

UDC 336.22:330.15

DOI: 10.15587/1729-4061.2021.233507

# INVESTIGATING THE INFLUENCE OF NANO-ECONOMY MANAGEMENT CHANNELS ON GLOBAL TRANSFORMATIONS IN THE WORLD

Tetiana Ostapenko

Corresponding author

PhD, Associate Professor\*

E-mail: ostapenco@ukr.net

Oleksandr Onopriienko

PhD, Associate Professor\*

Iryna Hrashchenko

PhD, Associate Professor\*

Elvira Danilova

Doctor of Economic Sciences,

Associate Professor\*

\*Department of Management Foreign Economic

Activity of Enterprises

National Aviation University

Liubomyra Huzara ave., 1, Kyiv, Ukraine, 03058

The problem under investigation is determined by the fact that enterprises consist of separate economic agents that play an increasingly important role in production processes and their management. The channels of such management provide the transfer of positive experience of the totality of economic agents to the global environment. Due to the permanent process of transformations in the world caused by this influence, the probability of being on the sidelines is a problem for most business entities. Their competitiveness and integration into the world economic networks depend on high-quality management and wide application of innovative technologies, including nanotechnologies.

The conducted study revealed that:

– nano-economy consists of baby economy, human economy, and the economy of nanotechnologies;

– the human economy is the central link and the main leader of the impact of nano-economy on global markets. The main components of its management are self-management, self-marketing, and innovative management of the organization personnel;

– nanotechnologies, the economics of nanotechnologies, and transfer of nano-knowledge are at the initial stage of their development;

– the impact of nano-economy on the development of the global environment is carried out through the functions of nanomanagement;

– the management channels of the nano-economy do not affect the entry of countries with transition economies into the global environment due to the fact that they lack the system of nano-economy. This is proved by multifactor analysis of the impact of nano-economy on exports. The obtained indicators, such as exports of USD 57 billion (by the exchange rate of 2021), 281 universities, 1,941,701 business entities, and 135 thousand scientific and technical institutions, do not correlate and determine low direct and inverse indicators of dependence.

The results of the study can be used:

– at separate enterprises – by using innovative personnel management, including motivating and training of personnel in self-management and self-marketing;

– at the state and regional levels – by creating favorable conditions for the development of baby economy in countries with transition economies and by promoting optimal solutions of separate economic agents

**Keywords:** nano-economy, baby economy, human economy, economy of nanotechnologies, self-management, nano innovation management, global transformations

Received date: 22.04.2021

Accepted date: 25.05.2021

Published date: 30.06.2021

**How to Cite:** Ostapenko, T., Onopriienko, O., Hrashchenko, I., Danilova, E. (2021). Investigating the influence of nano-economy management channels on global transformations in the world. *Eastern-European Journal of Enterprise Technologies*, 3 (13(111)), 18–30. doi: <https://doi.org/10.15587/1729-4061.2021.233507>

## 1. Introduction

In the modern world of high technologies, the implementation of innovative programs within the framework of management production systems is becoming increasingly important. The whole world must strive to position and relate itself to active developers and implementers of high technologies, including nanotechnologies. Such implementation is optimized for specific business entities that are managed in a certain way. Nano-economy, like the human economy, has different channels and forms of influence on global transformations. One of these channels of influence is the management channel when it depends on high-quality management whether an enterprise will be integrated into the world's economic networks and whether it will be competitive; the form of such an impact is nano knowledge transfer.

There are two main approaches to nano-economy, both as the human economy and as the economy of nanotechnologies. The proposed concept determines the logic of the nano-economy process as follows: from the baby economy, through the human economy to the economy of nanotechnological solutions. In the international environment, such processes are intensified under the influence of effective management decisions. It is in this perspective that research is carried out.

The analyzed problem is determined by the fact that enterprises consist of separate employees of different levels (from top managers to specialists-executors), who are economic agents, which form the system of nano-economy. The latter is managed in a certain way and the channels of such management ensure the impact of a set of these economic agents on global transformations in the world. It is necessary to outline such trends and patterns to determine

the processes of integration of business entities into global markets and the conditions for using international “know-how” in the field of management by these entities.

The relevance of this problem is determined by the fact that the likelihood of being on the sidelines of the world economic processes is a problem of various, even the smallest, entrepreneurial entities. All entrepreneurial structures try to position themselves as active players in the international arena. At the same time, they need to manage separate employees as defined by global approaches to the formation of a system of management of individuals.

---

## 2. Literature review and problem statement

---

The term “nanoeconomics” was proposed in 1987 by K. Arrow, who defined nanoeconomics as the theory of economic behavior of individual economic agents [1]. Since then, nanoeconomics has become a special section of economic theory, one of the central places in which is occupied by the management of the economic behavior of individuals. That is why many researchers focused their attention on this issue.

In particular, papers [2, 3] indicate that management begins in the family when it is necessary to initiate a management system to build oneself and one’s family. However, the issue of the transition of family management to household management remains controversial [2]. Having a clear management system in a family relationship, it is possible to adapt it to the entrepreneurial practice, which, in turn, can bring this practice to the global level. These issues are especially relevant for post-planned economies, which involve solving the issues of economic development based on the impact of nanoeconomics on the global environment [3]. To understand the impact of nano-economy management on global transformations, this aspect can be defined as the preliminary one.

Studies [4, 5] show that entrepreneurial structures should be self-trained and this depends on particular individuals who are trained within such organizations. Management without training is doomed to catching up on activities that lead to adaptation to the circumstances of the external environment. The option of overcoming such circumstances may be the formation of a strategic approach to the nano-economy. This approach is used in work [4]. On the contrary, a company that aspires to be a leader learns and applies leading management technologies and international approaches to its determining for training. Thus, the life-long learning factor becomes decisive for the creation of leadership management on a global scale. The socio-cultural factor under such circumstances becomes decisive for the development of nanoeconomics and its impact on consumer motivation [5].

In addition, in some articles [6, 7], it is noted that there is a single correct approach in the activities of world-class managers – the anti-crisis approach. It is underlined that Japanese management foresees crises due to constant monitoring of the external environment, European and American top managers monitor a crisis and apply anti-crisis measures. However, the nano-economic factor is crucial for organizations suffering from certain circumstances and this factor (individual or nano-economic) becomes the key to preventing or confronting a crisis. It is shown in paper [6] that the factor of development of different companies is the

human factor, but how to use it remains an open question. Management styles also outline the impact on management objects – people within companies – and determine managerial progress in world economic processes. In this context, researchers of the experience of American corporations [7], note that reorganization, as a way out of a crisis, also actively affects global approaches to the management of companies and employees.

At last, some researchers [8, 9] support a global approach to management, showing that individuals form common approaches to the management system, both nationally and internationally. In their opinion, global management is the quintessence of all approaches to managing individuals and companies. It is noted that at the present stage of entrepreneurship development, there is a leadership crisis, which becomes the basis for the formation of new values of global management [8]. In particular, management subjects under pandemic conditions become subjects of global management, which moves the world of entrepreneurship towards global transformations. Cognitive aspects of nano-management development are analyzed in various studies, but its impact on global transformations remains an open question [9].

In papers [10, 11], it is noted that nano-economy is an open resource of globalization when the factor of the basic (lowest) level of the economy influences its highest level – mega economy. It has been shown that social intelligence should develop nano-economy, but this is a general cultural aspect of its formation. However, the issues related to the influence of the cultural factor on global management remained unresolved [10]. Everything great starts from the small and moves from the particular to the general, so, how the world as a whole will develop depends on the economic behavior of an individual, and the channel of such influence is management. Open nano-economy shows in this context that management has global characteristics and a person decides, in which direction to develop [11].

It should also be noted that in the reviewed literature, the approach to the separation of an individual factor in management is defined as self-management and self-marketing. The latter is the management of one’s actions both within organizations and in individual actions in a family or a household.

However, these papers did not study the issues related to the consideration of nano-economy as a system with its interacting elements (subsystems) and processes. All this suggests that conducting a study on the consideration of the structure (structural elements) of nano-economy and its impact on the global level is advisable. The synergy of different styles of management of nano economic agents under conditions of formation of leadership within companies of different sizes requires further analysis. It is important to study nano-economy management and how this management affects the entry of the latter into the global environment.

---

## 3. The aim and objectives of the study

---

The aim of the study is to determine the management dominants, which become one of the main driving forces of the nano-economy and the channel of its influence on the global environment. This will make it possible to apply the obtained results in practice, to regulate and manage nano-economic entities at the entry (possibly in the case of leaving) of such entities into the global environment.

To achieve the set goal, it is necessary:

- to consider approaches to the interpretation of nanoeconomics as a systemic category;
- to investigate the formation of areas of management of the baby economy in the global environment;
- to characterize the impact of the human economy on the global environment;
- to characterize the main provisions of nano innovation management and transfer of nanotechnologies in the globalization context;
- to carry out a factor analysis of the impact of independent magnitudes of nano-economy on the dependent magnitude of the export potential of the countries with transition economies.

---

#### 4. The study materials and methods

---

The study was conducted using various methods. In particular, theoretical methods such as systemic analysis, structural approach, induction and deduction, observation, and comparison were used to formulate concepts of nano-economy, baby economy and nanotechnology economy. Based on theoretical concepts, an analysis of the possibility of applying them in the practice of entrepreneurial structures and national economies was carried out. In particular, cluster analysis was used to form baby clusters. In addition, surveys of a large group of individual entrepreneurs were conducted to determine the practice of decision-making on the development of nano subjects; multifactor analysis of the impact of nanoeconomics on the export potential of countries with transition economies was applied.

Consistent consideration of the logical components of nano-economy from the baby economy, through the human economy to the economy of nanotechnologies, was proposed as a methodological approach.

---

#### 5. Results of studying the impact of nano-economy management on global transformations

---

##### 5.1. Approaches to the interpretation of nanoeconomics as a systemic category

The theoretical basis of the study is the concept of Kenneth Arrow, who defined nanoeconomics as the economics of optimal decision-making by individual workers. This approach was supported in paper [12, 13], which stated that nanoeconomics may include baby economy and economy of nanotechnologies. The studies of nanoeconomics were mainly related to the emphasis on human economy, human behavior, and conditions of transactions in the economic life of enterprises, industries, and national economies. Nanoeconomics is a new category, the definition of which is only being formed.

In the scientific literature, there is no single approach to the interpretation of nanoeconomics. And there are several good reasons for this.

Firstly, different interpretation of nanoeconomics is related to the fact that nanoeconomics as a section of economic theory is at the stage of initial formation. Thus, the term “nanoeconomics” appeared only at the end of the last century. In paper [1], nanoeconomics was defined as the theory of economic behavior of individual economic agents under market and non-market conditions.

Secondly, fundamental changes have taken place in the world economy. The most important of them include accelerated development and transformation of services into the main factor of stability of the modern economy; explosive IT development and mass formation of new needs and new markets that have become global in nature [14, 15]. The development of the world economy, in general, is innovative.

Thirdly, these and other factors led to the formation, along with macro-, meso- and microeconomies, of new structural levels of the economic system as an object of economic research, namely, nano-economy, and mega economy.

Fourthly, the development of nano-economy had its own characteristics in different sectors of the world economy, regions, and groups of countries. After all, along with the functions of innovative development and improving the quality of life, the nano-economy performed such specific functions as restoration of the existence of the economic system and physical survival of the population in transition economies.

Fifthly, nanoeconomics implies various objects, subjects (and even levels) of research. In study [16], three main areas of comprehension of nanoeconomics by modern researchers – utilitarian, behaviorist, and evolutionary – were defined.

The first ones believe that nanoeconomics should include all economic relations associated with the development of nanotechnologies and nano-industry, regardless of their scale (from mega- to microsystems).

The second associate nanoeconomics with the economic relations and behavior of particular “individuals” and the possibilities of their accounting in the regulation of macroeconomic and microeconomic systems.

The third substantiate nanoeconomics as a special level of the economy, the result of the evolution of economic theory and practice, the system of relations of endogenous factors of production in the actions and operations of their performers. The basis of this approach “is the economic genetics and evolutionary economics, which makes it possible to create and apply nanotechnologies of operational management, significantly increasing labor productivity, efficiency and competitiveness of enterprises on the global scale” [17].

In addition, researchers separate four areas of nanoeconomics research that determine its subject area:

- nanoeconomics, nET – the scientific discipline, a particular section of economic theory;
- nano-industry, nIT – the sphere of economic practice related to the development of nanotechnologies;
- nano-economic policy of a state, regions, and corporations, nEP;
- nano-economic management, nEM [17].

According to the research outlined in paper [5], managerial approaches to nanoeconomics are determined by a more informative and effective policy of companies, when operational and economic solutions are more important than before (especially in a pandemic). The authors state that the digital transformation of the world is important for companies, governments, and social institutions. Researchers define nanoeconomics as the economic theory of determining, coding, and optimization based on individual human and technical inclinations. The latter are natural preferences, tendencies, models, trends, and relationships of people and technics for operating in the implication of nano-economic methods.

Some researchers use the term “nanoeconomics” for the symbolic name of the future economic arrangement, which will arise in the coming decades due to the mass spread of nanotechnologies in production and economic practice [18].

At the same time, it should be noted that most researchers recognize nanoeconomics as the primary level of economic relations.

We will define nano-economy as an integral part of the economy, the productive strength of which is particular individuals, which, thanks to optimal management decisions and the use of nanotechnologies, ensure the achievement and spreading of high competitiveness indicators in the economic environment.

Nano-economy as a process consists of such consistent phenomena: baby economy, human economy, and nanotechnology economy. The system of nano-economy begins with a family, its formation and development, with the birth of children of their upbringing at home and in a preschool educational institution, at school, college, and university. Thus, the primary stage of the nano-economy is the baby economy. As the newest category, the baby economy is a controversial phenomenon, and only a few researchers have the approaches to its definition.

Baby economy [19] is associated with the level of socialization of a child when a small person is already economical the moment he is born because a whole industry works around the birth of a child: artificial methods of insemination, support of a pregnant woman in specialized clinics. The very act of birth, which is pre-paid by a family, nursing a newborn baby, and hospitals are also economic actions related to the baby economy. In addition, there is a huge industry of children's products from clothes to prams. There are no separate statistics on this, but the world's leading brands produce entire lines of clothing, footwear, and accessories for children of all ages. In addition, hiring a nanny or visiting preschool educational establishments is an act of choice of parents for a convenient arrangement of a child's life. The choice of a school for further education, university, or college for obtaining a future profession is also an act of intensification and development of the baby economy.

There is also a particular aspect of using children in difficult labor positions of the criminal world. This can be considered the first pattern. This pattern is that the nano-economy begins with the baby economy, which has its own specific conditions for functioning and development.

The baby economy is an integral part of the nano-economy, which, thanks to the complex use of all types of resources in childhood, leads to the formation of a personality that in adulthood produces benefits based on the acquired knowledge and skills.

The second pattern is that the human economy is the central link in the chain of nano-economic processes. There is a combination of cultural, social, and economic approaches. Culture is a transfer of habits, skills, and experiences to future generations. These are traditions of doing business, traditions of using labor means and producing certain goods and services. These are the conditions for cooperation within certain groups and society in general. The community, in which a person lives (the closest environment), is a family. The economic feature of a family is a household.

Another regularity is the development of the economy of nanotechnologies within the framework of the nano-economy system. The management of the economy of nanotechnologies is a derivative management system from innovation management.

The nano-economy management under global conditions is determined by the use of basic functions and management methods in relation to three components of nano-economy:

baby economy, human economy, and nanotechnology economy. The proposed approach can be used to assess the impact of nano-economy on global transformations in the world.

## 5. 2. Forming the directions of baby economy management in the global environment

Thus, baby economy management involves household management, the process of the child's appearance in life, the system of support of child's vital activities, the process of education and upbringing in a pre-school educational institution, a school and a higher educational institution. Such management is indirectly related to the objective influence of globalization processes on the baby economy.

Household management is a special form of management that has always existed, but scientific approaches to its interpretation are being formed only today. Household management involves the formation of a system of family center management when the personality that is capable of creating innovative knowledge, in particular in nano areas is formed from a positively configured system of family relations. The solution of scientific problems for households and their management will lead to determining household participation in the system of economic relations of nano-, micro-, meso-, macro- and global levels. This, in turn, is necessary to understand the essence of the economic system as an integral multicomponent phenomenon with the establishment of links in the internal and external environment and the environment of the global order.

The impact of the household economy on the international economy and international economic relations is becoming a link of nano-economy influence on the evolution of the global environment. Thus, an individual influences the quality of international relations by forming a positive development of centers – the nearest human environment.

It should be noted that all management functions are also inherent in household management [20, 21]. It all starts with planning income and expenses and financial behavior in households. It is followed by the organization of the process of arranging household duties. In addition, the participation of family members in the necessary household activities is motivated. The process of interconnection between family members is coordinated. And, finally, the result is controlled for compliance with the goals and plans of a family at the last stage of household management.

Such functions of household management lead to the formation of economic behavior in younger family members and their development into fully-fledged economic individuals.

The child's birth process is also the one that it is possible to plan, organize, motivate, coordinate and control. These issues are normally dealt with by the head of the family, whose role in many countries of the world continues to be played by men. However, modern women, especially single ones, in Europe, North America, and in some other regions of the world, manage this process independently, because the quality of the process of emergence of a new person depends on this management. In many ways, these functions and their components are performed by specialized institutions (maternity hospitals, prenatal centers, red cross centers, etc.). In general, this process requires investing moral, psychic, material, and monetary resources.

The child life support industry is a special sector of the national economy, determined by significant volumes. Thus, the children's products industry consists of actually existing enterprises that can enter and often enter the world market.

In particular, children's toys produced by Chinese enterprises flooded the whole world.

And of course, a separate sector of the baby economy is the system of education and upbringing. These are institutions of preschool, secondary education, secondary special education, and universities. Currently, education is very differentiated: there are public, communal, and private educational institutions. The whole educational networks and online education are created. Thus, in Europe there operates the Bologna process, which implies the standardization of the educational process and in many countries introduces an international approach to baby economy management.

Note that baby economy as a system consists of the following elements:

- household economy (as a subsystem that provides for the economic life of family centers with different number of family members with or without children);

- baby industry (as a subsystem consisting of economic agents who produce children's products from food to clothes and footwear for children and pregnant women);

- a subsystem of educational process and upbringing (as a subsystem of educational institutions of different levels from preschool to higher and post-university education).

Baby economy management involves the management of its various subsystems within different territorial centers. In order to interpret the territorial development of the baby economy, it is necessary to determine its territorial features, which can form the corresponding clusters [22]. It should be noted that baby clusters are territorial child development centers, which include components that outline the existence and generation of a system of relations for the development of a separate individual.

The main characteristics of clusters are:

- geographical concentration, the totality of agents of the baby economy (educational institutions, households, business entities that produce children's goods and baby food);

- functional interdependence and interaction of participants (when, for example, schools are associated with baby food suppliers);

- specialization of the companies-subjects of a cluster (when educational establishments specialize in training certain personnel for economic institutions);

- existence of competition within a cluster (households compete for certain resources, signaling to the environment about the existence of demand for resources and finished products and services);

- availability of highly qualified personnel (after all, such personnel should ensure the education of the growing generation).

Baby clusters are determined by the following components:

- total income of population;

- income per resident;

- quantity of preschool educational institutions;

- quantity of secondary schools;

- quantity of higher educational institutions;

- production of milk, cream, yogurts, kefir, and sour cream.

The first two indicators concern the quality of the formation of the baby economy, the next three are related to the economy of the educational process and upbringing, the last indicator is related to the baby industry. Regarding the last indicator, it should be noted that there are no separate statistics on the baby industry and the indicator

reflecting baby food is almost the only one regarding the baby industry.

These indicators reflect the regional aspect of baby economy development.

We will illustrate this in the example of the Ukrainian economy. Of course, it is too early to talk about the development of the baby economy and baby clusters as a system, however, there are certain common features that determine the existence of clusters as territorial groups. Such associations contribute to the combination of advantages of small forms of entrepreneurship and large industries [23]. The main factor of baby cluster formation is geographical, when baby economy centers, which then affect the development of nanoeconomics in general, are formed on certain territories. Cluster analysis of baby economics is shown in Table 1.

Clustering was carried out by the  $k$ -mean method (by vector quantization method, which was invented to process signals but is often used for cluster data analysis). The purpose of  $k$ -mean clustering is to divide  $n$  values into  $k$  clusters, in which each value belongs to a cluster with the nearest mean, acting as a cluster prototype. That is, each observation refers to the cluster, the center (centroid) of which is closest. Euclid's metric is the "proximity" measure of:

$$\rho(x, y) = x - y = \sqrt{\sum_{i=1}^n (x_i - y_i)^2},$$

where

$$x, y \in R^n.$$

In this technique, the number of clusters is unknown and is chosen by a researcher at the beginning of the algorithm application.

In the R language, the function of  $k$ -mean *KMeans\_arma* was selected from the *armadillo* library of the *ClusterR* package.

To apply *KMeans\_arma*, the number of columns (variable vectors) in the data should exceed the number of clusters, otherwise, the function will detect an error. The algorithm is initiated once, and usually, 10 iterations are enough for convergence. The original centroids are distributed using one of the algorithms – *keep\_existing*, *static\_subset*, *random\_subset*, *static\_spread*, or *random\_spread*.

This analysis involves the separation of seven clusters represented in Table 1. Seven clusters were chosen to combine at least three regions, but cluster analysis identified baby clusters with a different number of regions and their different combination in the geographical aspect. It was found for all clusters that if there is "1", these regions belong to this cluster, if "0" – they belong to another cluster. For example, the first cluster includes only the regions marked as "1", those regions marked as "0" do not belong to this cluster.

The results of this (baby cluster) analysis are shown in Table 2. The data in Table 2 shows that the oblasts from different geographic parts of the country are included in the same cluster. Thus, as a result of the analysis, Chernivets'ka and Donetsk'ka oblasts were included to cluster 2, Khmelnyts'ka, Poltav'ska, Ternopil'ska, Vinnyts'ka, Zhytomyr'ska, were included to cluster 4, respectively. This indicates the absence of geographical centers of cluster formation.

Table 1

Cluster analysis and baby economics

Oblasts	1	2	3	4	5	6	7
Cherkas'ka	0	0	0	0	0	1	0
Chernihivs'ka	1	0	0	0	0	0	0
Chernivets'ka	0	1	0	0	0	0	0
Dnipropetrovs'ka	0	0	0	0	0	0	1
Donets'ka	0	1	0	0	0	0	0
Ivano-Frankivs'ka	0	1	0	0	0	0	0
Kharkivs'ka	0	0	0	0	0	0	1
Khersons'ka	0	1	0	0	0	0	0
Khmel'nyts'ka	0	0	0	1	0	0	0
Kirovohrads'ka	1	0	0	0	0	0	0
Kyyvs'ka	0	0	0	0	0	0	1
Luhans'ka	0	0	0	0	1	0	0
Lvivs'ka	0	0	0	0	0	0	1
Mykolaiivs'ka	0	0	0	0	0	1	0
Odes'ka	0	0	0	0	0	0	1
Poltavs'ka	0	0	0	1	0	0	0
Rivens'ka	0	0	0	0	0	1	0
Kyyv	0	0	1	0	0	0	0
Sums'ka	0	1	0	0	0	0	0
Ternopils'ka	0	0	0	1	0	0	0
Vinnys'ka	0	0	0	1	0	0	0
Volyns'ka	0	1	0	0	0	0	0
Zakarpats'ka	0	0	0	0	0	1	0
Zaporiz'ka	0	0	0	0	0	1	0
Zhytomyrs'ka	0	0	0	1	0	0	0

Table 2

Regional baby cluster

Cluster number	Oblasts included in the cluster
1	Chernihivs'ka Kirovohrads'ka
2	Chernivets'ka Donets'ka Ivano-Frankivs'ka Khersons'ka Sums'ka Volyns'ka
3	Kyiv
4	Khmelnyts'ka Poltavs'ka Ternopils'ka Vinnys'ka Zhytomyrs'ka
5	Luhans'ka
6	Cherkas'ka Mykolaiivs'ka Rivens'ka Zakarpats'ka Zaporiz'ka
7	Dnipropetrovs'ka Kharkivs'ka Kyyvs'ka Lvivs'ka Odes'ka

We can state that baby clusters are only being formed. Currently, there are three clusters that can exist as geographical centers, namely: cluster 3 – the city of Kyiv, clus-

ter 4 – Khmel'nyts'ka, Poltavs'ka, Ternopil's'ka, Vinnys'ka, Zhytomyrs'ka oblasts and cluster 5 – Luhans'ka oblast.

These clusters have interdependence based on existing economic, educational, and upbringing entities. Such clusters are the basis for the formation of nano-economy and baby economy systems in the state. Other clusters determined by the corresponding analysis are the association of different oblasts without accentuation and geographical concentration and factors of interdependence. At the same time, in those countries that are characterized by a high level of clustering, there is also a developed system of baby clusters, that is, territorial formations within several internal regions that have common borders. For example, the clusters of the production of children's fabrics were formed in the northern regions of Italy with the prominent textile industry, the clusters of the production of children's toys were formed in China. If a country is characterized by a low level of economic clustering, baby clusters are not clearly expressed, as in the case of countries with transition economies. Obviously, the level of development of clusters in a certain country, in particular, the production of goods for children, depends on:

- the level of total (internal and external) solvent demand for these goods;
- the level of competitiveness of their producers;
- a favorable investment climate and the level of infrastructure development necessary for the organization and development of highly efficient production of children's goods on a wide scale.

5.3. Functions of human economy management

The human economy, as a key element of the nano-economy, is characterized by appropriate productive forces, industrial relations, and management mechanisms.

By analogy with social production, industrial relations of the human economy, as well as of nano-economy, as a whole, include technical, economic, organizational, economic, and socio-economic relations.

Technical and economic relations significantly (positively or negatively) affect the accumulation of fundamental and applied knowledge and the introduction of innovations. In this relationship, a person plays a leading role, since researchers, designers, manufacturers of innovative goods and services are individuals.

Organizational and economic relations in our context primarily concern the introduction of new (innovative) developments in production in order to obtain an economic effect (commercial benefit). This stage of relations involves the relationship with existing equipment and technology when the possibility of improving or applying qualitatively new technology (equipment) depends on the existing technical level. A person is a nanoparticle in the system of industrial relations, along with the existing technology, he or she is a manufacturer of certain benefits offered for consumption in this economic environment. Production of demanded benefits is the main task of a person (individuals) and at the same time the main function of organizational and economic relations in the system of the human economy. These relations:

- a) are leading relations in the economic environment of a certain economic system;
- b) ensure the human behavior that is adequate to the technological arrangement of this environment.

Socio-economic relations are usually aimed at improving the life of an individual. Consequently, they are a conse-

quence and at the same time manifestation of economy, when a person creates, produces, and consumes in order to improve the level and quality of life, self-improvement, self-realization, as well as the acquisition of all features of a developed personality in a developed society. Of course, there is a certain share of individuals with low needs that do not encourage nano-economy to develop.

As the basis of productive forces, a person in nanoeconomics is considered in three qualities – as a factor, a tool, and a result of economic activity.

The logic of realizing the potential of a person (individual) at the stage of nano-economy – the human economy implies a dynamic approach to its formation. The process of growing up of an individual is associated with the stage of the baby economy. This stage flows into the period of full adult life when the obtained skills and characteristics of a certain individual are used and the new ones are acquired. This period is a period of application of everything acquired in the process of activity, a period of improvement, optimization of personal qualities, and active return from one's own activities. This is a period of receiving high motivational rewards for the activities. All achievements of an individual during this period involve the intensification of economic activity – when an individual turns into a leader, a highly professional engineer-inventor, or a high-quality executor-manager, or just a creative personality.

This stage is characterized by the spread of such type of activity of individuals, which leads to an increase in competitiveness of the national economy in general. The spread is a diffusion of highly professional human behavior, which eventually becomes inherent in the majority of the working population of a country. Thus, the ability to implement innovations is laid at school age when a child at school is taught to use knowledge in practice. The countries, such as the Netherlands, Germany, France, and other highly developed countries are characterized by a similar education system, which has a positive effect on the model of adult behavior in the workplace throughout working life.

The next stage involves the formation of moral, physical, cognitive, and psychological characteristics of development when a person consumes the benefits of his work and these consequences of labor are spreading throughout the entire society. Only when there is a critical mass of individuals satisfied with their state, it is possible to say that the human economy as a key subsystem of nano-economy, has a positive result, which is determined by the high indicators of competitiveness of the national economy and the achievement of a highly humane society. A person, directly and indirectly, affects all the changes that occur in the political and economic environment.

Thus, the human economy is the central link of the nano-economy, and a mature highly intelligent, highly moral, and highly professional person is its central subject that can carry out various types of activity: economic, scientific, and technical, social, political, etc. At the same time, scientific and technical activity becomes one of the main levers of influence of the human economy on the global environment. It is a scientific and technical activity that has influenced in recent decades the social evolution and development due to software, the Internet, gadgets, social networks, etc. Currently, the results of evolution are the development and implementation of nanotechnologies, which are a kind of high technologies that direct the economy to a new level of development.

The human economy as a complex systemic phenomenon is also characterized by appropriate management mechanisms, which act as functions of its management. The main components of human economy management include self-management, self-marketing, and innovative management of the organization's personnel.

Self-management is characterized by all the functions of management, which act as levers, mechanisms of influence of the human economy on the formation of the global environment. The functions of self-management include [24]:

- decision-making function;
- function of self-planning of working hours and personal work of a manager;
- function of self-organization of personal work;
- self-motivation and self-control functions.

Decision-making, which accumulates specific forms of management impact of other functions of self-management, is gaining a special influence on the development of international economic relations and the global environment as a whole.

Separate functions of the human economy can be considered self-marketing functions. In the studies performed by researchers, it is evidenced that self-marketing is a component of the “competence” of a specialist, the ability to analyze and predict the situation in the labor market, the situation of supply and demand, and as a result, to turn its “labor force” into a profitable product that enjoys demand [25]. Thus, the use of self-marketing makes it possible not only to create a positive image and a reliable reputation but also to actively promote one's ideas, developments, products and services to consumers, including in the context of global markets.

Functions of personnel management are well-known. Innovative approaches to personnel management require separate consideration.

Thus, the functions of human economy management are the functions of self-management, self-marketing, and personnel management. While the functions of self-management and personnel management are structured: planning, organization, motivation, coordination and control, the self-marketing functions are the functions of the individual's presence in the market environment: informational, distributional, transformative, stimulating, and managerial. At the same time, the self-management of an individual who structures his management activity includes self-marketing as a function of positioning an individual in the market environment.

As evidenced by the results of a theoretical study of the human economy:

- 1) management of the human economy and its functions act as leading elements of the nano-economy structure.
- 2) management functions in nano-economy are at the same time functions of influence of nano-economy on the global environment;
- 3) all functions of nano-economy reflect the effectiveness of economic mechanisms as for the impact of the lowest level of the economic system – nano- on the development of global systems of human development.

It should be noted that the management channels of the impact of nano-economy on global transformations in the world involve the use of innovative channels in the foreign economic activity of enterprises developing and implementing nanotechnologies.

#### 5. 4. The main provisions of nano innovation management and transfer of nanotechnologies in the context of globalization

In the world economic literature, “innovation” is interpreted as the transformation of potential scientific and technological progress into the real one, embodied in new products and technologies. The analysis of various definitions of innovation leads to the conclusion that the specific content of innovation includes changes, and the main function of innovation activity is the function of change.

Innovation researchers identified five typical changes [26, 27]:

- 1) use of new equipment, new technological processes, or new production support;
- 2) introduction of products with new properties;
- 3) use of new raw materials;
- 4) changes in the organization of production and its material and technical support;
- 5) emergence of new markets.

It is known that innovations are transformations that lead to gaining profit, and nanotechnologies are embodied in nano innovative products. Note that nanotechnologies today correspond to the fundamental level of development, the vast majority of these technologies are at the main stage of research. Although there are goods or products that are used in human life. Most nano research at this stage of science is just beginning to gradually move to the applied sphere. And this specificity is inherent in the formation of nano innovation management.

Nano innovation management can be defined as a totality of principles, methods, and forms of management of nanotechnological processes, nano innovation activities, personnel and organizational structures engaged in this activity [28, 29].

Like for innovation management, nano innovation management is characterized by:

- goal setting and strategy selection;
- management of the following functions of nano innovations: planning, organization, motivation, coordination, and control.

Nano innovation management can develop not only at enterprises – legal entities but also within the framework of the activities of individual entrepreneurs. Innovation develops in enterprises of different sizes, so, of course, innovation management can be implemented at large enterprises (mostly multinational corporations), which have a sufficient amount of agglomerated funds to make innovative decisions. However, small business entities (mostly individual entrepreneurs) also introduce innovations, first of all, managerial “know-how”, which simplify the management of personnel, resources, assets, and technologies.

Nano innovation management includes such activities as technology transfer. Technology transfer is the transfer of knowledge between different enterprises (from a developer to an implementer). The transfer of nanotechnologies, which involves the transfer of nano knowledge from developers to those who use them in practice, is relevant. The transfer of nano knowledge is at the initial stage because this is fairly new knowledge that is at the fundamental stage of research.

It should be noted that nanotechnology transfer is part of nano scientific and technical relations. The latter include the commercial and non-commercial sphere of development, implementation, production, and application of nanotechnological solutions. Such stages of nano scientific and technical

relations imply that they are a process of nano innovation management. When one management process covers all stages of such relations, it means the activation of operational nano innovation management.

Nano innovation management is characterized by the process of influencing the competitiveness of individual enterprises in international markets. This process consists of the following stages:

- information dissemination;
- training;
- creation of nanotechnologies;
- transfer of nanotechnologies;
- diffusion of nanotechnologies;
- formation of competitive environment;
- formation of the balance of the specific environment.

The decisive stage of this process is the diffusion of nanotechnologies. We would like to emphasize that the process of diffusion of national nanotechnologies has certain differences from the process of diffusion of foreign nanotechnological knowledge, although the factors of these processes are identical. In this case, it is possible to trace a pattern, which involves reducing the intensity of diffusion of foreign nanotechnologies with an increase in the level of development of the national innovation system. In addition, based on the exogenous and endogenous theories of knowledge diffusion and its combination, we emphasize that the international process of nanotechnology spread, the final stage of which is diffusion, gradually affects the competitiveness of enterprises. Such a process begins with the influence of determining factors on the process of dissemination of nanotechnologies – the speed of information dissemination and training, continues with the process of international exchange of nanotechnology itself – creation, transmission, and diffusion.

It should be noted that different entrepreneurs have common features in conducting economic activities. However individual economic entities (individual entrepreneurs – IEs) are distinguished by certain features.

The survey of individual entrepreneurs gave the following results:

- most entities’ number of employees is 1 person;
- annual income is up to USD 35,000 (by the exchange rate of 2021);
- factors influencing the financial behavior of the IE are the current legislation;
- most individual entrepreneurs do not use the services of tax experts to optimize tax payments;
- all activities are carried out personally by the IE (from ordering goods to their payment and to the formation of financial behavior in its own activities);
- all financial behavior regarding charges and payment of fines and penalties for late delivery or payment of products or executed works is formed in accordance with the current legislation;
- most individual entrepreneurs try to invest funds from the main activity in business development, which is a very positive phenomenon for both nano-economy and the national economy as a whole;
- all respondents testified that their expenses are covered by income received from the activities of the IE.

Using the behavioral approach to the interpretation of nano-economy, we note that the behavior, and in particular financial, of individual entrepreneurs is balanced, as well as based on the legislation of a particular country, the requirements of the INCOTERMS’2020 system. In countries with



a transitional economy, there is an attempt to establish legally such norms that are customs (unwritten, understandable, repeated rules) and it is these norms that determine the business behavior of various business entities, and especially self-employed individual entrepreneurs. The last aspect implies that no one controls them from outside and the IEs organize activities the way they think it is correct. However, it is the legislation that helps not to go against the rules, it forms the business policy of various business agents. This is a positive sign for the management of entrepreneurial structures and in the formation of nano-economy, that is, the legislation uses the practice of business regulation that exists in different countries of the world and internationally. Thus, the management sphere of the nano-economy is its guide through micro-and macroeconomy and directly into the global environment as well.

Management channels of the impact of nano-economy on global transformations involve the use of the relationship between the country’s participation in the world economic processes and the number of entrepreneurial entities and the quality of their international activities.

**5. 5. Factor analysis of the impact of independent nano-economic magnitudes on the dependent magnitude of export potential of countries**

As an approbation of the theoretical study, using the example of empirical research conducted in Ukraine, a linear regression model, which is presented below, was constructed. This model became the basis for analysis of the impact of factors of nano-economy on the export of countries with transition economies.

The linear regression was constructed based on the programming language R.

The dependent variable is the Export of Ukraine, USD 1 million (2021 exchange rate).

$$Y - Exp\_Ukr.$$

Vector of independent variables is (Quantity of universities, Quantity of economic entities, Quantity of enterprises in the field of scientific and technical activities).

$$X - (Univ\_quant; econ\_entities\_quant; tec\_scien\_enterprise\_quant).$$

The linear regression model takes the following form:

$$Exp\_Ukr = a_0 + a_1 \times Univ\_quant + a_2 \times econ\_entities\_quant + a_3 \times tec\_scien\_enterprise\_quant.$$

The export of Ukraine is influenced by such indicators as the number of universities, the number of economic entities, and the quantity of scientific and technical enterprises. Such an impact is assessed by multifactor regression, the results of which are shown below. The source data of the model are given in Table 3.

The research model takes the following form:

$$Exp\_Ukr = (1,502_e + 06) + (-5,151_e + 03) \times Univ\_quant + (3,134_e - 01) \times econ\_entities\_quant + (5,151_e + 00) \times tec\_scien\_eterprise\_quant.$$

Table 3

Data covering 2010 to 2019

Year	Export of Ukraine, USD, million (by the rate of 2021)	Quantity of universities	Quantity of economic entities	Quantity of enterprises in the scientific and technical area
2010	19,208	349	2,184,105	12,075
2011	24,753	345	1,701,797	93,493
2012	25,082	334	1,600,304	87,431
2013	23,842	325	1,722,251	97,052
2014	26,927	277	1,932,325	115,023
2015	36,522	288	1,974,439	131,035
2016	40,644	287	1,865,631	125,133
2017	50,008	289	1,805,144	121,546
2018	56,254	282	1,839,672	126,100
2019	57,217	281	1,941,701	134,800

The results of the study show that universities at an increase in their number affect the decrease in export rates. At the same time, a relatively insignificant (by 11 %) decrease in the number of economic entities corresponds to an increase in export indicators. The largest direct relation with Ukraine’s export volumes is associated with the number of scientific and technical entities.

The coefficients of model verification are given in Table 4.

Table 4

Coefficients of model verification

	Estimate	Std. Error	t value	Pr (> t )
(Intercepts)	1.502 <sub>e</sub> +06	5.985 <sub>e</sub> +06	0.251	0.810
	-5.151 <sub>e</sub> +03	1.068 <sub>e</sub> +06	-0.482	0.647
	3.134 <sub>e</sub> +01	1.137 <sub>e</sub> +06	0.276	0.792
	5.015 <sub>e</sub> +00	8.861 <sub>e</sub> +06	0.566	0.592

Residual standard error: 319800 on 6 degrees of freedom. Multiple R-squared: 0.5924, Adjusted R-squared: 0.3886. F-statistic: 2.906 on 3 and 6 DF, p-value: 0.1233.

Residuals:  
Min -19.937.  
1Q -2.529.  
Median 1.429.  
Max 6.645.

Results of the study of the model quality are given in Table 5.

Table 5

Results of studying the model quality

1	2	3	4	5
100,498.767	-18,661.248	-3,726.994	-171,992.243	-486,964.690
6	7	8	9	10
-249,373.359	-60,748.876	242,099.368	351,046.202	297,823.075

The results given in Table 5 indicate a fairly low quality of the model since there are no statistically significant coefficients. The determination factor of 0.59 is a fairly medium indicator. These indicators testify to a dubious hypothesis of the existence of a relationship between factor and objective variables.

The results of the model verification for heteroscedasticity, multicollinearity, and auto-correlation are shown below. The diagram of variance of model residuals is shown in Fig. 1.

Verification for heteroscedasticity with the Breusch-Pagan test:

Breusch-Pagan test.  
 BP=3.7119, df=3, p-value=0.2943.  
 Non-constant Variance Score Test.  
 Variance formula: ~fitted.values.  
 Chi-square=2.261816, Df=1, p=0.1326.

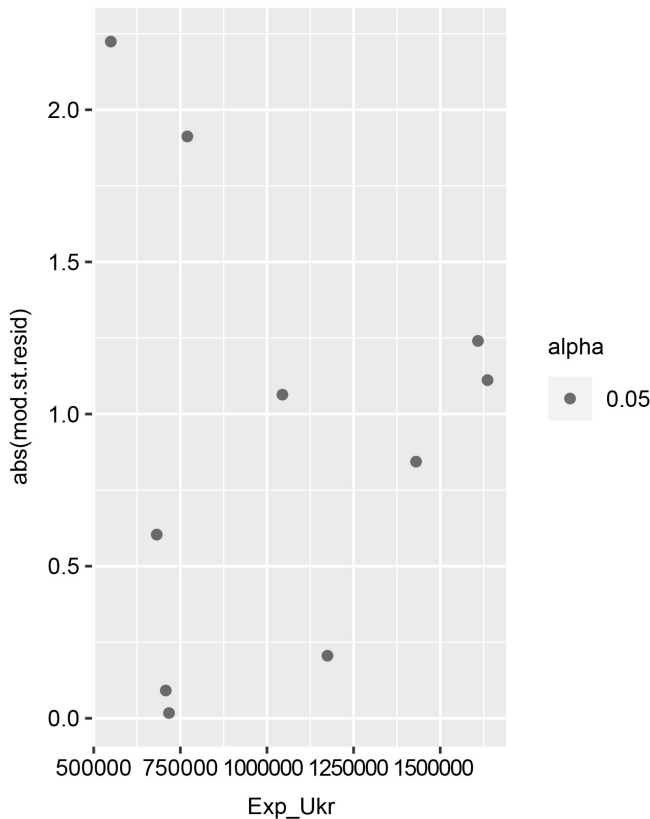


Fig. 1. Diagram of variance of model residuals

The tests show that the variance of residuals is constant and there is no heteroscedasticity.

Values  $p=0.2943$  and  $p=0.1326$  enable taking the hypothesis about homoscedasticity.

Verification for the existence of multicollinearity of the model by the Belsy method.

Correlation matrix  $X$  is given in Table 6.

Table 6

Correlation matrix  $X$

Univ_quant	Econ_entities_quant	Tec_scienc	Ent_quant
Univ_quant	1.000000	-0.1634530	-0.8192800
Econ_entities_quant	-0.163453	1.0000000	-0.3283775
Tec_scienc_ent_quant	-0.819280	-0.3283775	1.0000000

Observing the high pair correlation factor ( $>0.6$ ) between the pair of variables (Quantity of universities, Quantity of enterprises in the field of scientific and technical

activities), we can conclude that there is multicollinearity in the system.

Table 7 is a multicollinear diagnosis of the model.

Table 7

Multicollinear diagnostics

MC Results detection		
Determinant $ X'X $ :	0.1063	0
Farrar Chi-Square:	16.0652	1
Red Indicator:	0.5183	1
Sum of Lambda Inverse:	20.6452	1
Theil's Method:	1.2637	1
Condition Number:	138.8583	1
1 --> COLLINEARITY is detected by the test		
0 --> COLLINEARITY is not detected by the test		

Belsy test indicators prove the existence of multicollinearity.

Verification for the existence of autocorrelation of residuals using the Durbin-Watson method.

The diagram of standardized model residuals is shown in Fig. 2.

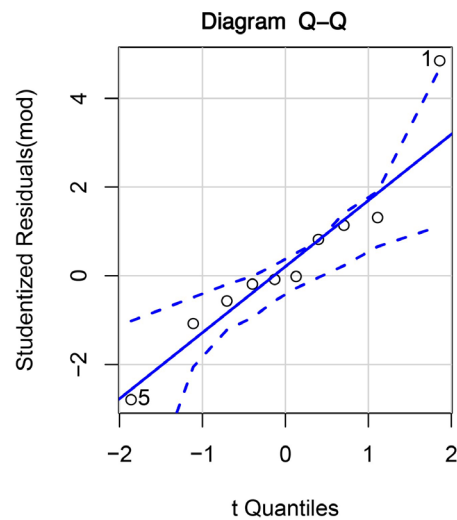


Fig. 2. Diagrams of standardized residuals of the model

The results of the Durbin-Watson test and the value  $p=0.002$  prove the presence of autocorrelation of residuals in the model.

This factor analysis revealed that the determinants of the nano-economy do not significantly affect the export potential of a country. The relations are not tight and do not directly affect export volumes. Thus, it is necessary to form such economic policy at the level of a country that intensifies managerial approaches at enterprises of various organizational and legal forms and different sizes.

## 6. Discussion of results of studying the impact of nano-economy on the global environment

The absence of developed nano-economy in some geographical centers was revealed. This is due to the insufficient level of their socio-economic and technological development,

the archaisms of management culture, the fact that economic entities mostly lack the need for innovations due to the insufficient competitive environment in these centers. In addition, there is no unified policy on the development of nano-economy and specific measures to support it, such as targeted financing of subsidies for children to visit preschool institutions, as practiced in developed countries.

The issues of nano-economy formation are based on three components – baby economy, human economy, and nanotechnology economy. Nano-economy should be presented as a systemic formation that is created over a long time, when all elements exist as integral entities, linked with certain regular relations, in particular, in the field of management.

The baby economy involves a system of household management, management of the training and education system, and management of baby industry enterprises. The study of baby economy management used cluster analysis that showed that in countries in the transition economy there are no baby clusters, which shows the lack of relations in the formation of the baby economy as an integral phenomenon.

The human economy and its activation are influenced by scientific, technical, organizational, economic, and socio-economic relations within the national economic system. Unlike alternative statements, according to which resources are the main link in management, the result of the study suggests that a person is a central link in the processes of enterprise management, a key factor in its effectiveness. It goes about individualization and management, in particular, and nano-economy as a whole.

The formation of nano innovation management as the management of nanotechnology economy is considered as a system of management of the entire cycle of technological development: from the development of fundamental solutions to the creation of competitive advantages in the international markets of relevant products and processes. Its main stage is the diffusion of nanotechnological solutions, which is a consequence of the nano-technological transfer. The studies contain the approaches that distinguish between commercial and non-commercial forms of transfer of nanotechnologies, which become the basis for the interpretation of transfer relations. These relationships are characterized by the intensification of the activities of individual entrepreneurs, who, as carriers of nano economic features, form their activities based on the national legislation and opportunities for their own benefit. The survey showed that by intensifying their activities, individual entrepreneurs are becoming a factor of nano-economy strengthening within the countries with transition economies. It should be noted that in [9, 11, 14], individual entrepreneurs are not considered as potential players both in national, and international markets. The corporations in various forms are the main ones, but nano-economy as an economy of individuals becomes an integrator of all relations and managerial relations, in particular.

The multifactor regression presented in the paper becomes the basis for conclusions on the impact of a nano-economy factor on the export potential of national economies, an indicator of low dependence between these categories in the countries with transition economies. These results of the study are given in Tables 3–7 and shown in Fig. 1, 2.

Management channels of the nano-economy influence on the global environment were determined. In particular, the nano-economy was divided into three components, which explain differently the management aspect of nano developments.

Thus, the baby economy, human economy, and nanotechnology economy have different management systems (from household economy to nano innovation management), which become the channels for nano-economy influence on global transformations. However, the management channels of the nano-economy influence on the global environment are a debatable issue, in which there are a large number of uncertain factors.

The practical component of the study shows that the results can be used in the development of various components of nano-economy in the context of globalization. At the present stage, global nano management is being formed. On the one hand, an individual activates the use of an individual factor both in terms of the process and functional management, creating a system of managerial relations aimed at the intensification of the efficiency of economic activity. On the other hand, the formation of concentrated centers of nano innovation management on economic entities becomes a powerful factor in the breakthrough of national nano-technology companies into the international environment.

The limitations of this study are related to the fact that the results were obtained from a limited data sample. This leads to the situation that the obtained results can be specifically used only if they cover certain aspects of the economy or the innovative systems of a particular country as a whole, rather than a part of it – nano-economy. Thus, the baby industry is not separated by certain data. In particular, there are no data on the production of children's footwear or children's clothing, food, etc. There is no information on the production of nanotechnologies either.

The study may be subsequently developed in the separated components of nano-economy, in the system of global management of the household, baby industry, education and training systems, self-management and self-marketing, nano innovation management in general.

---

## 7. Conclusions

---

1. Currently, nano-economy is part of the economy, the productive force of which is individuals, who, thanks to optimal management decisions and the use of nanotechnologies, ensure the achievement and spread of indicators of high competitiveness in the economic environment. Nano-economy as a system affects global transformations in the world through the use of the managerial approach. As a process, the nano-economy consists of the baby economy, human economy, and nanotechnologies economy.

2. Baby economy is the initial stage of the nano-economy and, as its component, is part of relations with the global external environment. This relationship begins with the household management, continues in the management of the educational process and the process of upbringing, and ends with the management of real enterprises manufacturing children's goods and food.

Household management, which has all the functions of management, involves the formation of a system of family center management, when fully-fledged economic individuals, in particular, individuals who are able to create innovative knowledge, especially in nano-branches, are formed from a positively arranged system of family relations.

International management technologies are most often implemented in the management of the educational process and upbringing.

On the whole, baby economy management involves the management of its various subsystems within different territorial centers.

3. Human economy is the central link and the main leader of the impact of the nano-economy on global markets. Management of the human economy and its functions are the leading elements of its structure. We can separate self-management, self-marketing, and innovative management of personnel of organizations as the main components of human economy management. Self-management is characterized by all management functions, namely: decision-making function; the function of self-planning of working hours and personal work; the function of self-organization of personal work; self-motivation and self-control functions. Nano-economy influences the formation and development of the global environment through them. This conclusion is proved by studies of active management and self-management of personnel at certain enterprises. Personnel motivation and its training provide enterprises with highly qualified staff with determining the number of individual employees as centers of nano-economy development. All functions of the human economy reflect the effectiveness of economic mechanisms of influence of the primary level of the economic system – nanolevel – on the development of global systems of human development.

4. Economy of nanotechnologies is at the embryonal phase of development. Most nano research at this stage of scientific development is just beginning to move gradually into the applied sphere. Accordingly, nanotechnologies in the vast majority are at the initial stage of designing, and their transfer is at the initial stage of development. This specificity is also inherent in the formation of nano innovation management as a totality of principles, methods, and forms

of management of nanotechnological processes, nano innovation activities, and personnel and organizational structures engaged in this activity. Nano innovation management can develop not only in companies that vary in size but also within the activities of individual entrepreneurs. Small business entities (mostly private entrepreneurs) also introduce nano innovations, first of all, managerial “know-how”, which simplify the management of personnel, resources, assets, and technologies. Indicators of the IE development show that the majority have an annual income exceeding USD 35,000 (by the exchange rate of 2021), which proves the positive business climate in the relevant environment and prospects for the development of nano innovation management.

5. Export of countries with developed economies is influenced by such indicators of the level of development of nano-economy as the number of universities, the number of business entities, and quantity of scientific and technical organizations. At the same time, performed a multifactor analysis of the impact of nano-economy on export showed that the determinants of nano-economy, due to the lack of its system, do not significantly affect the export potential of a country. The relations are not tight and do not directly affect export volumes. After all, the obtained indicators: exports of USD 57,217 million (at the exchange rate of 2021), 281 universities, business entities in the amount of 1,941,701 units, and 134.8 thousand scientific and technical organizations, do not correlate and determine low and inverse indicators of dependence. Thus, there is an urgent need to create preconditions for the formation of a nano-economy system in countries with transition economies with appropriate mechanisms to influence the entry of these countries into the global environment.

## References

1. Arrow, K. (1987). Reflections on the essays. Arrow and the Foundations of the Theory of Economic Policy. London, 727–734. doi: [http://doi.org/10.1007/978-1-349-07357-3\\_36](http://doi.org/10.1007/978-1-349-07357-3_36)
2. Satir, V. (1992). *Kak stroit sebya i svoyu semyu*. Moscow, 192.
3. Andriushyna, L., Trynyak, M., Kakovkina, O., Shuba, V. et al. (2020). Mindset as a value-related and conceptual factor of economic development of post-colonial states. *Economic Annals-XXI*, 184 (7-8), 79–93. doi: <http://doi.org/10.21003/ea.v184-08>
4. Senge, P., Kleiner, A., Roberts, C., Roth, G., Ross, R., Smith, B. (2004). *The Dance of Change: The Challenges to Sustaining Momentum in Learning Organizations*. Moscow, 601.
5. Abramov, A., Saponov, A. (2019). Sociocultural dimension of traditional and modern forms of consumer motivation. *Economic Annals-XXI*, 180 (11-12), 40–47. doi: <http://doi.org/10.21003/ea.v180-05>
6. Sull, D. (2004). *Pochemu khoroshie kompaniyi terpyat neudachi, i kak vydayuschiesya menedzhery ikh vozrozhdayut*. Moscow, 214.
7. Tichi, N., Devanna, M. R. (1990). *Lidery reorganizatsiy: iz opyta amerikanskikh korporatsiy*. Moscow, 204.
8. Chirikova, A. (2002). *Krizis liderstva i novye tsennosti globalnogo menedzhmenta*. Persona-Miks, 2.
9. Ishchenko, I., Bashkeieva, O., Petrov, P. (2019). Empirical model of congruence of mental space as a tool for the analysis of changes in international relations. *Economic Annals-XXI*, 176 (3-4), 4–12. doi: <http://doi.org/10.21003/ea.v176-01>
10. Frankovský, M., Birknerová, Z., Zbihlejšová, L., Medviď, M. et. al. (2018). Social intelligence in the cultural context: comparison of Ukrainian and Slovak managers. *Economic Annals-XXI*, 169 (1-2), 62–66. doi: <http://doi.org/10.21003/ea.v169-12>
11. Prisco, G. (2006). *Globalization and Open Source Nano Economy*. Available at: <http://www.kurzweilai.net/globalization-and-open-source-nano-economy>
12. Kleyner, G. B. (1996). *Sovremennaya ekonomika Rossiyi kak «ekonomika fizicheskikh lits. Voprosy ekonomiki*, 4.
13. Kleyner, G. B. (1997). *Nanoekonomika. Anatomiya esche odnogo strannogo rossiyskogo fenomena*. *Yuridicheskiy vestnik*, 22.
14. Kichurchak, M. (2020). Evaluation of cultural sphere development in the European Union countries as a factor of forming social capital and creative industries: experience for Ukraine. *Economic Annals-XXI*, 184 (7-8), 68–78. doi: <http://doi.org/10.21003/ea.v184-07>
15. Steshenko, J., Artemyev, A., Myktybaev, T., Khavanova, I., Masterov, A., Ponomareva, M. (2019). Assessment of the impact of socio-economic factors on productivity increase. *Economic Annals-XXI*, 177 (5-6), 70–81. doi: <http://doi.org/10.21003/ea.v177-06>
16. Inshakov, O. V. (2007). *Nanoekonomika i ekonomicheskaya genetika*. Volgograd, 94.

17. Manakhova, I. V. (2011). Nanoeconomics: Many-Level Approach to Research of Economic Relations. *Izvestiya Saratovskogo universiteta. Ser. Ekonomika. Upravlenie. Pravo*, 11 (2), 8–12.
18. Chumachenko, B., Lavrov, K. (2001). Nanotekhnologii – klyuchevoy prioritet obozrimogo buduschego. *Problemy teorii i praktiki upravleniya*, 5, 71–75.
19. Ostapenko, T. (2015). Baby-economy as a factor of efficiency increase of human potential using in conditions of globalization. *Zovnishnia torhivlia: ekonomika, finansy, pravo. Serii: Ekonomichni nauky*, 3 (80), 66–73.
20. Okunevičiūtė Neverauskienė, L., Pranskevičiute, I. (2018). Contribution of the economic and social sector to economic development: the case of the UK, Sweden and Lithuania. *Economic Annals-XXI*, 174 (11-12), 10–15. doi: <http://doi.org/10.21003/ea.v174-02>
21. Ligonenko, L., Borysov, Y., Hromozdova, L., Deineha, I., Leontovych, S., Kosiak, I. et. al. (2021). Defining the socio-demographic predictors of priority investment in the context of tasks for the financial subsystem of startup-management. *Eastern-European Journal of Enterprise Technologies*, 1 (13 (109)), 15–25. doi: <http://doi.org/10.15587/1729-4061.2021.225639>
22. Palyvoda, O. M. (2015). Enterprise clusters in the environment of poor economic confidence. *Actual problems of economics*, 6, 202–210.
23. Zhyhalkevych, Zh. M. (2014). Innovatsiina paradyhma klasteroutvorennia. *Ekonomika ta upravlinnia pidpriemstvamy. Visnyk Berdianskoho universytetu menedzhmentu i biznesu*, 2 (26), 79–83.
24. Chaika, H. L. (2014). *Samomenedzhment menedzhera*. Kyiv: Znannia, 422.
25. Kytskai, L. I. (2016). Selfmarketing as a tool of successful employment and forming image of employee. *Investytsiia: praktyka i dosvid*, 6, 26–31. Available at: [http://www.investplan.com.ua/pdf/6\\_2016/6.pdf](http://www.investplan.com.ua/pdf/6_2016/6.pdf)
26. Rakhmetova, A., Budeshov, Y. (2020). Quality of life as an indicator of public management performance in the Republic of Kazakhstan. *Economic Annals-XXI*, 184 (7-8), 133–153. doi: <http://doi.org/10.21003/ea.v184-12>
27. Shumpeter, Y. (1982). *Teoriya ekonomicheskogo razvitiya*. Moscow: Progress, 560.
28. Vanyushina, N., Makarova, A., Shanturova, G. (2020). An integrative model of emotional intelligence development of the Chinese secondary language personality in the context of modern management. *Economic Annals-XXI*, 183 (5-6), 142–149. doi: <http://doi.org/10.21003/ea.v183-14>
29. Schmarzo, B. (2020). Mastering Nanoeconomics in the Era of Digital Transformation. *The Economic Data, Analytics Digital Transformation*. Available at: <https://www.linkedin.com/pulse/mastering-nanoeconomics-era-digital-transformation-bill-schmarzo/>