



NORWEGIAN JOURNAL OF DEVELOPMENT OF THE INTERNATIONAL SCIENCE

№53/2021

Norwegian Journal of development of the International Science

ISSN 3453-9875

VOL.2

It was established in November 2016 with support from the Norwegian Academy of Science.

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The Scientific journal “Norwegian Journal of development of the International Science” is issued 24 times a year and is a scientific publication on topical problems of science.

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Norwegian Journal of development of the International Science

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site: <http://www.njd-iscience.com>

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ECONOMIC SCIENCES

MODERN MODEL OF TIES BETWEEN THE PARTICIPANTS OF ECONOMIC RELATIONS IN TERMS OF POST-INDUSTRIAL DEVELOPMENT OF SOCIETY

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Abstract

We have studied the relationship between the participants in economic relations in terms of post-industrial development. Existing modern technologies and technical capabilities, which are formed on the basis of the use of digital technologies have changed the approach to the system of relations between market participants. Modern digitalization, which has become a necessary tool for economic relations between economic entities has changed the capabilities of each of the participants in this process. The very structure of economic relations and the technology of realization of such relations have also changed. The very structure of economic relations and the technology of realization of such relations have also changed. Households are becoming a new equal participant in economic relations. The level of development of households and the intensity of their inclusion in the system of economic relations of the state is one of the indicators of the level of economic development of the state. In the conditions of digital economic relations special requirements to the goods (works and services) which are made by subjects of managing have been formed. Demand requirements can be met only by applying an individual approach to each of the clients. It is households that can focus their activities on securing specific orders. Involving households in the chain of economic relations between market participants will help to obtain an economic effect for all its participants. We investigated that households are an important subject of the entire economic system of Ukraine, which has an impact on the formation of GDP. We have proposed a mechanism for the formation of links between economic entities and the involvement of households in the overall economic process as an equal economic institution of economic relations. We have developed a scheme of relations between participants in market relations, which will help ensure the required level of resource needs in the production process, and will improve the economic condition of each of the participants in this system of relations and the state as a whole. The implementation of such a model requires the formation of a single information database with a differentiated level of access for each of the participants in the business process. Active introduction of digitalization in the system of economic relations and in the economic process, along with the formation of innovative production takes the implementation of the main strategy of state development.

Keywords: Households, Agriculture, digitization, system, power, economic relations, economic entities

The formed vector of modern development of society is focused on the active transition to the post-industrial stage of development. Mechanized large-scale machine production is replaced by the use of new knowledge, highly skilled labor, and automated methods and management systems, which is a manifestation of the post-industrial stage of economic development. Today, the indicator that determines economic efficiency is the level of digitalization of the production process and its management system. Modern information technologies have changed the approach not only to the organization of the production process and technologies, but also to the system of connections between market participants. The information technology revolution has changed the material basis of the economy, transforming it into a digital socio-technological system. Such drastic changes have prompted the creation of new models of relations between the participants in economic

relations.

The integration of the latest information technologies not only in the process of production of goods, or services has caused revolutionary changes in human society. Indicators of the information society are: leveling the boundaries between the hierarchical elements of economic relations and different strata of social development; deconcentration of production and population; growth of information exchange; closing the process of production and consumption; ecological reconstruction of the economy; development of individual attitude of the producer to the consumer; formation of polycentric, self-governing management systems; distribution of a closed production cycle; creation of integrated automated control systems; formation of strong logistical links between the production of products by different participants in economic relations and consumers.

Table 1

Distribution of households by self-perceived of their income, economic expectations for the next 12 months

	All households			including living		
				in urban areas		in the countryside
	2018	2019	2018	2019	2018	2019
Number of households (thousands)	14934,9	14881,7	10061,3	10037,5	4873,6	4844,2
Distribution of households by self-assessment of their income level during the last year (%):						
was enough and made savings	8,7	11,2	8,7	11,5	8,7	10,7
was enough, but no savings were made	47,6	49,3	49,0	50,7	44,5	46,2
constantly denied themselves the essentials other than food	40,2	36,7	39,2	35,2	42,1	39,7
it was not possible to provide even sufficient food	3,5	2,8	3,1	2,6	4,7	3,4

Source: Generalized by the author on the basis [1]

The existing complexity and versatility of the modern economic system requires a careful analysis of the factors that have become elements of socio-political transformation. Households, as a separate economic category and a separate business entity has become an equal participant in market relations.

We analyzed the final sample survey conducted by the State Statistics Service of household members who took part in the survey of living conditions on the self-assessment of households of the level of their material

security. It should be noted that in Ukraine in 2019 there were 14,881.7 thousand households, while in 2018 there were 53.2 more households (19364.9 households).

Among the total population in the urban area lived 10061.3 - 10037.5 thousand households, respectively, in 2018 and in 2019, which is 67.37-67.45% of the total population. In rural areas during 2018-2019 lived respectively 4873.6-4844.2 thousand households (or 32.63-32.55% of their total) (Table 1).

Table 2

Dynamics of the unemployment rate in Ukraine during 2000 -2019 (population in thousands)

Years	Total population	Economically active population	Employed population	Unemployed population	Unemployment rate	Registered unemployed
2000	48923,2	21150,7	18520,7	2630,0	12,4%	1178,7
2001	48457,1	20893,6	18453,3	2440,3	11,7%	1063,2
2002	48003,5	20669,5	18540,9	2128,6	10,3%	1028,1
2003	47622,4	20618,1	18624,1	1994,0	9,7%	1024,2
2004	47280,8	20582,5	18694,3	1888,2	9,2%	975,5
2005	46929,5	20481,7	18886,5	1595,2	7,8%	891,9
2006	46646,0	20545,9	19032,2	1513,7	7,4%	784,5
2007	46372,7	20606,2	19189,5	1416,7	6,9%	673,1
2008	46143,7	20675,7	19251,7	1424,0	6,9%	596,0
2009	45962,9	20321,6	18365,0	1956,6	9,6%	693,1
2010	45778,5	20220,7	18436,5	1784,2	8,8%	452,1
2011	45633,6	20247,9	18516,2	1731,7	8,6%	505,3
2012	45553,0	20393,5	18736,9	1656,6	8,1%	467,7
2013	45426,2	20478,2	18901,8	1576,4	7,7%	487,6
2014	42928,9	19035,2	17188,1	1847,1	9,7%	458,6
2015	42760,5	17396,0	15742,0	1654,0	9,5%	461,1
2016	42584,5	17303,6	15626,1	1677,5	9,7%	407,2
2017	42386,4	17193,2	15495,9	1697,3	9,9%	352,5
2018	42153,2	17296,2	15718,6	1577,6	9,1%	341,7
2019	41902,4	17381,8	15894,9	1486,9	8,6%	338,2

Source: Generalized by the author on the basis [2]

Analyzing the distribution of households by self-assessment of their income level, economic expectations for the next 12 months should be noted that 47.6-49.3% of households in the dynamics for 2018-2019, respectively, had a sufficient amount of income, but they did not make savings. Only 11.2% of households in 2019 and 8.7% of households in 2018 testified to the adequacy of income received in Ukraine over the last year. 40.2% of households in 2018 and 36.7% of households in 2019 testified about the difficult economic situation, in which they had to

constantly refuse the most necessary things, except for food.

In general, these studies show an improvement in the economic situation of Ukrainian households in 2019. However, analyzing the state of income of households in Ukraine by territorial location, we noted that their economic situation was better in those located in urban settlements, compared with households in rural areas. If, in 2019, according to self-assessment, 50.7% of households in urban areas said that the level of income was sufficient, but they did not make savings,

then in rural areas this category of households was 4.5% less and their percentage was 46, 2% (Table 3). Quantitative expression, which characterizes the ratio of the number of unemployed in the country to the total number of economically active working population in the country (in the region or in a social group) can be

analyzed by the unemployment rate. A certain level of unemployment, expressed as a percentage and presented in the dynamics over the years characterizes the general condition and welfare trends of the population. It should be noted that in Ukraine there is a general trend of population decline.

Table 3

Ukraine's labor force by sex, type of area and age groups in 2019

	All population aged 15 years and older		Urban area		Countryside	
	thousand people	in% to the total population of the corresponding age	thousand people	in% to the total population of the corresponding age	thousand people	in% to the total population of the corresponding age
All population aged 15 years and older	18155,7	56,3	12457,1	57,7	5698,6	53,6
from it						
15-70 years	18066,0	63,4	12409,6	64,3	5656,4	61,5
20-64 years	17698,8	72,9	12192,3	74,0	5506,5	70,5
working age	17381,8	74,0	11959,3	75,4	5422,5	71,0
by age groups						
15-24 years	1365,9	36,2	813,9	33,8	552,0	40,4
25-29 p years	2123,1	80,0	1401,0	82,0	722,1	76,4
30-34 years	2661,2	82,0	1879,6	83,4	781,6	78,8
35-39 years	2616,2	85,8	1942,7	87,5	673,5	81,1
40-49 years	4696,0	86,0	3271,6	87,7	1424,4	82,2
50-59 years	3919,4	73,8	2650,5	74,8	1268,9	71,6
60-70 years	684,2	13,7	450,3	13,1	233,9	15,0
71 years and older	89,7	2,4	47,5	2,1	42,2	2,9

Thus, if in 2000 the quantitative dimension of the population was 48923.2 thousand people, in 2019 - this figure decreased to 41902.4 thousand people, which is 7020.80 thousand people less than in the base year.

Despite the demographic decline, it should be noted that Ukraine has significant potential a hard-working population. Analyzing the data on the number of Ukrainian labor force in 2019, we noted that the population aged 15 and older in Ukraine is 56.3%, or 18155.7 thousand people, of which 12457.1 thousand people are urban population, and 5698, 6 thousand people - are in rural areas.

The ratio of the employed population of Ukraine

to the number of economically active over the years increases its importance (Fig. 1). Thus, if in 2000 this ratio was 0.88, in 2019 its value was 0.91. This indicates an increase in the number of employed people in the structure of the economically active population. At the same time, the unemployment rate in 2019 decreased to 8.6%, while in 2000 it was much higher and amounted to 12.4%. These are all positive trends to improve the economic condition of the population of Ukraine and improve welfare. Figure 1 shows the dynamics of change in the economically active population and the number of employed people in Ukraine.

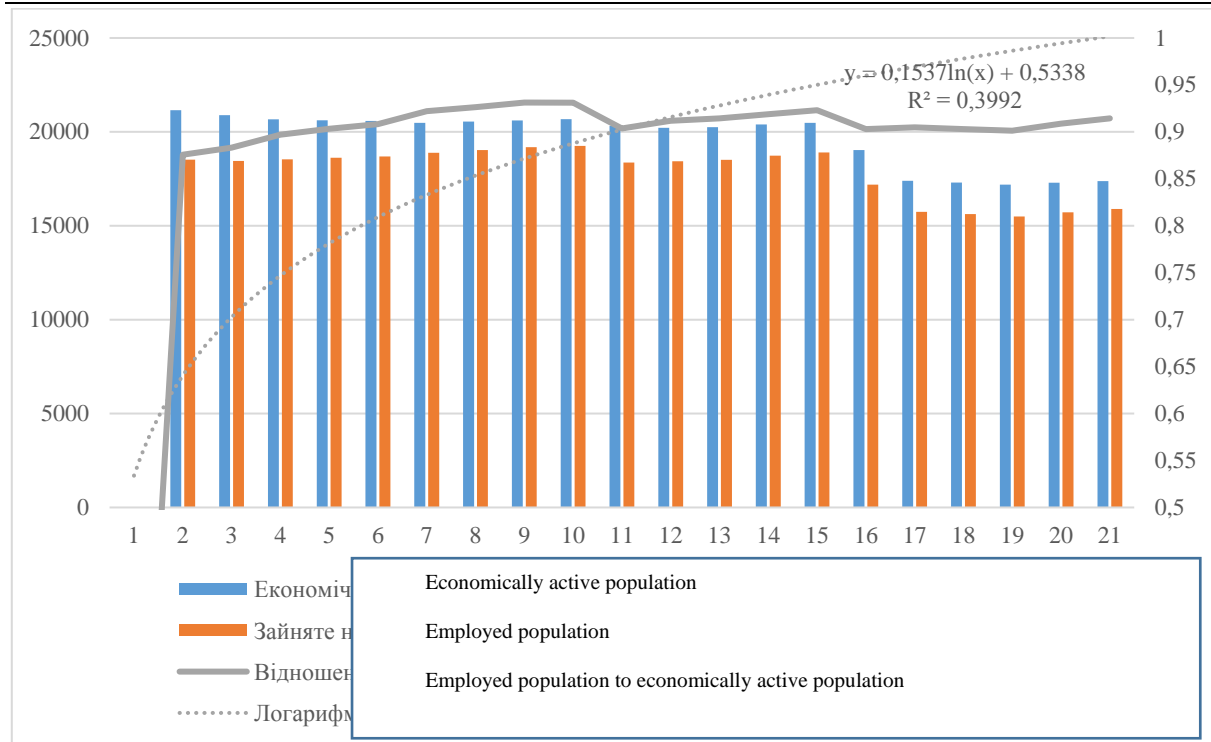


Fig. 1. Dynamics of the number of economically active and employed population of Ukraine during 2000-2019.

In the process of conducting a macroeconomic assessment of economic institutions in Ukraine, households are differentiated by place of residence into those living in urban areas and those living in rural areas. Such a distribution is necessary in order to distinguish the specifics of income and expenditure and economic behavior of households that live in different places of residence and have different nature of employment and type of economic activity.

Despite the significant labor potential of the population of Ukraine, the value of income of both the total population and household income has low economic indicators. Thus, 20.9% of the population of Ukraine in 2018 had an average per capita equivalent total income of less than UAH 3,000 per month per person, in 2019, due to the increase in minimum social guarantees, this figure decreased twice (10.7%). The maximum share of the population in 2018 (29%)

received income in the amount of 5 - 6 thousand UAH. And in 2019 - the maximum share of the population (20.6%) received income in the amount of 4-5 thousand UAH per person per month. We noted the differentiation of incomes of the population living in urban and rural areas. The incomes of the population living in urban areas are much higher. This trend is observed both in 2018 and in 2019. In 2019, only 4.1% of the population living in urban areas and only 0.7% of the population living in rural areas received incomes of more than UAH 12,000 per month. In general, the share of the population with per capita equivalent total income per month, below the average level of total income is 59.9 and 60.7%, respectively, in 2018 and 2019. And the share of the population with per capita equivalent total income per month, lower than the actual subsistence level is 27.6 and 23.1%, respectively, in 2018 and 2019 (Table 4).

Table 4

Distribution of population and households by level of per capita equivalent total income, %

Indexes	2018			2019		
	All households	including live		All households	including live	
		in urban areas	in the countryside		in urban areas	in the countryside
The whole population	100,0	100,0	100,0	100,0	100,0	100,0
Із середньодушовими еквівалентними загальними доходами у місяць, грн						
to 3000,0	20,9	18,8	24,7	10,7	8,8	14,4
3000,1-4000,0 ²	27,3	27,7	26,8	19,2	17,6	22,4
4000,1-5000,0 ³	22,8	21,9	24,8	20,6	20,6	20,8
5000,1-6000,0 ⁴	29,0	31,6	23,7	16,6	16,4	17,0
6000,1-7000,0	-	-	-	10,4	10,5	10,1
7000,1-8000,0	-	-	-	7,9	8,6	6,5
8000,1-9000,0	-	-	-	4,6	5,0	3,8
9000,1-10000,0	-	-	-	3,2	3,6	2,3
10000,1-11000,0	-	-	-	2,3	3,0	0,9
11000,1-12000,0	-	-	-	1,5	1,8	1,1
over 12000,0	-	-	-	3,0	4,1	0,7

The share of the population with per capita equivalent total income per month, lower than:						
average level of total income	59,9	60,8	56,7	60,7	62,0	57,7
statutory subsistence level	1,3	1,0	1,8	1,1	1,0	1,3
the actual subsistence level	27,6	25,6	31,5	23,1	19,9	29,5

A similar situation is observed with data on household incomes. The information that shows the dynamics of the level of per capita equivalent total income expressed as a percentage we present in table 4.

We noted that the transformation of the entire economic system of Ukraine with the transition to market relations has contributed to the separation of households living in rural areas. It should be noted that for a long time the formation of Ukraine's economy, this institution was a closed economic unit, and was not considered as an economic entity involved in shaping the country's GDP and as an indicator of the level of economic development. For a long time, households' activ-

ities were focused exclusively on subsistence production. However, everything changed during the transition of Ukraine's economy from the command-administrative type of development to market relations. In such a system, households began to acquire the characteristics of equal participants in economic relations. Due to the rapid development of microcredit, a significant level of digitalization and the ability to use digital technologies, they have the opportunity to operate in various sectors of the economy, and sell products or end users, or be involved in the technological process of large enterprises or regional clusters as equal market participants.

Table 5

Distribution of households by level of per capita equivalent total income, %

Indexes	2018			2019		
	All households	including live		All households	including live	
		in urban areas	in the countryside		in urban areas	in the countryside
All households	100,0	100,0	100,0	100,0	100,0	100,0
With average per equivalent overall income per month, UAH						
< 3000,0	19,8	18,3	22,9	10,5	8,9	13,9
3000,1-4000,0 ²	26,8	26,8	26,9	19,4	18,0	22,4
4000,1-5000,0 ³	22,3	21,4	24,2	19,7	19,4	20,3
5000,1-6000,0 ⁴	31,1	33,5	26,0	16,3	16,2	16,6
6000,1-7000,0	-	-	-	10,4	10,3	10,4
7000,1-8000,0	-	-	-	7,9	8,6	6,5
8000,1-9000,0	-	-	-	4,6	5,0	3,9
9000,1-10000,0	-	-	-	3,3	3,7	2,6
10000,1-11000,0	-	-	-	2,7	3,4	1,2
11000,1-12000,0	-	-	-	1,8	1,9	1,2
> 12000,0	-	-	-	3,4	4,6	1,0
Share of households with per capita equivalent total monthly income, lower:						
average level of total income	58,1	59,1	54,8	59,7	61,1	56,7
statutory subsistence level	1,3	1,1	1,6	1,1	0,9	1,6
the actual subsistence level	26,4	25,0	29,2	23,3	20,6	29,1

Modern economic conditions and technical and technological capabilities have led to a change in the very functions of households and the conditions of their management. This led to the fact that the economic activity of households began to affect the economic performance of the state, the socio-economic development of the population of Ukraine and the formation of GDP. An indicator that characterizes the actual level of income of the population of Ukraine is the size of the average wage, estimated in US dollar equivalent. It should be noted that over the years the income of the population of Ukraine is growing. If, as of January

2010, the average salary of a Ukrainian was 239.5 US dollars, then in January 2020 - 430.5 dollars. US, which is almost twice as much as the base period. During the analyzed period, the NBU exchange rate of the hryvnia against the US dollar increased almost 3.5 times from UAH 8.00 / USD in January 2010 to UAH 28.01 / USD. US in 2017 to 24.92 UAH / USD in January 2019.

The dynamics of the average monthly salary in Ukraine, converted into foreign currency (US dollars (USD)) at the rate of the NBU at the end of the month we present in Table 6.

Dynamics of the average salary in Ukraine for the period 2010 - 2020 (equivalent to USD - US dollars).

Period	Average salary	Change from the previous year		NBU exchange rate, UAH / USD
		UAH	%	
01.2010	239,5	-	-	8,00
01.2011	289,3	+49.8	+20.8%	7,94
01.2012	340,7	+51.4	+17.8%	7,99
01.2013	375,3	+34.6	+10.2%	7,99
01.2014	393,8	+18.5	+4.9%	7,99
01.2015	213,8	-180.0	-45.7%	16,16
01.2016	173,4	-40.4	-18.9%	25,15
01.2017	221,5	+48.1	27.7%	27,12
01.2018	275,3	+53.8	24.3%	28,01
01.2019	332,3	+57.0	20.7%	27,76
01.2020	430,5	+98.2	29.5%	24,92

Source: The average salary in Ukraine in US dollars. URL: <https://index.minfin.com.ua/ua/labour/salary/average/usd/>

Comparing the size of the average salary in Ukraine as of March 2020 with the value of the average salary in the countries belonging to the "eurozone" (ie, in those areas where the currency is EUR - Euro), amounted to 1869.00 Euros, which is equivalent is 2050.67 US dollars or 57867.42 UAH / month. While the average monthly salary in the United States is 4269 dollars, which is equivalent to 3632 euros, or 118220 UAH. [3].

Given the above data, the indicators regarding the condition of households, their well-being and their opportunities are quite clear.

All this indicates the need to change the approach to the organizational structure of business and the relationships between participants in economic relations. Households, as an important part of entrepreneurship, must become equal participants in economic relations and participants in the implementation of the common strategic goal of the group of participants. For a country to become rich, first of all, its population must become well-off. That is why the economic well-being of households and their members is a determining factor in the stability of the country's economic growth. Participants in any business process are always: the state - as a regulator of relations; enterprises - as producers of economic benefits; households - as a resource and an element necessary for the implementation of part of the business process. The lack of a methodology for including households in the overall business process, which is aimed at shaping the country's GDP, reduces the economic benefits of enterprises that could use households as service providers or producers of essential goods, including them in the overall technological process aimed at implementing the strategy. The economic benefit of involving households in the general scheme of the technological process is also beneficial for the state. Increasing the working population brings additional tax revenues to the state budget and reduces the needs of the population in need of additional social guarantees and payments. Therefore, households involved in the production process become active participants in economic relations, ensuring the development of the country's economy. Households, realizing their functions in

economic processes, become participants in the formation of the state budget of the country, become participants in the cycle of resources and monetary aggregates and ensure the realization of the labor potential of the state. Large enterprises provide the market with unified products. However, modern demand has its own specific features, requiring an individual approach to a particular customer of goods, works and services. It is the households that are the participants in market relations, which can focus their activities on the implementation of specific orders, meeting the needs of consumers with goods, works and services with specific characteristics. A similar vision is highlighted in the research of scientists, in particular in the work of Perit IO [3], which notes that one of the important indicators of economic stability of the state is the level of economic development of households as elements of entrepreneurship. The cost of production, provision of services to households is quite high, however, the legal provision of the state, which regulates and stimulates the activities of small businesses and works to ensure employment of households helps to reduce taxation of their activities. Due to this, such production of goods (works, services) at the enterprise level is inefficient, but for households it is a source of income and an opportunity to generate income. Therefore, it is this cooperation of households with consumers that makes it possible to meet the requirements of a particular category of users of goods with specific characteristics. There are not many such consumers, so the market for goods with special characteristics is not large, which does not allow to work in large volumes with a focus on expanding the market. That is why the involvement of households in the chain of economic relations between market participants will help to obtain the maximum economic effect primarily for the state and for households themselves. It is important to develop the technology of legal relations and the economic model of including households in the production process of regional associations of enterprises.

Based on our research, we believe that households as institutional subjects of economic relations have an important impact on the process of social reproduction and the dynamics of its indicators in the future. We

investigated that households are an important subject of the entire economic system of Ukraine, which has an impact on the formation of GDP.

Households are the center of human capital formation in each country. Households are such a social

institution of the state, which determines the standard of living of the population and forms the main guidelines for the development of the state, because this is what the state is created to ensure the development of society and its basic needs.

Table 7

Distribution of households by number of persons in their composition and volume of total household resources, 2010-2019.

Indexes	Years									
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Distribution of households by number of persons in their composition, %:										
one person	23,4	23,6	22,4	22,6	22,8	20,3	19,7	19,9	19,7	19,5
two person	28,3	27,9	30,0	29,1	29,6	32,5	32,3	32,0	32,8	33,4
three person	25,5	25,8	25,0	26,9	25,3	25,9	26,9	27,3	26,5	26,7
Four person & more	22,8	22,7	22,6	21,4	22,3	21,3	21,1	20,8	21,0	20,4
Share of households with children under 18 (%)	37,9	38,0	38,0	38,0	38,0	38,2	38,2	38,2	37,8	37,9
Share of households without children (%)	62,1	62,0	62,0	62,0	62,0	61,8	61,8	61,8	62,2	62,1
Aggregate resources on average per month per household, UAH	3481,0	3853,9	4144,5	4470,5	4563,3	5231,7	6238,8	8165,2	9904,1	12118,5

It should be noted that according to demographic and social statistics of Ukraine, in 2019 households predominate with the number of their members in which two persons (33.4% of the total household) or three persons (26.7% of the total household). A similar situation with slightly different indicators is observed throughout the study period (2010-2019). A significant share of Ukrainian households are without children, their percentage is 62.1%, while with children only 37.9%. The total resources of households in Ukraine on average per month per household in 2019 is UAH 12,118.5.

Thus, households are a unique socio-economic formation that directly affects all areas of economic development and forms the main vector of economic development of the state. Involving households in the general economic process as an equal institution of

economic relations will help to close the system of relationships and relationships in the labor market and in the market of production and sale of products (goods, works and services).

When households are included in the general process of economic development of the country and in the technological process of production (goods, works and services) of various enterprises - it will have a positive effect on the formation, distribution and redistribution of gross national product and will affect the formation of resource potential (including labor resources.) and the reproduction of production factors. Therefore, the entire economic system of the country is formed today, based on the level of development not only of enterprises but also of households, as an equally important institution of economic relations in Ukraine.

Table 8

Dynamics of the structure of total resources of households in Ukraine on average per month (per household), %

Indexes	Years					
	2010	2012	2014	2016	2018	2019
Money	89,1	91,0	91,2	86,0	89,9	92,0
- wages	47,6	50,8	48,8	46,7	54,5	57,3
-income from entrepreneurial activity and self-employment	6,1	4,1	5,2	5,2	6,0	6,5
- income from the sale of agricultural products	3,4	2,8	3,2	2,9	2,5	2,4
-pensions, scholarships, social benefits provided in cash	25,8	27,1	27,0	23,1	19,9	19,2
- cash benefits from relatives, other persons and other cash income	6,2	6,2	7,0	8,1	7,0	6,6
The cost of consumed products obtained from personal farms and from self-procurement	5,0	3,8	4,6	4,8	3,8	3,6
Non-cash benefits and subsidies for housing and communal services, electricity, fuel	0,6	0,6	0,4	4,7	2,8	0,7
Non-cash benefits for the payment of goods and services for health care, tourist services, vouchers for recreation centers, etc., for the payment of transport and communication services	0,5	0,5	0,4	0,4	0,4	0,4
Other income	4,8	4,1	3,4	4,1	3,1	3,3
Reference: total income, UAH	3369,8	4031,9	4470,9	6095,0	9720,2	11859,8

Considering the structure of total resources on average per month per household in the dynamics over the years, we noted that the share of household income

from entrepreneurship and self-employment increases over the years.

Dynamics of accounts of institutional sectors of the economy, UAH mln. (2010-2019)

Year	Sectors of the economy						All economy
	Non-financial corporations	Financial corporations	General government sector	Households	Share in the structure of the economy, %	Non-profit organizations serving households	
	Resource. Issue (in basic prices)						
2010	1761515	94100	231949	292503	12,25	8222	2388289
2012	2331305	98393	290718	421011	13,36	9226	3150653
2014	2435632	115273	307820	484536	14,45	10766	3354027
2016	3759145	104685	429010	748944	14,81	16510	5058294
2018	5504780	145866	718471	1096406	14,63	27946	7493469
2019	6153915	177995	722009	1277885	15,27	39020	8370824
	Using:						
	- intermediate consumption						
2010	1168789	24492	73329	118323	8,25	3383	1434130
2012	1615180	37349	86149	147020	7,79	2798	1888496
2014	1646698	45850	95751	179102	9,09	3907	1971308
2016	2540823	41285	147383	298798	9,84	6777	3035066
2018	3759899	50683	234782	417951	9,34	11964	4475279
2019	4154421	66985	231493	479737	9,70	15358	4947994
	- gross value added						
2010	592726	69608	158620	174180	18,25	4839	954159
2012	716125	61044	204569	273991	21,71	6428	1262157
2014	788934	69423	212069	305434	22,09	6859	1382719
2016	1218322	63400	281627	450146	22,25	9733	2023228
2018	1744881	95183	483689	678455	22,48	15982	3018190
2019	1999494	111010	490516	798148	23,32	23662	3422830
	Consumption of fixed capital						
2010	-90796	-4086	-16447	-2796	2,42	-1213	-115338
2012	-128808	-4526	-24088	-27976	15,02	-897	-186295
2014	-137462	-4777	-23955	-29203	14,89	-693	-196090
2016	-229006	-6136	-34558	-42248	13,48	-1574	-313522
2018	-292327	-8800	-62980	-64793	15,02	-2352	-431252
2019	-344974	-9518	-56511	-76254	15,50	-4619	-491876
	Net value added						
2010	501930	65522	142173	171384	20,43	3626	838821
2012	587317	56518	180481	246015	22,87	5531	1075862
2014	651472	64646	188114	276231	23,28	6166	1186629
2016	989316	57264	247069	407898	23,86	8159	1709706
2018	1452554	86383	420709	613662	23,72	13630	2586938
2019	1654520	101492	434005	721894	24,63	19043	2930954

Source: Formed by the author on the basis of data from the State Statistics Service of Ukraine [6]

Thus, if in 2012 in the structure of household income of Ukraine the share of income from entrepreneurial activity and self-employment was 4.1%, in 2019 - their value increased to 6.5% on average per month. At the same time, the opposite trend is observed in the share of income from the sale of agricultural products, whose share in the structure of household income in 2010 was 3.4% on average per month, and in 2019 their value was only 2.4%. However, it should be noted that the lion's share in the structure of households in Ukraine on average per month consists of cash income received in the form of wages (57.3% in 2019) and social benefits in the form of pensions, scholarships, social benefits provided in cash (19, 2% in 2019). The trends of these indicators are similar compared to the previous ones. In the dynamics by years (2010-2019), the share of cash income

received in the form of wages increased from 47.6% to 57.3% in 2010 and 2019, respectively, and the share of household income received in the form of pensions, scholarships, social benefits cash benefits tended to decrease from 25.8% to 19.2% during the analyzed period. The study data are presented in table 9.

In the structure of national economic activities of Ukraine households are identified as a separate institutional sector during the assessment of the activities of institutional sectors of the economy. The following are identified in the structure of the institutional sectors of the economy [6]: non-financial corporations; financial corporations; general government sector; households; non-commercial organizations serving households.

After assessing the dynamics of accounts of institutional sectors of the economy during 2010-2019,

we noted that in the overall structure of accounts of all sectors of the economy of Ukraine, households are gradually increasing the share of influence on all indicators of its development. Examining the cost and share of output of resources in different sectors of the economy, we found that the share of output of resources by households over the years increases not only in value, but also has an impact on their structural distribution between different sectors of Ukraine. In the process of analysis. We investigated that in 2010 the share of household output in the total resource structure of all sectors of the economy was 12.25% (UAH 292503 million), while in 2019 - its share increased to 15.27% and amounted to 1277885 million UAH, with the total value of this indicator in all spheres of the economy of Ukraine 8370824 million UAH.

The indicator of net value added in the economy of Ukraine in 2019 amounted to UAH 2930954 million, among which the share of net value added of households is 24.63% of all sectors of the economy, which in monetary terms is UAH 721894 million.

These research results show that households are an important sector of the economy and an economic unit whose members live in the same living conditions and carry out production and supply resources to the relevant markets. As a result of joint activities, participants in households (members of households) receive income from the distribution and use of which they jointly make sound economic decisions. As a result of the distribution of income, household members take into account the material and spiritual needs of each participant. Each household is headed by one of its members. That is, the household, we believe, is not just a separate economic entity, but a whole "small state" that operates in accordance with conditionally developed rules and principles. In view of this, the state must take care of the development and well-being of such separate subjects of economic relations, providing them with social guarantees and promoting the development of their material, resource, spiritual and social status. With an increase in household income due to the production of goods (works and services), the country's GDP will increase. By involving households in the general economic process and in the technological process of production by various enterprises, the value added will increase, which will increase the economic performance not only of enterprises but also of the state as a whole.

The process of production (goods, works or services) by households requires more labor costs than

similar production at the enterprise, because the technological process of households can not always be automated, or involve the use of innovative resource-saving technical means. In addition, when assessing the technology of production by households located in rural areas in comparison with similar farms living in urban areas will differ in the scope of their activities. The activities of households that carry out their activities in rural areas in most cases produce or process agricultural products in volumes sufficient not only for their own consumption, but also intended for sale and income from this process. Such activities enable households to meet their food needs and meet other needs in the absence of jobs in rural areas, earning income from agricultural activities. The activity of households in the field of agricultural production is a tool to provide both rural and urban populations with food in the required volumes, according to the level of demand for them in the market and the supplier of raw materials for the processing industry.

Ukrainian households sometimes reach significant sizes. In 2019, 56.9% of households own land, and 31.4% of households keep livestock, poultry and bees. This indicator indicates the main direction of activity of households in Ukraine as an agrarian state (Table 10).

11.6% of Ukrainian households in 2019 own more than 25-50 ares of land. They manage an area of 5-10 hectares. 11.5% of households. All this indicates a significant volume of production in this area, which represents their production as a commodity, aimed at making a profit. In Ukraine, such households operate without the registration of a legal entity, however, the nature of the activity is close to farms, if their products are sent for sale and not for personal consumption. The income received by the household is stored in the seventh, forming a source of consumer spending of households. The mechanism of income generation thus corresponds to the conditions of creating sources of subsistence for households as a separate institutional sector of the economy.

To this end, we conducted research to determine the need to involve households in the overall scheme of economic activity of enterprises and the formation of a system of equal economic relations and relations between all participants in market relations within the legal field.

The modern economy needs a new approach not only to the system of enterprise management, but also to the organizational structure and relations between economic entities.

Table 10

Distribution of households by availability and size of land plots, availability of livestock, poultry and bees by decile (10%) groups depending on the size of average per capita equivalent cash income in 2019,%

Indexes	All households	including decile (10%) groups at the level of average per capita equivalent cash income per month										
		the first	second	third	fourth	fifth	sixth	seventh	eight	the ninth	tenth (higher)	
All households, including:	100	100	100	100	100	100	100	100	100	100	100	100
households that keep livestock, poultry and bees	31,4	43,7	39,4	37,6	37,2	28,8	31,6	29,5	27,1	24,0	15,0	
households that have land plots	56,9	75,8	68,8	65,0	61,4	54,8	58,4	50,7	51,3	46,3	37,0	
Distribution of households with land plots (%) by size of land area they use:	100	100	100	100	100	100	100	100	100	100	100	
10 acres and less	32,8	22,1	31,3	30,7	33,7	32,3	38,8	31,3	39,9	33,5	42,1	
10,1 - 25 acres	16,6	21,4	16,6	17,9	15,6	12,6	13,5	18,2	11,5	19,5	17,9	
25,1 - 50 acres	11,6	15,3	12,8	12,0	9,1	11,7	9,9	8,5	13,1	11,8	9,1	
50,1 - 100 acres	10,8	10,3	11,5	8,7	11,2	13,6	12,3	10,1	8,9	12,0	8,9	
1,1 - 2 hectare	4,7	6,0	4,6	4,0	5,3	4,5	4,4	6,2	2,6	5,4	3,2	
2,1 - 5 hectare	11,5	14,3	11,2	14,4	11,1	11,6	8,2	10,9	12,4	9,7	9,3	
5,1 - 10 hectare	8,3	8,8	8,3	9,0	9,9	9,1	9,4	10,2	7,9	3,9	4,6	
10,1 hectare and more	3,7	1,8	3,7	3,3	4,1	4,6	3,5	4,6	3,7	4,2	4,9	

Source: Formed by the author on the basis of data from the State Statistics Service of Ukraine [5]

Since our study noted the impact of households on economic, environmental and social processes of state development, as well as the impact on macroeconomic processes, it is necessary to form a model of relationships and economic relations between households and other business entities. To ensure the maximum economic, environmental and social effect of cooperation of all market participants, it is necessary to develop a system of relationships and a chain of relationships between all economic entities and combine them into a single model with the labor market, resource market, logistics market, finance market and commodity market. Our scheme of relations

between the participants of market relations, which provides for the inclusion of households in the overall production process, contributes not only to the formation of aggregate supply, but also speeds up money circulation. Because the population, which has a significant part of financial resources, opens up greater opportunities to meet their own needs and more easily spend the income (Fig. 2.).

Involving households in the production process often requires significant financial injections. To this end, it is necessary to create an investment climate that will allow households to develop and expand their production capacity.

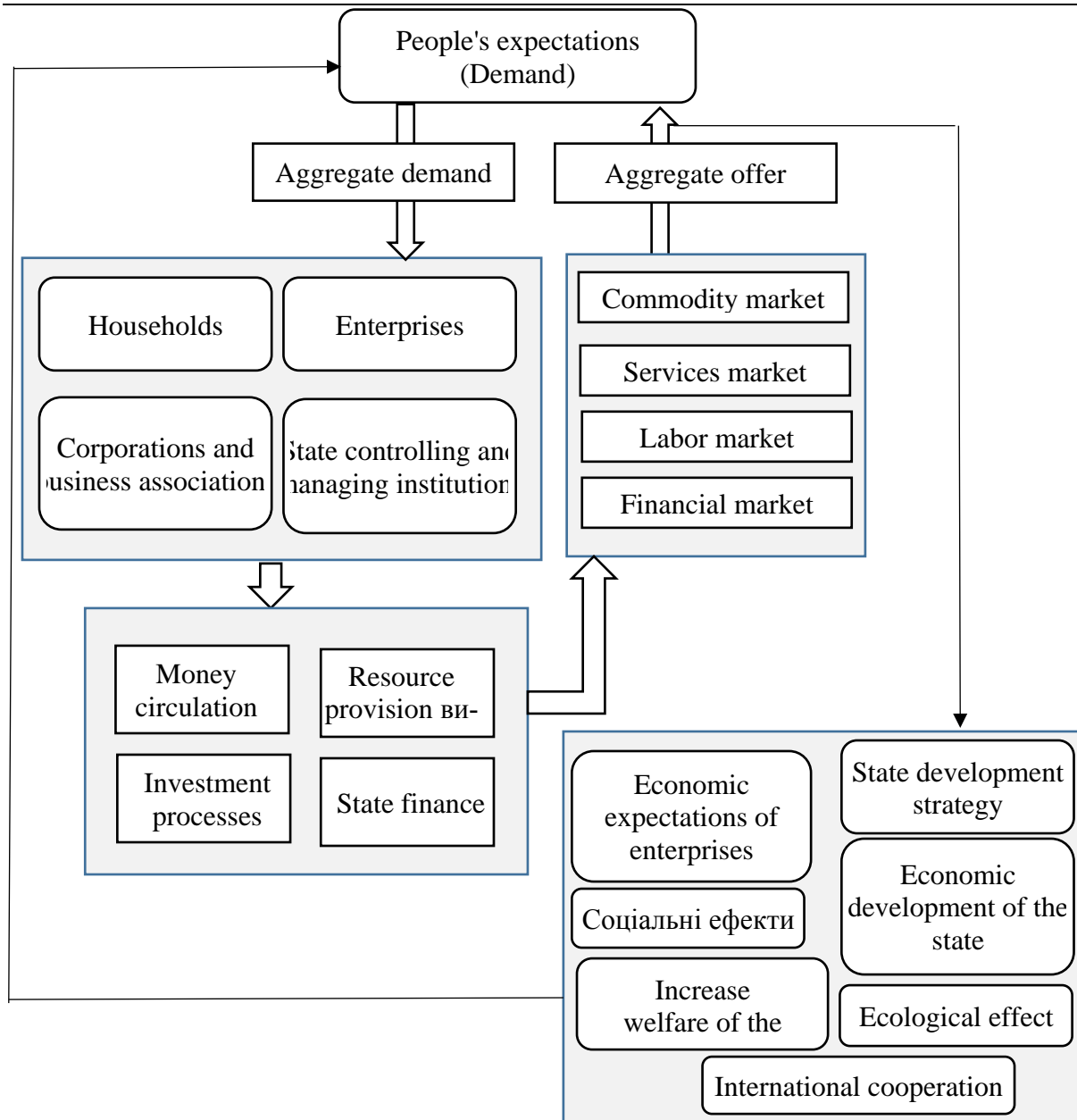


Fig. 2. The mechanism of relationships between participants in market relations and households as an equal participant in the sphere of economic relations

To this end, it is effective to create regional clusters that will include not only manufacturing enterprises, but also logistics enterprises and the system of financial and economic services for small and medium-sized businesses, micro and small enterprises. That is, the presence of a financial institution that will serve the financial and economic relations of cluster members is an urgent need. An important structure in the cluster member service system is the Outsourcing Company and the Business Support Center. The outsourcing company will provide organization, business and settlement system between the cluster members and state regulatory authorities. The Business Support Center will facilitate the cooperation of enterprises with research institutions and participants of the general business process in the direction of innovation and building relationships with the cooperation of each member of the cluster. The logistics company in the structure of the cluster will

provide a system of logistics links, which will contribute to the formation of a closed production cycle and ensure on the one hand uninterrupted supply of raw materials for some industries and sales of finished products for other enterprises. When using a single information database with a differentiated level of access to each of the participants in the business process, depending on the level of its hierarchy, the implementation of our proposed modern model of organization and conduct of business becomes possible. Such a model will contribute to the required level of resource production, and improve the economic condition of each of the participants in this system of relations and the state as a whole.

We believe that our proposed model of relations between the subjects of market relations, which includes households, form a cumulative supply not only for the domestic market, but also to meet the needs of the external market. The main task is to build strong

economic chains of relations between market participants, which will contribute to the common goal, the basis of which is the state development strategy aimed at meeting the social needs and expectations of the social sphere and all its participants. Improperly constructed logistics links only create obstacles to the common goal of market participants - to achieve the expected effect. Only a transparent scheme of relationships and a clear sequence of relationships will make it possible to achieve the goals of each of the market participants. Today's level of digitalization and the availability of electronic information systems and automated control systems combined with a differentiated level of access to a common information database will make it possible to implement a certain idea. The use of transparent systems for the accumulation of resources and their costs by digitally displaying the entire movement of assets of each entity will allow you to clearly track the income that is subject to taxation of the final beneficiaries. Digital registration of each of the participants in market operations and the system of communications in business transactions between them will remove from the "shadow economy" a significant share of business structures and help provide the state with sufficient resources to perform its main function - social security. Therefore, we believe that the basis of state development is the involvement of all participants in market relations, including households in the overall process of gross domestic product accumulation. The active introduction of digitalization in the system of economic relations and in the economic process, along with the formation of innovative production, takes the implementation of the main strategy of state development.

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DERIVATION OF THE STANDARDIZED DISTANCE BETWEEN MULTIDIMENSIONAL EXPERIMENTAL AND CONTROL SAMPLES

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Abstract

Significant cost reduction in public health can be achieved by improving the process of correct diagnosis identification. However, in order to improve the process concerning diagnosis, it is firstly required to know how close experimental and control samples are given particular set of disease features. This paper serves to explain an approach to calculate and standardize the distance between multidimensional experimental and control samples in order to improve the diagnostic process. The idea behind the proposed approach is to use a special technique for testing the hypotheses about the significance of the differences between samples using Mahalanobis distance and F-distribution.

Keywords: F-distribution, beta distribution, Mahalanobis distance, standardized distance.