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# DEFINITION OF CONCEPTUAL BASICS OF NANO ECONOMICS AS INCLUSIVE SOCIETY ENVIRONMENT

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The definition of nanoeconomics can relate to different levels and areas of economic life. First of all, this is the nanolevel of the economic system. As a human economy, nanoeconomics provides for the allocation of an individual factor within the framework of a socio-economic phenomenon. The nanoeconomic aspect is central to the definition of inclusion. So, the inclusion of a person, as the main subject of nanoeconomics, to the formation and stabilization of economic systems is the initial one in the integration of an individual in relation to production processes and economic development. A person is involved in academic and social life by making decisions about their own business and integrating it into the sectoral and national economic space. It is proved that its indicators are the conditions for clustering the economic system. The study carried out a cluster analysis of the innovation system in a country with an economy in transition.

In addition, the study outlined that inclusive phenomena in the economy are close to integration and are the opposite of segregation and isolation. It is noted that different institutions of integration can be used to form objective conditions for the development of babyeconomics. Public decisions of inclusion involve the use of Arrow's impossibility theorem.

The research results can be used:

- the individualistic functions of inclusion should be used in the formation of the babyeconomics, the human economy and the economy of nanotechnology;

- states of inclusion must be created at all levels of the economic system;

- a person and wealth are an individualistic aspect of an inclusive economy, because national wealth consists of individual wealth.

Nanoeconomics is just beginning to be included in the systemic processes of inclusive economic phenomena, especially in countries with economies in transition

**Keywords:** inclusive economics, nanoeconomics, babyeconomics, human economics, economic integration and isolation, individualistic functions of inclusion

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## 1. Introduction

The phenomenon of inclusion is relevant, the doctrine of which is spreading more and more throughout the world. So, by definition, inclusion is the process of increasing the degree of participation of all citizens in society.

Inclusion is the process of incorporating individuals into the nanoeconomics system. As a process, inclusion consists of sequential actions for the transition of the existence of an individual person to the system of human relations, which are filled with nanoeconomics. Inclusion involves the development and implementation of specific solutions that can enable everyone to participate equally in academic and social life. Detachment from social processes is not welcomed in the activities of an individual.

A number of decisions taken at different stages of the development of nanoeconomics become the basis for the transition from single subjects to their synergistic combination. The skills of making such decisions are formed within the framework of babyeconomics, when the decision to have

a child is made. After all, parents determine the principle of the child's existence in society, whether the child is divorced from social trends, or, on the contrary, integrates into social life and establishes social ties to form communication skills in adulthood. Parents decide which items of children's life will be bought and the practice of spending money on clothes, shoes, furniture and food will be encouraged. This is the consumption of parents, in which children have only a low level of the right to vote on the acquisition of a particular item, but when the child grows up, becomes an adult, certain skills of consumer behavior are formed in it. Of course, when it comes to inclusion and education, then it is primarily about instructing children with special needs to the regular educational process. The opportunity to have a quality education opens the doors of universities and other educational institutions for children with disabilities and special needs. With education, such individuals can enter adulthood and work to ensure a certain standard of living.

The relevance of the study is determined by the fact that nanoeconomics is a human economy and should be included

in modern economic and social processes. Nanoeconomics is an individualistic phenomenon and involves the adoption of relevant decisions on technological-economic, organizational-production and socio-economic relations within the economic system. These relations relate to the extended process of economic reproduction and at all its links there is an entry of individuals, as representatives of nanoeconomics, to socio-economic systems.

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## 2. Literature review and problem statement

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There are authors who consider various approaches to the interpretation of the concept of inclusive economic development [1, 2]. In the historical plane, a combination of various approaches to the macroeconomic assessment of the efficiency of the economy is analyzed. Thanks to such an analysis [1], it is reasonably explained using the example of various scientific works, why the main macroeconomic indicators do not thoroughly assess the efficiency of the economy and its sustainable development. The concept and methodology of the Inclusive Development Index developed by the World Economic Forum in the context of sustainable development of countries are analyzed in detail. But this study has limitations [2] on the use of the individualized factor of the inclusive economy, is the object of analysis in this article. All this suggests that it is advisable to conduct a study on babyeconomics, human economics and the economics of nanotechnology.

Other authors [3] assess consulting as an entrepreneurial activity of professionals from different fields of knowledge to provide assistance is determined by its inherent socio-economic restrictions on access to the services of its subjects. It is noted that an inclusive approach to the process of providing consulting services is aimed at overcoming barriers to access to consulting. The content of the latter is the formation and use of a system of measures to facilitate the use of consulting services for those strata of the population, business entities, who are excluded from professional assistance. This is a specific example of using an inclusive system for a specific type of business.

In the works [4, 5], the features of inclusive economic development [4], and the possibilities of achieving it in countries with different levels of socio-economic development, have been investigated. The key areas of economic growth have been identified in accordance with the global Sustainable Development Goals. The sustainable development system is an example of the formation of an inclusive economy [5], which is influenced by individual individuals. It is necessary to define itself in relevant research on an inclusive economy in a state of sustainable development.

The present research [6, 7] approaches to determining the content of inclusive sustainable economic growth in the global economy [6]. The studies carried out prove that mankind has defined the basic requirements of the 21st century and outlined the ways to solve them. Inclusive economy and inclusive economic growth in recent years have become one of the topics in the documents of international and supranational organizations [7]. However, it can be stated that in the countries of the world there is no uniform agreement on the definition of inclusive development. Based on the above, it can be noted that the research of inclusion should be of a comprehensive nature using the characteristics of the institutional order.

Inclusive development is present within national economies and at the global level [1, 3, 4]. However, at the human level, the inclusive system is not considered. Such a problem is acquiring special relevance in the modern conditions of globalization. After all, the nanolevel of the economic system should be implemented at the micro-, meso-, macro- and mega-levels, which is determined by the peculiarities of the inclusive economy and social relations.

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## 3. The aim and objectives of research

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The aim of this research is to define nanoeconomics in the context of inclusive economic development. This will make it possible to determine the individual factor in the progressive development of an inclusive economy.

To achieve the goal, the following tasks were set:

- to include nanoeconomics in the formation of innovation clusters as combinations of industry and national economic space;
- to consider nanoeconomics as the inclusion and integration of economic development;
- to determine the ratio of inclusion and education at the level of babyeconomics;
- to determine the level of national wealth as a manifestation of the inclusion of nanoeconomics to the national economic system.

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## 4. Materials and methods of research

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This analysis is based on statistics from a country with an economy in transition. The research used the following methods: systems analysis and structural approach, induction and deduction, observation and comparison, cluster analysis. General scientific methods have been applied to interpret inclusive phenomena in economics and to influence nanoeconomics on these phenomena. Cluster analysis was carried out to assess the level of innovative clustering of the regions of the studied country.

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## 5. Results of research on the conceptual foundations of nanoeconomics as an inclusive public environment

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### 5.1. Cluster analysis of innovative phenomena in the country's economy

Of course, within the framework of human economics decisions are made about inclusion in academic and social life. These are decisions concerning their own business and its integration into the sectoral and national economic space. This is a space for social life. Its indicators are clusters and the level of clustering of territorial businesses. The phenomenon of clustering is known, which involves the unification of industry manufacturers of one geographic center. An individual manufacturer of a certain product is a representative of a separate business, but its capacity increases with collaboration with similar businesses in the region.

To determine the participation of Ukrainian regions in innovation and potentially in the global innovation environment, it is proposed to use cluster analysis. For this, the initial data (which are shown in Fig. 1) for the regions of Ukraine and the city of Kyiv are presented in the environment of the statistical package Statistica 12.

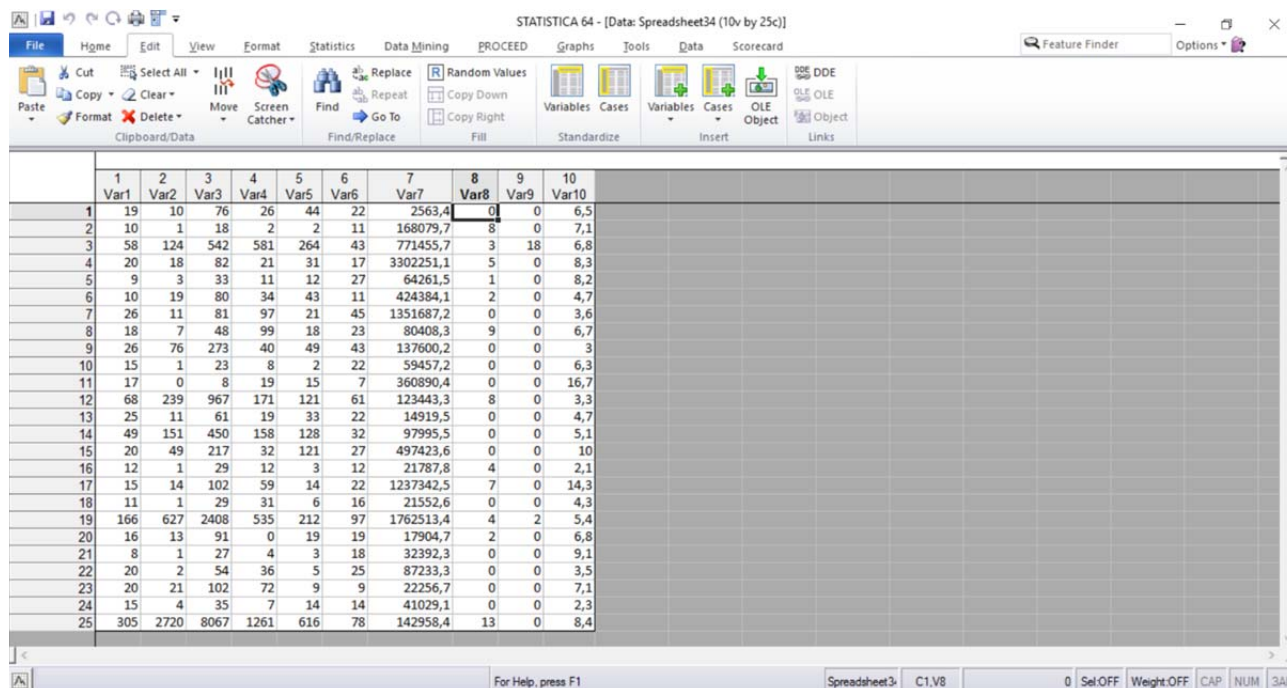


Fig. 1. Initial data for cluster analysis

The main indicators that were taken for the cluster analysis were as follows:

- 1Var1. Organizations performing scientific work;
- 2Var2. The number of scientific performers, doctors of science;
- 3Var3. The number of scientific work performers, candidates of science;
- 4Var4. The number of researchers who traveled outside Ukraine;
- 5Var5. Received titles of protection for inventions;
- 6Var6. The number of industrial enterprises that innovated;
- 7Var7. Volumes of innovative products sold outside Ukraine;
- 8Var8. Acquisition of new technologies outside Ukraine;
- 9Var9. Transfer of new technologies outside Ukraine;
- 10Var10. Innovative cooperation with foreign partners (European countries).

For the purpose of data reduction, the procedures of cluster analysis were applied – dividing the set of objects under study into homogeneous groups. Cluster analysis methods can be used in cases when it comes to a simple grouping, in which it all comes down to creating groups based on quantitative characteristics.

A distinctive feature of cluster analysis from other classification methods is the absence of a training sample, thus, algorithms are implemented without training. A significant advantage of cluster analysis is the ability to split objects not by one parameter, but by a number of features. In addition, cluster analysis makes it difficult to apply traditional econometric methods.

The solution to the problem of cluster analysis is a separation that satisfies the criterion of optimality.

There are a lot of cluster analysis algorithms. The most common among them, in particular for their software and hardware implementation, are hierarchical (tree-like) procedures. The principle of their work lies in the sequential

combination of groups of elements at the beginning of the approximate ones, and then the most. The disadvantages of hierarchical procedures include the cumbersome nature of their algorithmic implementation. At each step, the algorithms require calculating a distance matrix, respectively, machine resources and time.

Dividing into different numbers of clusters of innovative development in Ukraine, it is possible to get different options for solutions.

In the Statistica 12 environment, in the Statistics/Multivariate Research Methods menu, select the Cluster Analysis command. Among the available clustering methods, let's define the method of tree clustering, as the rule for hierarchical unification, let's choose the single link method, methods for determining the distances between objects – the Euclidean distance.

The results of such a clustering procedure were concluded in the following sequence of actions:

- rule of combining into clusters;
- horizontal tree diagram;
- vertical tree diagram;
- schedule of the order of merging;
- distance matrix.

This sequence of steps, which was used for the clustering procedure, allows to track the cluster analysis procedure. At the first stage, it is possible to assume that each area is a separate cluster, that is, there are 25 clusters. The distance matrix determines the smallest distance between clusters, for example, the Euclidean distance is 2985 between the C13 and C20 cluster, 236 between C16 and C18, 4804 for C5 and C10, 6825 for C8 and C22, which allows for the first clustering: C1, (C13, C20), (C16, C18), C23, C21, C24, (C5, C10), (C8, C22), C14, C9, C25, C12, C2, C6, C11, C15, C3, C7, C17, C19, C4. The merge performed is confirmed by the merge rule and horizontal or vertical tree diagrams. Thus, a partition into 21 clusters is obtained. Since the goal of the study is to obtain 10 clusters, the clustering procedure must be continued according to the same algorithm. At a certain

stage, let's obtain such a division into 10 clusters: (C1, C13, C20, C16, C18, C23, C21, C24, C5, C10, C8, C22, C14, C9, C25, C12), C2, C6, C11, C15, C3, C7, C17, C19, C4.

C denotes the number of the corresponding area in Fig. 1.

These values of cluster analysis show that a definite trend has not yet been observed. There is one cluster of sixteen regions of Ukraine, and the remaining nine clusters are created by an innovative component of one region. In fact, this means that each of the regions of our state is authentic and unique in the development of international relations of innovative regional systems. The first cluster (agglomerated) provides for general approaches to the development of innovative activity and its international component in the following areas: Vinnytsia, Zhytomyr, Ivano-Frankivsk, Kyiv, Kirovohrad, Lviv, Mykolaiv, Odesa, Rivne, Ternopil, Kherson, Khmelnytskyi, Cherkassy, Chernivtsi, Chernihiv, city of Kyiv.

In practice, it is quite obvious that some significant innovation clusters make up such regions as Kharkiv. But even insignificant regions in terms of their contribution to the country's GDP, for example, Volyn, Sumy, Poltava or Zakarpattia, are slowly increasing it. Clusters of Dnipropetrovsk, Donetsk, Zaporizhzhia, Luhansk regions, which have more opportunities and resources to develop their own innovative activities, should more actively modernize production facilities and transfer academic science to industry, mainly to metallurgical, machine-building and chemical industries.

Thus, the cluster analysis determined that most regions of Ukraine are similar in the development of innovation and which nanoeconomics needs improvement. Thus, all the initial data for cluster analysis indicate that the activation of innovative activity should begin with upbringing in a family, a preschool childcare institution and universities. These areas should develop the economics of the educational process and education for the subsequent opportunities for the development of creative individuals who have developed and implemented high and nanotechnology. In such areas as Kharkiv or Dnepropetrovsk, it is necessary to create conditions for the use of innovations in enterprises producing goods or services. And, on the other hand, it is necessary to maintain the scientific potential by developing babyeconomics and its transition to the human economy and the economy of nanotechnology.

K-means clustering was also performed – a vector quantization method, was invented for signal processing, but is often used for cluster analysis of data. The goal of k-means clustering is to divide  $n$  values into  $k$  clusters, in which each value belongs to the cluster with the closest mean. It acts as a prototype of a cluster, that is, each observation refers to the cluster, the center (centroid) of which is the nearest.

The degree of "closeness" is the Euclidean metric:

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

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

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

In the R language, the k-means value `KMeans_arma` was chosen from the `armadillo` library of the `ClusterR` package.

To use `KMeans_arma`, the number of columns (replaceable vectors) in the data must exceed the number of clusters,

otherwise the function will return an error. The algorithm is initiated once, and usually 10 iterations are enough for convergence. Output centroids are distributed using one of the algorithms – `keep_existing`, `static_subset`, `random_subset`, `static_spread`, or `random_spread`.

The result of cluster analysis is the data given in Table 1.

Table 1

The results of cluster analysis

Regions	1	2	3	4	5
Vinnytsia	0	0	0	1	0
Volyn	1	0	0	0	0
Dnipropetrovsk	0	0	1	0	0
Donetsk	1	0	0	0	0
Zhytomyr	1	0	0	0	0
Zakarpattia	0	0	0	1	0
Zaporizhzhia	0	1	0	0	0
Ivano-Frankivsk	0	0	0	1	0
Kyiv	0	1	0	0	0
Kirovohrad	1	0	0	0	0
Luhansk	0	0	0	0	1
Lviv	0	0	1	0	0
Mykolaiv	0	1	0	0	0
Odesa	0	1	0	0	0
Poltava	0	0	0	1	0
Rivne	1	0	0	0	0
Sumy	0	1	0	0	0
Ternopil	1	0	0	0	0
Kharkiv	0	0	1	0	0
Kherson	0	0	0	1	0
Khmelnytskyi	1	0	0	0	0
Cherkasy	0	0	0	1	0
Chernivtsi	0	0	0	1	0
Chernihiv	0	0	0	0	1

The indicators and results of cluster analysis using the vector quantization method determine that the grouping of regions of Ukraine has slightly different characteristics. Thus, the optimal innovation cluster unites Dnipropetrovsk, Lviv and Kharkiv regions. Donetsk and Luhansk regions, which were in a separate cluster in the previous study, in this method are generators of different groups: 1<sup>st</sup> and 5<sup>th</sup> clusters. This study shows that the groups formed in Soviet times are regrouping in modern conditions and differences are created between the regions of the first cluster – 16 regions. Separate features inherent in a smaller number of regions of Ukraine are beginning to stand out. So, the group of regions includes regions from different geographic zones of Ukraine, when Donetsk region is combined with Volyn and Khmelnytskyi regions, and Sumy with Zaporizhzhia. It can be argued that there is a mutual intertwining of economies and innovation spheres of different regions of Ukraine.

Note that innovative development is effective only in close connection with investment attractiveness [8]. Capital investments by region are presented in Table 2. These data indicate the financial ability to invest in innovative development. The largest share of investments is observed in Dnipropetrovsk, Kyiv, Donetsk and Kharkiv regions and city of Kyiv.

Table 2.  
Capital investments by region in 2020

Regions	Capital investment		
	Thousand. c.u.	As a percentage of the total volume / %	Per person/c.u.
Ukraine	508217042	100.0	12223.9
Vinnytsia	13601513	2.7	8888.8
Volyn	9121580	1.8	8884.5
Dnipropetrovsk	58601434	11.5	18568.1
Donetsk	26597759	5.2	6482.3
Zhytomyr	9270208	1.8	7708.3
Zakarpattia	5080997	1.0	4067.6
Zaporizhzhia	15495040	3.1	9244.3
Ivano-Frankivsk	6338028	1.2	4653.9
Kyiv	32760002	6.4	18414.8
Kirovohrad	6745999	1.3	7331.0
Luhansk	3259085	0.6	1534.4
Lviv	23641491	4.7	9507.8
Mykolaiv	9504884	1.9	8536.7
Odesa	21437523	4.2	9077.5
Poltava	25156889	5.0	18343.7
Rivne	5650634	1.1	4915.1
Sumy	7200076	1.4	6801.1
Ternopil	7296821	1.4	7074.8
Kharkiv	20248586	4.0	7697.6
Kherson	7199137	1.4	7051.9
Khmelnyskyi	10617033	2.1	8520.3
Cherkasy	9079342	1.8	7684.1
Chernivtsi	3319516	0.7	3704.7
Chernihiv	7957105	1.6	8157.3
City of Kyiv	163036260	32.1	55768.2

From the Table 2 it can be seen that the cluster-creating areas are determined by a significant amount of investments and their per capita indicators. This indicates the financial ability to support innovation.

It should be noted that the decision on inclusion is also made in the development and implementation of nanotechnology within certain clusters. In modern realities, nanotechnological solutions are ahead of their time; they are revolutionary aspects of new technologies. Supply dictates demand. But these decisions must be implemented in the consumer's life circumstances and improve them. It should be noted here that inclusive solutions should relate to academic life, because the academic space consists of separate technologies. Thus, physics, chemistry, electronics, biology and other sciences of human life are developing nanotechnological solutions and integrating this area into the economy of nanotechnology.

## 5.2. Nanoeconomics as inclusion and integration of economic development

The concept of inclusion is close in meaning to the concept of integration and the opposite is segregation and isolation. So, isolation (from the French – isolation) – separation of someone or something, deprivation of ties with the environment. Isolation in nanoeconomics provides for the implementation of activity only with the use of one's own efforts, without connections and the outside world. This happens when a person is limited in their actions (disability, limited communication, etc.), or does not have experience in

making connections. These can be sole proprietors who are just starting their own business and do not have economic relations with partners, suppliers, competitors, consumers and the possibility of using substitute products. Or when a former student is educated but cannot find a suitable job. Also, isolation can be observed in the personal invention of nanotechnology, when a potential consumer does not understand such technological solutions.

However, it should be noted that inclusion, in addition to the individualized factor, includes the components such as justice, growth, stability and sustainable development.

So, justice provides for the possibility of instructing the individual and business entities to influence weighted decisions at the state level. It is fair to use all agents of economic life for the appropriate allocation of resources and participation in the formation of national income and wealth.

Growth within the national economy is also an element of inclusion, because growth is an increase in the scale of the economic system and various actors from individuals to transnational corporations are involved in this increase. Growth is the basis for economic development, a more fundamental category. There are two main types of growth: exogenous and endogenous. The latter is an inclusive phenomenon, since it assumes the existence of internal impulses for development. In different types of macroeconomics, these impulses are excellent. In countries with economies in transition, these can be private entrepreneurs and the weak influence of government regulation on the formation of growth inclusion.

Stability is a factor and a result of inclusion. In conditions of stability, it is less difficult to connect to economic development than in conditions of crisis. Stability presupposes equilibrium conditions at the macro level, which are influenced by various factors, including individual ones.

Sustainable development also affects the positive conditions for the formation of an inclusive economy, since all economic phenomena and social processes must enter the signs of environmental friendliness. Especially the environmental friendliness of the existence of an economic man.

Understanding the need for inclusion will help to overcome nanoisolation. In inclusion, all stakeholders must be actively involved in order to achieve the desired outcome. Just as the diffusion of technology is a multiplier process for the development of the state economy, so the participation of citizens in society is a predisposing factor of influence on a person in the development of nanoeconomics. An indicator of this is the level of opening a private business in a particular country. And, accordingly, the level of closing business units. This is a natural increase in economic agents. If this growth is positive, then the inclusion of nanoeconomics is actively developing. If it is negative, that is, when enterprises are closed more open, then it is necessary to change the state business policy and create an innovative environment.

Integration differs from inclusion in that in the case of the former, certain institutions of an inclusive environment are created. These include:

- transparent format for registering a business, when a business is opened and closed in a single window. Administrations should involve individuals in the formation of entrepreneurial structures, including in the form of tax incentives;
- institution of cooperation between business and tax authorities. When certain forms of business have advantages in payments to the state budget, including sole proprietorship, they are very popular with potential business entities;

– institution of market management of business entities. The theory of management should be widespread for various entrepreneurial structures, this is self-management for sole proprietorship, and corporate management for LLCs and CJSCs and OJSCs, and the like;

– institution for business consulting support. For any form of business, there are consultants who support the entry of the business into the cluster environment and provide marketing support to promote goods and services on the market;

– institution for innovative business support. Now there is a separation of innovation from the entrepreneurial environment, this is a legacy from Soviet times. Science is separate, enterprises are separate. An inclusive environment provides for the transfer of innovative business to the entrepreneurial sphere, when the main subject of financing innovation is business, and only then the state or universities.

These institutions of integration can be used to form the objective conditions for the development of babyeconomics.

### 5. 3. Determination of the ratio of inclusion and education at the level of babyeconomics

The combination of inclusion and education is a developmental process for babyeconomics. Firstly, such a component of the baby-economy as the economy of households provides for the inclusion of the latter in the system of nanoeconomics and the system of the national economy. Household inclusion is determined by the ability to be the supply of labor and the demand for various types of consumer products. The ability to buy baby products is also by including children and their parents in the baby industry. Here it is possible to dwell on the issue of preference aggregation. Given the preferences of all individuals, it would be desirable to have a way of “aggregating” them into one social preference. In other words, knowing how all individuals rank different placement states, it would be possible to use this information to construct a social ranking of different placement states. This is the problem of public decision making at its most general level. Public decisions are made to create demand for baby products purchased by parents and separately by children of different ages. This aggregation occurs at the level of different needs of different household representatives. Then, when the child enters adult individual life, she has the skills to consume and form the economic basis of well-being within a given national economy.

Let’s make a list of some of the requirements for what the mechanism of public decisions should meet, based on inclusion:

1. For a given set of full, reflective and transitive individual preferences, the mechanism for making public decisions has to lead to public preferences that satisfy the same characteristics. Thus, the decision to send a child to a lyceum or gymnasium becomes a public decision. This is the public demand for quality education.

2. If all individuals prefer alternative  $x$  over alternative  $c$ , then social preferences should give  $x$  a higher rank than  $y$ . So, lyceums and gymnasiums require attending classes in a certain uniform, therefore, this is how the aggregate demand of the highest rank for high-quality education and premium clothing is formed.

3. Preferences for  $x$  and  $y$  should depend solely on how people rank  $x$  and  $y$ , not how they rank other alternatives. That is, there are two alternatives to lyceums and gymnasiums as well as ordinary general education schools, other options are not considered.

All three of these requirements seem to be acceptable. However, it can be quite difficult to find a mechanism that would satisfy them all. Indeed, Kenneth Arrow proved the existence of the following surprising result.

Arrow’s impossibility theorem. If the mechanism for making public decisions corresponds to properties 1, 2, and 3, then this situation is a dictatorship: all public rankings of alternatives belong to one person.

Arrow’s impossibility theorem shows that three very acceptable and desirable features of the mechanism for making public decisions are incompatible with democracy: there is no “thorough” way of making public decisions. There is no perfect way to “aggregate” individual preferences that would lead to one social preference. If there is a desire to find an image of aggregation of individual preferences, which would lead to public preferences, it is necessary to abandon one of the properties of the mechanism for making public decisions described by Arrow’s theorem [7].

Consideration of inclusion and education deserves special attention. Of course, as noted, babyeconomics is responsible for the sociologization of the child in relation to society. The school must provide such skills and competencies. Proceeding from an educational institution, a full-fledged citizen can join society and become a conductor of the baby and nanoeconomics to the development of the national economy. The functions of including the child in the educational space include the following:

– the usefulness of learning, when a child receives such knowledge that allows it to enter the university, this integrates the applicant to the university and to the community of people with higher education. Also, the usefulness of studying at the university becomes a prerequisite for the attractiveness of a certain workplace;

– the well-being of a person, when the level of well-being allows one to get such an education that will become a pass to the elite club of workers with an appropriate salary;

– utilitarian skills, when education provides such skills that allow, under any initial conditions, to enter the category of highly qualified workers with an appropriate level of income.

Maximization of inclusion is determined by the fact that there should be an accumulation of social wealth on the basis of individual wealth. The indicator of social wealth as national was first defined in the 17<sup>th</sup> century. W. Petty as the sum of accumulated wealth. Further attempts at statistical research of national wealth date back to the 19<sup>th</sup> century, and since 1853, its measurements become the topic of international statistical congresses.

### 5. 4. National wealth as a manifestation of the inclusion of nanoeconomics to the national economic system

At the end of the XIX-beginning of the XX century, representatives of the historical school denied the effect of objective economic laws, since on their Dimka, there is only a wealth of individuals, as a result of the functioning of nanoeconomics (economists – Russian, German). Other scholars approached the definition and calculation of national wealth from the point of view of the possibility of using it for tax purposes. In the interpretation of the French economist, national is wealth that brings profit to its owner at the nanoscale. And on the scale of society, it is the sum of the wealth of individuals, determined in current prices, that is, it does not include property of the state, churches and public facilities (parks, streets, canals, etc.). An English

economist calculated national wealth based on income tax information. Other researchers determined it on the basis of data on property, possessed by inheritance or as a gift, and in other ways [9].

The concept of income is statistically related to the category of wealth. So, Table 3 shows the indicators of the formation of the gross national income of countries with economies in transition in 2020.

Table 3

Gross national income in 2020

Income category	In actual prices, mln. c.u.				
	I quarter	II quarter	III quarter	IV quarter	2020
Gross profit	283704	335718	530437	605859	1755718
Remuneration of wage earners	514859	486190	549013	599140	2149202
Tax excluding subsidies and production and imports	129825	124789	164839	179480	598933
Income from property received from other countries, excluding those paid	-16955	-63843	-63047	-59052	-202897
Gross national income	911433	882854	1181242	1325427	4300956

From the Table 3 it can be seen that the main article of the formation of the national income is the gross profit received by economic entities. Let's note that the power's income is also formed, not least of all, from the wages of employees. The total income of the population of a country with an economy in transition differs somewhat from the amount of wages of employees and also includes income from business, shown in Table 4.

Table 4

Disposable income of the population of Ukraine in 2020

Income structure	Year	
	Mln. c.u.	in % to 2019
Total income	3972428	106.1
Costs and savings	3972428	106.1
Disposable income	3062229	105.4
Average monthly available income per person, c.u.	6113	106.1
Real disposable income	×	102.6

Note: × – no data available.

It is obviously that the data in Table 4 show that all indicators of income of individuals tend to increase (from 2 to 6 %). This is a positive value that favorably affects the formation of wealth and determines that the individual is included in the processes of creating welfare at the national level.

An inclusive public environment, therefore, involves the inclusion of the wealth of individuals in its public manifestation. In the first half of the twentieth century, the interpretation of national wealth was widespread as a combination of "economic" goods that have a price, and "free" goods – gifts of nature and the like. In addition, national wealth was defined as a good that it can be valued in money. For example, the price of an apartment building should include the climate

and landscape where the house is located. And personal wealth should include not only a person's monetary income, but also the level of education, qualifications, practical skills, competence and place of residence. Since it was not possible to reveal the real value of the "free" goods of nanoeconomics in practical calculations, the amount of national wealth was defined as the sum of "economic" goods. Certain Western economists included in the national wealth the level of professional training of workers, the life expectancy of the population, and other elements associated with the personality of the nanoparticipant of production, recognizing them as inclusions to the definition of living national wealth. Its value was defined as "the cost of production of people", that is, the cost of upbringing, education and health maintenance. Known comparisons of "living" and speech wealth, when the "average cost of a person" was calculated.

Modern Western statistics defines national wealth as the total value of all tangible assets available in the country, the pole of the balance of international debt and investment. This method can also be used to calculate individual wealth for the formation of the quality of nanoeconomics. Non-reproducible assets were calculated using census data or various approximate methods, for example, using the average ratio between the value of buildings and the value of land. Or for the wealth of nanoeconomics, human capital is the expression of the quality of nanoeconomics.

In 1947, the International Association for Research on Problems of National Income and Wealth was established [10, 11].

National wealth is the totality of all the benefits that are at the disposal of the society, the country.

Social wealth as an economic category is due to the development of productive forces, quantitative growth and qualitative complication of the needs of production and consumption. Influence on the concrete historical patterns of reproduction of social wealth is exerted by the social forms of its movement, due primarily to the system of dominant production relations.

The most important feature of social wealth is the use of social labor in its creation. The latter is not only the source of all created material and spiritual benefits, but also a necessary condition for the development of the person itself, outside the creative activity of which benefits lose the quality of social or social wealth. Yes, and for the development of nanoeconomics, social labor is a mechanism for obtaining wealth and a manifestation of its materialized component.

Social labor as an economic category of wealth is a universal measure of this wealth, it can quantitatively express the totality of its elements, regardless of the specifics of their material content and social form of movement. The object of nanoeconomics – a person – becomes a channel for the inclusion of a person in the social environment.

There are individualistic functions of inclusion, which provide for the functions of the individual regarding inclusion in socio-economic processes. The growth of labor productivity and production efficiency makes it possible to significantly change the working and living conditions of people. However, many problems remain especially environmental ones. All this requires purposeful activity of society to create material, technical, organizational, economic and social conditions for effective and creative work of a person. This is the process of humanization of production. With the development of society, the needs of the producers themselves for education and culture, living standards, and

working conditions are constantly growing. So, the humanization of production is not only the result of scientific and technological development, but also a necessary prerequisite for the implementation of its achievements and further development.

Modern society experiences an organic need for a true and comprehensive humanization of production and labor. In developed countries, much has been done to improve working conditions, develop both general and vocational education, health care, physical culture and sports, provide people with housing, household services, and the like.

The individualistic functions of inclusion are a complex multilevel problem. Its solution involves the use of material, technical, organizational, economic and socio-economic factors. The basic is the change in the content and working conditions, which is directly related to the improvement of technology and production technology.

Individualistic inclusion provides that in order to improve production and achieve high results, risk groups are created at firms – temporary research teams. They bring together talented, enterprising engineers and scientists, develop promising scientific and technical ideas and materialize them in new products. Such teams successfully solve urgent problems of modern scientific and technological development. Special risk firms are also being created – venture capital firms, developing new directions for the development of production.

It should be noted that the development of human creativity, the activities of rationalizers and inventors are playing an ever-increasing role. So, through nanotechnology, creative individuals are included in the innovative national environment.

Another function of inclusion is the ecological aspect of humanizing the working and living conditions of a person. Pollution of air, water and land adversely affects human health, causes disease, reduces efficiency, and shortens life expectancy. Changing the ecological situation of a person is both an individualistic and a global problem.

The individualistic functions of inclusion are the motivational mechanism of labor, which primarily includes such universal, general economic elements as the needs and interests of a person, because for the sake of their satisfaction, a person produces various benefits. Incentives to work can be material and moral (spiritual).

An inclusive economy has certain states, which are manifested in a set of actions and conditions for the inclusion of the subject of nanoeconomics into the public economic environment. These states are general market equilibrium, competitiveness of the national economy, and the achievement of public goods.

To compare the results of the activities of various economic institutions, one of which is the market, it is necessary to use a certain criterion, allowing to talk about which of them is the best of public opinion. One of these criteria is the concept of efficiency (optimality) according to Pareto, or economic efficiency.

This criterion is widely used in microeconomics to analyze the distribution of goods and production resources in conditions when their available quantity is limited.

If a certain state of distribution of goods is not Pareto optimal, then there must be some way to improve the state of one or several individuals without worsening the position of others.

It should be noted that during the optimal allocation of resources in production, analysis is allowed at three levels: an individual firm, an industry and the national economy as a whole.

As was the case with pure exchange, the Pareto criterion assumes that limited resources should be fully utilized. A different state is the achievement of high levels of competitiveness. Competitiveness is the state that the national economy achieves through the formation of a high-quality competitive environment, which, in its erg, is created by the activities of individual individuals, enterprises, industry and internal regions. Thus, an individual creates its own creative brand and works with it in an entrepreneurial environment. Competitiveness involves the formation of public goods. Thus, public goods are significantly different from private goods. It is possible to single out, first of all, such their differences as the absence of competition in consumption and the absence of exclusion from consumption.

The first feature is that by consuming such goods, the utility of an individual does not decrease with an increase in the number of consumers. For a certain volume of public goods, the growth in the number of consumers does not lead, as is typical for private goods, to an increase in market provision of this good, it is the result of an increase in demand. This means that the marginal cost of providing the good to the additional individual is zero.

This property of public goods is due to the fact that they are indivisible. It is impossible to differentiate individuals according to the volume of consumption of such a good; as a consequence, the supplier is also unable to establish a relationship with each individual customer.

Since there is no way to refuse someone in the consumption of a predetermined amount of a public good, the problem arises of how to provide this good.

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## **6. Discussion of the results of the study of nanoeconomics as an inclusive public environment**

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The results obtained are explained by the fact that an inclusive environment in a country with an economy in transition is determined by the existence of weak institutions of integration and inclusion. The entry of an individual into integrative economic systems in such countries provides for inactive nanoeconomics and the absence of its systemic education.

There are such methods for determining the level of an inclusive economy as the Inclusive Development Index, but its formation methodology is rather complicated. The method of cluster analysis helps to structure the innovation system and determine the territorial and sectoral development centers. According to certain authors [1], inclusive development develops more intensively in those regions that have a greater amount of investment, because if there is investment, then there is innovation. Regions of a country with economies in transition such as Dnipropetrovsk or Donetsk and Kharkiv regions have more opportunities for inclusion compared to regions such as Chernivtsi or Rivne. The city of Kyiv also stands out as a center for the inclusion of both the city and its inhabitants towards the national innovation environment. The problem of inclusion in regions with low indicators of economic development is unresolved.



Inclusion is a factor of integration, and integration at all levels of economic systems. So, for the integration of a person into a team, industry, national economy and international regional formations, it is necessary to have innovative perspectives of inclusion. Problematic is the question of determining the role of an individual in integration phenomena on a global scale.

Babyeconomics is the primary part of nanoeconomics. Households, the baby industry and the educational process and upbringing system is an inclusive process within the national economic space. Even according to statistics, baby products do not differ from products for the adult population. This is a question of disconnecting from existing industries but their manufactured adult products. The inclusion of the baby industry is the starting point for understanding babyeconomics. And the problem for a further solution is the separation of the babyeconomy and its parts from the nanoeconomic systems within the framework of national economic complexes.

Tables 3, 4 present data on the formation of national income. National wealth is created by the receipt of its individual components from individuals. However, income and wealth are not identical phenomena, but those that are determined by a certain level of inclusion. In a country with an economy in transition, the average monthly income is 6113 c.u. and it provides opportunities for growth. However, whether its growth is formed from inclusive phenomena in the economy remains an unresolved problem.

But there are certain limitations in the study, so it is very difficult to assess the contribution of an individual to national economic development and its determinant – national wealth.

The disadvantages of this study include the limited coverage of statistics on the individual factor of inclusion.

As the prospects for using this study, one can highlight the determination of the dynamics of inclusive phenomena in the economy under the influence of the inclusion of individuals in the process of extended production reproduction. The state with clusters in the economy can change under the influence of the development of nanoeconomics, but experimentally this study can be limited by the opacity of the economic activity of individuals.

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## 7. Conclusions

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1. Innovation clusters in one of the countries with economies in transition have not been formed and innovation activity is disordered. Inclusive phenomena characterized by innovative impact become the basis for the development of nanoeconomics. And the latter affects the innovative inclusion of various business entities. This situation can be explained by the fact that society on the path of transformations is just beginning to form a complex economic system, and under these circumstances, inclusion is considered as a mechanism for such a formation. For the development of an inclusive economy, it is necessary to take into account the possibility of forming sectoral organizations in the form of clusters. Indicators for cluster analysis form five clusters, including a different number of areas. But these are areas from different regions of the country and there is no systematic nature in their education.

2. Inclusion is associated with the phenomenon of integration. Economic integration is based on the use of certain institutions and provides for a wider range of mutual rela-

tions. In this regard, integration is considered as a process taking place at different levels and at the nanoscale in particular. Integration of individuals into the national economy and into global economic processes is becoming the goal of the development of nanoeconomics at the present stage of human evolution. Integration is a qualitative indicator of inclusion and the use of various institutions of integration leads to the fact that the inclusion of an individual in an inclusive environment is accompanied by changes. Such changes consistently increase labor productivity and efficiency of nanotechnological solutions created by a specialist in an inclusive environment.

3. Institutions of integration can be used to form objective conditions for the development of the babyeconomics. Inclusive phenomena are quite common in the education system and are determined by the individualistic functions of inclusion. Babyeconomics, under similar circumstances, is the starting point for the development of inclusion, because it is on the studio bench that a young person receives an example of the inclusion of various persons (with special living conditions) into society. This example remains close to a person throughout its life and is transferred to its various spheres. The system of education and upbringing contributes to the inclusion of babyeconomics in an inclusive social environment. This is especially true of the quality of the sociologization of the child and the transfer of this experience into adulthood.

4. Inclusive phenomena also relate to the formation of national wealth. Thus, national wealth is created by combining the wealth of individual individuals, is directly related to nanoeconomics. The mechanisms for the inclusion of individuals in the formation of national wealth can be the conditions of market equilibrium, the production level of competitiveness and the formation of public goods. Inclusion should be aimed at obtaining and forming wealth both for an individual and for society as a whole. Nanoeconomics is the vehicle for creating the foundations for the accumulation of wealth. Quantitative indicators of the formation of national income reflect the conditions for the formation of wealth inclusion. In this aspect, individual income becomes a component of national wealth.

The conceptual principles of nanoeconomics as an inclusive social environment are: a dynamic combination of isolation, inclusion and integration. Integration is an inclusion with the use of certain institutions – the conditions for registering a business, cooperation between the state and business, market management of business structures, business consulting support, innovative business support. Also, public decisions in inclusion are particularly highlighted, and special conditions for the combination of nanoeconomics and education are determined, especially through the use of the levers of babyeconomics.

Also, questions of the formation of national wealth as a manifestation of inclusion. What happens with the use of individualistic functions of inclusion, which should be attributed to environmental, motivational and labor.

All these features of the inclusion of the individual in the social economic environment are involved in the formation of various states of inclusion.

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## References

1. Uniyat, A. V., Yuzvin, Z. I. (2019). The concept of inclusive economy in the context of modern sustainable development of countries. *Efektivna Ekonomika*, 2. doi: <https://doi.org/10.32702/2307-2105-2019.2.55>
2. Komarova, V., Mietule, I., Arbidane, I., Tūmalavičius, V., Prakapienė, D. (2021). Will production in the modern world and its regions return to a slow growth regime? *Economic Annals-XXI*, 187 (1-2), 4–14. doi: <https://doi.org/10.21003/ea.v187-01>
3. Marchenko, O. S. (2020). Inkliuzyvnyi pidkhd u sferi konsaltnhu ta profesiyni posluhy "PRO BONO". Materialy mizhnarodnoi naukovo-praktychnoi Internet-konferentsiyi: Inkliuzyvnyi rozvytok ekonomiky v umovakh hlobalnykh vyklykiv sohodennia. Kharkiv, 4–6. Available at: [https://science.kname.edu.ua/images/dok/konferentsii/2020konf/1-28\\_\\_.pdf](https://science.kname.edu.ua/images/dok/konferentsii/2020konf/1-28__.pdf)
4. Bobukh, I. M., Shchegel, S. M. (2018). Strategic environments of economic growth in Ukraine: inclusiveness as a key priority. *Visnik Nacional'noi' Akademii' Nauk Ukraïni*, 7, 55–70. doi: <https://doi.org/10.15407/visn2018.07.055>
5. Dunska, A., Zhaldak, H. (2021). The influence of endogenous innovative sources on the development of exports of industrial enterprises. *Economic Annals-XXI*, 187 (1-2), 99–113. doi: <https://doi.org/10.21003/ea.v187-10>
6. Tkalic, T. (2018). Inclusive economy as a model of world economic growth. *Naukovyi visnyk MNU imeni V.O. Sukhomlynsko. Ekonomichni nauky*, 1 (10), 93–98. Available at: <http://www.mdu.edu.ua/wp-content/uploads/Econom-visnyk-10-17.pdf>
7. Arrow, K. J. (1963). *Social Choice and Individual Values*. New-York.
8. Pererva, P., Usov, M., Chernobrovkina, S., Larka, L., Rudyka, V. (2021). Methods for Assessing the Investment Attractiveness of Innovative Projects. *Studies of Applied Economics*, 39 (6). doi: <https://doi.org/10.25115/eea.v39i6.5167>
9. Tsapko-Piddubna, O. (2021). Inclusive growth policy and institutional assessment: the case of Central and Eastern European countries. *Baltic Journal of Economic Studies*, 7 (2), 233–239. doi: <https://doi.org/10.30525/2256-0742/2021-7-2-233-239>
10. Benko, N. (2021). Dominants of development and reproduction of human capital as a strategic component of change. *Baltic Journal of Economic Studies*, 7 (2), 28–36. doi: <https://doi.org/10.30525/2256-0742/2021-7-2-28-36>
11. Barash, Y., Kryvytskyi, Y., Ablamskyi, S. (2018). External experience for the execution of exchange regulation and possibilities of its application in Ukraine. *Baltic Journal of Economic Studies*, 4 (1), 25–30. doi: <https://doi.org/10.30525/2256-0742/2018-4-1-25-30>