a complex defense system that usually responds to the intrusion of an alien force that poses a threat to human health. A similar system is possible at an enterprise – the security subsystem, which is responsible for the integrated security of the enterprise. The security subsystem of an enterprise performs certain functions: detection, mitigation, prevention of threats and dangers, forecasting, ensuring the safety of the enterprise and its staff, elimination of the consequences of losses, preservation of property, creating a favorable competitive environment and others. The subjects of security of an enterprise are those persons, bodies, divisions, departments, services, institutions that are directly involved in business security.

Based on the above, we offer an analogy of biological and economic subsystems in **Table 5.2**.

● **Table 5.2** The analogy of biological and economic systems

<b>Human organism systems</b>	<b>Road transport enterprise systems</b>
Nervous system	Strategic management system (organizational)
Musculoskeletal (motor) system	Technical and technological system
Circulatory (cardiovascular) system	Logistics system
Lymphatic system	Social system (staff management)
Digestive system	Production system (service delivery system)
Respiratory system	Financial system
Urinary system	Ecological system
Integumentary system	Marketing system
Sensory system	Information system
Endocrine system	Quality assurance system
Reproductive system	Investment and innovation system
Immune system	Security system

*Source: generated by the author*

The organ systems don't work in isolation, their activity is interdependent. This ensures the viability of the entire human body. In the same way, the subsystems of an enterprise are interconnected and form a complex system, ie the enterprise is characterized by structural complexity. That is, an enterprise is considered as a «living organism», which is a set of economic subsystems («body systems») that function together. Certain departments or structural economic units («organs») are responsible for the stable and adaptive functioning of the «living organism».

Authors Y. Buleev, N. Briukhovetskaia [41] believe that in a transition economy it is advisable to move to the concepts of «holism» and «animalism». Holism (from the Greek Holos – whole – according to the mystical and philosophical tradition, based on the principle of subordination of all parts of a single whole; at this time one of the fundamental principles of systems theory) is the view that the world is seen as a complex whole, including areas of psychological, biological and physical reality [42]. The concept of «animalism» is the development of the concept of «holism», when a company is seen as a spiritual system that has a corporate culture, values, a balanced attitude to collective and external institutions [41].

In his work, G. Kleiner [43, 44] emphasizes that the work of researchers who use the analogy between an enterprise and a living organism can be represented as the concept of «animalistic management». To denote the driving force that coordinates the actions of subsystems, the author proposes to use the concept of «soul» of an enterprise. Manifestations of the «soul» of an enterprise are diverse and include the peculiarities of the internal climate, interaction with customers and partners, reactions to external factors and corporate culture. In his other work [45], the author develops this idea and proposes a new section of strategic management, the subject of which would be the «soul» of the economic system. This type of management (by analogy with risk management) the author proposes to call soul management.

Thus, to fully maintain the viability of an enterprise, it is necessary to study not only the «physical body» of it in the form of a set of functional subsystems, but also its «soul» – corporate culture, which must be developed based on paradigms of sustainable development and social responsibility. Thus, it is necessary to form such a management system of a «living» organization, which took into account the possibility of sustainable operation, development and adaptation of the enterprise to the influence of external conditions on the basis of self-organization.

The further development and use of Stafford Beer's cybernetic model (VSM – viable system model) has great prospects for the formation of a viable management system of a «living» organization [16]. The model of a viable system consists of three groups of elements: operating elements, metasystems and environment. The operating element and the metasystem were divided by the author into five interacting systems. In order to be viable, a firm, like a living organism, needs five levels (subsystems) of management, which can be reflected as aspects of the organizational structure. Each level has contractual powers of autonomy and operates within its competence. The flow of information goes from the bottom up, gradually filtering out unnecessary details. Management levels are activated as needed. If any level of management comes to a standstill and does not find a solution, the upper level is included in the work.

When modeling a viable system and reflecting its integrity, the graphical method is used mainly, which allows to present the model more clearly (Fig. 5.1).

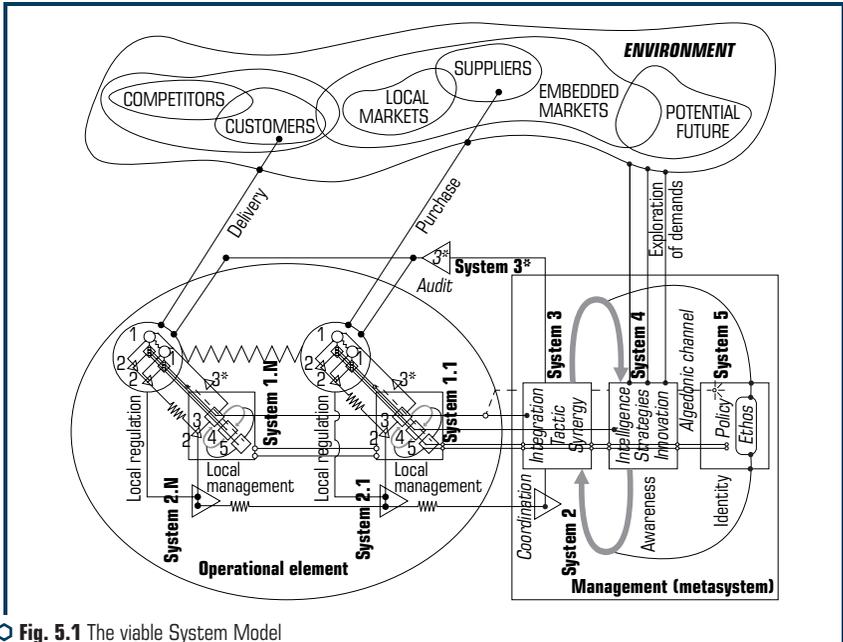


Fig. 5.1 The viable System Model  
Source: adapted by the authors from [17, 29]

The figure presents three elements – the environment, the operating element and the meta-system, as well as various connections (interactions) between them. Each element of the system consists of: (1) control unit (square shape); (2) operations responsible for interacting with the environment to offer their products and services (round shape); and (3) a local coordination system (triangular shape) [46].

The Viable System Model (VSM) offers the ability to scientifically design any organization as a system with the regulatory, learning, and adaptive capabilities necessary to ensure its survival (viability) in the face of changes that may occur in its environment over time, although they are not provided for in its design. A viable system contains five subsystems that interact with each other and can be reflected as aspects of the organizational structure. System 1 in the model of a viable system represents the operational (autonomous) control units of various elements of production. Each System 1 is first and foremost a viable system according to the recursive nature of the system. System 2 plays an important role in coordinating other subsystems, provides information channels and bodies that allow the subsystems in System 1 to communicate with each other

and with System 3. System 3 is responsible for monitoring the performance of each operating unit, defining directives, allocating resources, rights and responsibilities of the units of System 1, as well as to identify potential synergies and ensure interaction with Systems 4 and 5. Next to System 3 is System 3\*, which is responsible for performing audit activities in the operational units of System 1.

The bodies in System 4 are responsible for monitoring the environment, forecasting the future and identifying potential risks, in order to monitor how an organization must adapt to remain viable. Finally, System 5 sets out the principles and objectives of the system, playing a key role in preserving their identity. Also, to balance needs, it is responsible for policy decisions within an organization as a whole and the requests of different parts of the organization and the management of the organization in general.

The whole viable system can be represented as part of a viable system (parts that make up operations or System 1). Each viable system is part of a larger viable system. Recursion offers a new way of manifesting the purpose of a business or organization. The vertical deployment of the system supports the recursion of operational units to smaller subsystems [17, 28, 29, 47, 48].

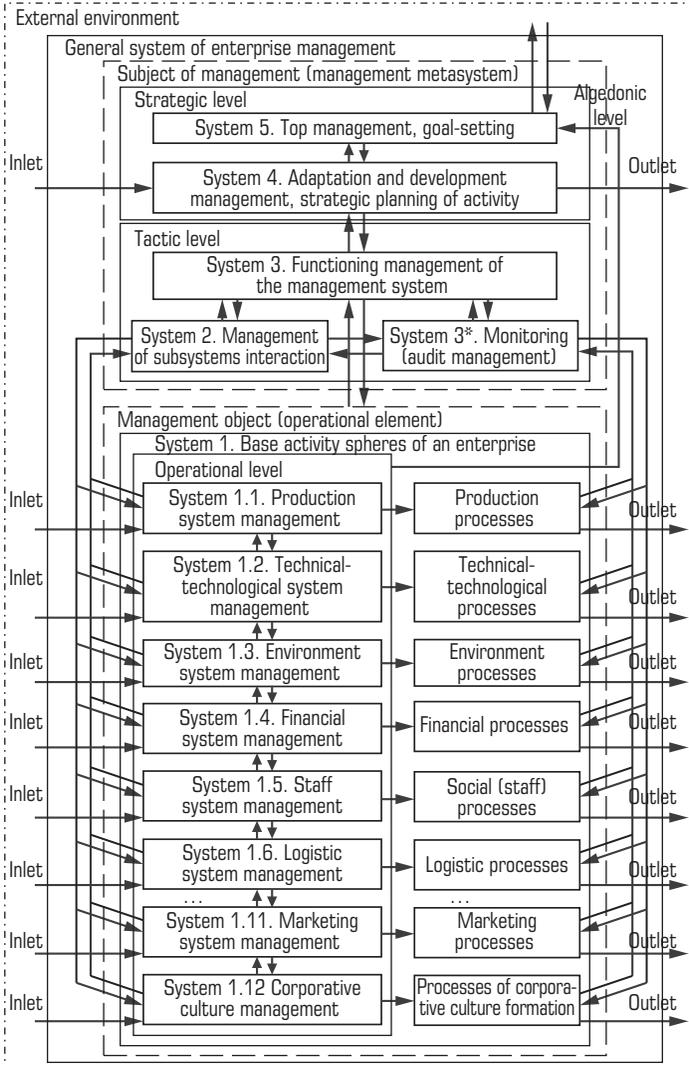
Depending on the stage of cognition of objects or processes, on the aspect of their consideration, the purpose of creating the same system can be represented by different structures. In this case, a simplified principled generalized structure of the management system of a viable enterprise is proposed, which is shown in **Fig. 5.2**.

The main systems of an enterprise are given in accordance with the proposed systems of an enterprise, in accordance with their analogy with the «living» (biological) systems of the organism (**Table 5.2**). The general viable enterprise management system in the literature [16] is compared with the nervous system, which regulates all other body systems and processes all signals, makes decisions.

The subject of management (control subsystem) is a set of subsystems to support production, technical and technological, economic, social and other systems of an enterprise, which are defined in **Table 5.2**. The metasystem contains two levels of management: strategic and tactical. System 5 is responsible for goal setting, develops strategic goals, mission, and System 4 – decisions, related to strategic planning of an enterprise, model development, adaptation to the external environment. System 3 – optimizes the functioning of the system as a whole, coordinates the distribution of efforts and resources between departments. System 3\* – audit management, monitors, controls and internal audits of an enterprise.

It is proposed to form the operational element on the basis of a set of basic subsystems of an enterprise («physical body») and subsystems of corporate culture («soul» of the enterprise). Each viable system is part of an even larger viable system. In **Fig. 5.2** we can see that the operating element also has a structure in the form of certain systems 1.1, ..., 1.N, similar to a viable system. Each viable system is part of a larger viable system. Twelve subsystems of management of certain processes of an enterprise are separated: production, technical-technological, logistic, ecological, financial, marketing, social (staff), information, investment-innovative, maintenance of quality, safety and formation of corporate culture. These subsystems are interconnected and form the overall system of an enterprise. Recursion offers a new way of manifesting the purpose of a business or organization. Vertical deployment of the system supports recursion of operational units to smaller subsystems.

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○ Fig. 5.2 The management system of a viable enterprise  
Source: generated by the author

The representation of the enterprise system in the form of a living organism has been considered. To form a holistic system of an enterprise, the systems of the human body have been considered in more detail and the corresponding systems of the enterprise have been determined. A set of functional subsystems of an enterprise by analogy with the systems of a living organism, the activity of which is interdependent, which ensures the stability of the «living organism» of the enterprise to the influence of external conditions has been formed. It has been determined, that in order to fully maintain the viability of an enterprise, it is necessary to study not only the «physical body» of the enterprise as a set of functional subsystems, but also its «soul» – corporate culture, which must be developed on the basis of paradigms of sustainable development and social responsibility.

The multilevel recursive viable model of the enterprise management system, which is built on the basis of the concept of viable systems, has been improved. The object in the management of a viable system is a set of basic systems of an enterprise, which are defined by analogy with the biological system. This model of the system is proposed as fundamental for the construction of other types of systems, which allows to form a management system at each level of recursion, ie the corresponding systems of an enterprise. The model allows the top management of an enterprise to generate, coordinate and adjust decisions on the functioning of the enterprise.

However, within the framework of this section, no situational attention was paid to the elements of anti-crisis management, which in the era of turbulence is crucial and, as is customary, a «must have». The next section will focus on this direction.

## REFERENCES

1. Talalaev, A. (2011). Upravlenie organizatsiei s pozitsii zhivyykh sistem. *Ekonomika i zhizn*, 45 (9411). Available at: <https://www.eg-online.ru/article/151715/> Last accessed: 01.12.2019
2. De Gius, A. (2004). *Zhivaia kompaniia. Rost, nauchenie i dolgozhitelstvo v delovoi srede*. Saint Petersburg: Izdatelstvo Stokgolmskaia shkola ekonomiki v Sankt-Peterburge, 218.
3. De Gius, A. (2006). *Samoobuchaiushchiasia organizatsiia*. Moscow: Dobraia kniga, 224.
4. Bir, S. (2009). *Mozg firmy*. Moscow: Librokom, 416.
5. Nait, F. (2009). *Etika konkurentsii*. Moscow: EKOM, 605.
6. Perotto, P. (1990). *Darvinizm i menedzhment. Novii khoziai i strategii obnovleniia*. Libri: Sole 24 Ore, 203.
7. Drozdov, I. N. (2002). *Upravlenie razvitiem organizatsii. Dalnevostochnii gosudarstvennii tekhnicheskii universitet. Vladivostok: Tsentr gumanitarnyykh tekhnologii*. Available at: <http://gtmarket.ru/laboratory/basis/4498> Last accessed: 23.04.2021
8. Chirico, J. M., Nystrom, A. M. (2018). *The Living Company: A Systems Approach. Evolving Leadership for Collective Wellbeing (Building Leadership Bridges)*. Bingley: Emerald Publishing Limited, 221–235. doi: <http://doi.org/10.1108/s2058-88012018000007014>
9. De Geus, A. P. (1997). *The Living Company*. *Harvard Business Review*, 75 (2), 51–59.

10. De Geus, A. P. (1998). The living company: A recipe for success in the new economy. *The Washington Quarterly*, 21 (1), 197–205. doi: <http://doi.org/10.1080/01636609809550303>
11. Harder, J. W., Robertson, P. J. (2006). The spirit of the new workplace: Leading in a living organization. *The Human Factor*, 18–23.
12. Tracy, L. (1989). *The living organisation: Systems of behavior*. New York: Praeger.
13. Meier, K., Devis, S. (2007). Zhivaia organizatsiia. Moscow: Izdatelstvo «Dobraia kniga», 386.
14. Arghode, V., Jandu, N., McLean, G. N. (2020). Exploring the connection between organizations and organisms in dealing with change. *European Journal of Training and Development*, 45 (4/5), 366–380. doi: <http://doi.org/10.1108/ejtd-06-2020-0095>
15. Vladoš, C. (2013). Change Management and Innovation in the «Living Organization»: The Stra. Tech.Man Approach. *Management Dynamics in the Knowledge Economy*, 7 (2), 229–256. doi: <http://doi.org/10.25019/mdke/7.2.06>
16. Bir, S. (1993). *Mozg firmy*. Moscow: Radio i sviaz, 416.
17. Beer, S. (1994). *Brain of the Firm*. Chichester: John Wiley Sons, 346.
18. Beer, S. (1979). *The Heart of Enterprise*. London and New York: John Wiley, 582.
19. Vrat, P., Agarwal, A. (2013). Designing a performance management system inspired by human body organization. *International Journal of Bioassays*, 2 (6), 889–896. Available at: <https://www.ijbio.com/articles/designing-a-performance-management-system-inspired-by-human-body-organization.pdf> Last accessed: 21.06.2021
20. Poliakov, A. (20140). *Struktury predpriatiia. Grafy zatrat*. Available at: <http://graphcost.com/index.php/menu-afuooop/2014-04-07-14-53-14/5-structuri-predpriatia> Last accessed: 28.06.2021
21. Tereshchenko, V. M. *Zhivoi organizm kompanii. Elitarium*. Available at: [http://www.elitarium.ru/zhivojj\\_organizm\\_kompanii/](http://www.elitarium.ru/zhivojj_organizm_kompanii/) Last accessed: 23.04.2021
22. Serbulov, Iu. S., Stepanov, L. V., Glukhov, D. A. (2013). Modelirovanie rynochnykh barerov na osnove iskusstvennoi immunnoi sistemy. *Lesotekhnicheskii zhurnal*, 4, 223–231.
23. Beklemishev, A. V., Bobrova, A. V. (2007). Upravlenie predpriatiem: Ot finansovogo monitoringa k sovetu direktorov. Moscow: Finans. gazeta, 47.
24. Boidell, T. (1996). *Kak uluchshit upravlenie organizatsiei*. Moscow: Assiana, 204.
25. Khammer, M., Champi, Dzh. (1997). *Reinzhiniring korporatsii: Manifest revoliutsii v biznese*. Saint Petersburg: Izd-vo S.-Peterburgskogo un-ta, 332.
26. Fedotova, I. V. (2013). Formuvannia modeli zhyttiezdatnoi systemy upravlinnia ATP. *Ekonomika transportnoho kompleksu. Zbirnyk naukovykh prats*. Kharkiv: KhNADU, 22, 109–120.
27. Awuzie, B., McDermott, P. (2016). A systems approach to assessing organisational viability in project based organisations. *Built Environment Project and Asset Management*, 6 (3), 268–283. doi: <http://doi.org/10.1108/bepam-08-2014-0037>
28. Hoverstadt, P., Bowling, D. (2002). Modelling Organisations using The Viable System Model. *Fractal*, 14. Available at: <https://www.fractal-consulting.com/wp-content/uploads/Modelling-Organisations-using-the-Viable-System-Model.pdf> Last accessed: 9.05.2021

29. Pérez Ríos, J. (2010). Models of organizational cybernetics for diagnosis and design. *Kybernetes*, 39 (9/10), 1529–1550. doi: <http://doi.org/10.1108/03684921011081150>
30. Vahidi, A., Aliahmadi, A. (2018). Describing the Necessity of Multi-Methodological Approach for Viable System Model: Case Study of Viable System Model and System Dynamics Multi-Methodology. *Systemic Practice and Action Research*, 32 (1), 13–37. doi: <http://doi.org/10.1007/s11213-018-9452-0>
31. Vahidi, A., Aliahmadi, A., Teimoury, E. (2019). Researches status and trends of management cybernetics and viable system model. *Kybernetes*, 48 (5), 1011–1044. doi: <http://doi.org/10.1108/k-11-2017-0433>
32. Brazhnikova, L. N. (2011). Zhiznesposobnost sistemy strategicheskogo upravleniia finansovoi deiatelnosti u predpriatii ZhKKh. Pratsi Odeskogo politekhnichnogo universitetu, 3 (37), 34–40.
33. Lysenko, Iu. G. (Ed.) (2008). Metodologija modelirovaniia zhiznesposobnykh sistem v ekonomike. Donetsk: OOO «IUgo-Vostok, Ltd», 361.
34. Milov, A. V., Timokhin, V. N., Chernous, G. A. (2004). Ekonomicheskai kibernetika. Donetsk: DonNU, 418.
35. Sokolova, L. V. (2004). Teoriia i praktyka adaptatsii pidpriemstv do minlyvoho biznes-sere-dovyshcha. Kharkiv: KhNURE, 288.
36. Shpak, S. A. (2018). Category of adaptation and adaptivity in the enterprises' restructuring management theory. *The Journal of Zhytomyr State Technological University. Series: Economics*, 1 (83), 96–103. doi: [http://doi.org/10.26642/jen-2018-1\(83\)-96-103](http://doi.org/10.26642/jen-2018-1(83)-96-103)
37. Prives, M. G., Lysenkov, N. K., Bushkovich, V. I. (2001). Anatomiiia cheloveka. Saint Petersburg: Gippokrat, 704.
38. Dubynin, V. A., Sapin, M. R., Sivoglazov, V. I., Kamenskii, A. A. (2010). Regulatornyie sistemy organizma cheloveka. Moscow: Drofa, 386.
39. Sapin, M. R., Bilich, G. L. (2002). Anatomiiia cheloveka. Moscow: Oniks, 465.
40. Sinelnikov, R. D., Sinelnikov, Ia. R. (1996). Atlas anatomii cheloveka. Vol. 1–4. Moscow: Meditsina, 488, 272, 216, 316.
41. Buleev, Y. P., Briukhovetskaia, N. E. (2009). Predpriiatyia y novie orhanyzatsyonnie strukturi v sisteme sotsyalno-ekonomicheskyykh otnosheniy obshchestva. *Ekonomika promyslovosti*, 2, 3–14.
42. Taran, V. A. (2018). Modern holistic understanding of the world. *Mir nauki, kultury, obrazovaniia*, 2 (69), 218–220. Available at: <https://cyberleninka.ru/article/n/sovremennoe-holisticheskoe-ponimanie-mira> Last accessed: 05.10.2020
43. Kleiner, G. B. (2018). Humanistic Management, Social Management and System Management – The Way to the Management of the 21st Century. *Russian Management Journal*, 16 (2), 231–252. doi: <http://doi.org/10.21638/spbu18.2018.204>
44. Kleiner, G. B. (2000). InstitutSIONALnye faktory dolgovremennogo ekonomicheskogo rosta. *Ekonomicheskai nauka sovremennoi Rossii*, 1, 5–20.

45. Kleiner, G. B. (2011). Resursnaia teoriia sistemnoi organizatsii ekonomiki. Rossiiskii zhurnal menedzhmenta, 9 (3), 3–28.
46. Puche, J., Ponte, B., Costas, J., Pino, R., de la Fuente, D. (2016). Systemic approach to supply chain management through the viable system model and the theory of constraints. *Production Planning & Control*, 27 (5), 421–430. doi: <http://doi.org/10.1080/09537287.2015.1132349>
47. Hoverstadt, P., Bowling, D. (2005). Organisational viability as a factor in sustainable development of technology. *International Journal of Technology Management & Sustainable Development*, 4 (2), 131–146. doi: <http://doi.org/10.1386/ijtm.4.2.131/1>
48. Hoverstadt, P.; Reynolds, M., Holwell (Retired), S. (Eds.) (2020). *The Viable System Model. Systems Approaches to Making Change: A Practical Guide*. London: Springer, 89–138. doi: [http://doi.org/10.1007/978-1-4471-7472-1\\_3](http://doi.org/10.1007/978-1-4471-7472-1_3)