

## CALCULATION OF THE EFFICIENCY OF INVOLVING THE INSTITUTE OF AUDIT IN SUSTAINABLE DEVELOPMENT OF RURAL AREAS IN UKRAINE

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**Abstract:** The article considers the problem of the need to involve the audit institute in the implementation of sustainable development goals in Ukraine in accordance with the Decree of the President of Ukraine "On Sustainable Development Goals of Ukraine until 2030", which is based on the United Nations Sustainable Development Goals until 2030. The study proposes new approaches to measuring the effectiveness of involving the audit institute in the formation of the basic conditions for sustainable development of rural areas in the united territorial communities (UTC) by calculating the total effect of such partnership and cost recovery of audit services. Establishing the total effect of the acceptance on the balance of the united territorial communities of land and property complexes, natural and other assets of rural areas, reducing the risks of inefficient use of funds of the State Fund for Reconstruction and Development, optimizing management costs, income growth of rural communities and gross domestic product growth UAH 1,182 billion, five-year market (volume) of public audit partnership in rural areas - in the amount of UAH 3.35 billion, payback of UAH 1 for audit services - UAH 35.3 thousand, which will significantly accelerate the formation of basic conditions ("Primary capitalization") sustainable development of rural areas, by involving the institute of audit.

**Keywords:** Audit, United territorial communities, Efficiency, Sustainable development.

### 1 Introduction

Focusing on sustainable development, the modern world is in constant search of indicators for its implementation. The audit institute is involved in the implementation of sustainable development goals, and therefore should also have appropriate benchmarks and calculations. Thus, it is necessary to identify approaches to measuring the effectiveness of the involvement of the audit institute in rural development. An objective prerequisite for defining such approaches is to clarify the relationship between the goals of sustainable development and the capabilities of the audit institution in their implementation. It is based on both the UN Sustainable Development Goals until 2030 [1] and the Sustainable Development Goals of Ukraine, which are defined in the National Report "Sustainable Development Goals of Ukraine" [2] and the Decree of the President of Ukraine "On Sustainable Development Goals for Ukraine until 2030" [3]. On the other hand, the possibilities of the audit institute in ensuring the implementation of these goals are considered.

### 2 Literature Review

In Ukraine, the creation and adaptation of systems for calculating the effectiveness of the involvement of audit institutions were due to the efforts of such scientists as M. I. Bondar [4], V. P. Bondar [5], V. M. Zhuk [6], T. O. Kamenska [7], V. F. Maksimova [8], K. P. Melnyk [9], O. V. Pasko [10], O. M. Petruk [11], K. I. Redchenko [12], O. Yu. Redko [13], L. V. Chyzhevska [14], O. L. Sherstiuik [15], Yu. B. Slobodyanyk [8] and others. Along with this, the scale of modern public expectations from the institute of audit requires a significant strengthening of its mathematical and computational basis for determining effectiveness.

It is important to explore expected effectiveness of involving the audit institute in the development of rural areas with the help of qualitative (the ratio of audit capabilities in the implementation of most current and future goals of sustainable development of rural integrated territorial communities) and quantitative (the possibility of calculating the integrated indicator of the expected effect of the efforts of the audit institute to achieve the goals of sustainable development of rural areas) parameters.

The purpose of the study is to scientifically substantiate the capabilities of the audit institute in the implementation of sustainable development goals and the development of economic and mathematical model for measuring the effectiveness of its involvement and calculation of the digital effect.

### 3 Materials and Methods

To achieve this goal used the scientific developments of domestic and foreign scientists on the theory, methodology and practice of auditing, regulations (International standards of quality control, audit, inspection, other assurance and related services, domestic legislation on auditing, decisions, reports Audit Chamber of Ukraine (ACU), State Institution "Body of Public Oversight of Auditing" (BPOA), orders of the Ministry of Finance of Ukraine), statistical information on the state of audit in Ukraine, etc.

To achieve this goal, general scientific and specific methods were used, the main of which are: observation – to determine the components of the audit of the initial capitalization of rural areas, analogy – in justifying the feasibility of public audit partnership (GAP) in rural areas, statistical – in studying the audit activities in Ukraine, mathematical modeling – to optimize the set of audit procedures of rural entities and calculate the effectiveness of the audit institute in the development of rural areas; methods of analysis, synthesis and evaluation – to study the development strategy of the Audit Chamber of Ukraine, its regional offices and identify opportunities to expand the methodological tools for risk assessment in auditing; methods of modeling and classification – to study the internal structure of the audit institute; graphical – to study models and strategies for the development of risk assessment in auditing.

### 4 Results and Discussion

The study of the participation of the audit institute in the implementation of sustainable development goals is possible by analyzing the scope of audit support for such goals for the period up to 2030. Table 1 provides an estimate of this ratio for the purposes in which the involvement of the audit institute is obvious now and in the future.

Table 1: Participation of the audit institutions in the implementation of sustainable development goals

Sustainable Development Goals of Ukraine for the period up to 2030	The scope of audit support for sustainable development goals
1	2
Goal 1 "No poverty Goal 10 "Reduced inequality"	Ensuring economic literacy of the population, their entrepreneurial activity; Development of a network of audit companies in rural areas
Goal 2 "Zero hunger (No hunger)... and promote sustainable agriculture"	Ensuring the development of agricultural entrepreneurship, its competitiveness, and investment attractiveness
Goal 4 "Ensure... quality education and promote lifelong learning opportunities for all"	Development of auditors' competence, including in the field of public-private partnership Improving the economic literacy of the rural population
Goal 8 Promote economic growth" Goal 11 "Ensuring openness ..."	Ensuring confidence in the public reporting of business entities of local authorities Improving the efficiency of accounting, control, and other areas of management
Goal 9 "Creating sustainable infrastructure... promoting sustainable industrialization"	Advisory and information support

and innovation”	
Goal 17 “Strengthen ... revitalize the global partnership for sustainable development”	Involvement of the institute of audit in normative-legal acts, programs of public-private partnership, joint projects on sustainable development, including UTC

Source: Developed by the authors.

As can be seen from Table 1, half of the sustainable development goals identified in Ukraine (8 out of 17) can and should be involved in their implementation. The goals of sustainable development of Ukraine until 2030 are guidelines for the development of projects, forecasts and program documents, draft regulations. Therefore, these documents should reflect the composition of the relevant audit software. The domestic audit system does not actually have its representation (audit firms) in agricultural regions, there is no audit support and appropriate methodological support, the audit institute does not participate in public-private partnership projects, and more.

The share of audit entities in the development of regions is asymmetric, the development policy of which differs from the state policy of decentralization in the general, and sustainable development of rural areas, in particular, which significantly narrows the opportunities for transformational audit processes in the context of decentralization reform (Figure 1).

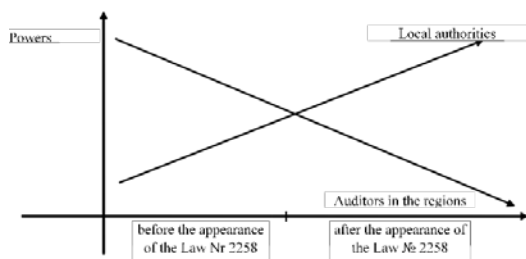


Figure 1 – Inconsistency of audit development in Ukraine with decentralization policy revealed

Source: Developed by the authors.

It is important to find out what is the scope and economic effect of audit participation in the development of rural UTCs. After all, rural UTCs are, so to speak, the primary link in the implementation of sustainable development goals. Table 2 shows the objectives for sustainable development in the UTC (from the author’s survey of UTC chairmen) and the relevant areas of audit support for its achievement.

Table 2: Areas of audit support for the goals of sustainable development of rural UTCs

No	Implementation of the goals of sustainable development of rural UTCs	Scope of audit support
A	1	2
<b>FORMATION OF BASIC CONDITIONS (“PRIMARY CAPITALIZATION” UTC) (optimal term - 5 years)</b>		
<i>Current goals (2020-2022)</i>		
1	Acceptance of land and property complexes of the united village and settlement councils	Audit support for registration of rights, evaluation, balance sheet
2	Effective use of budget funds of the State Fund for Regional Development (SFRD)	Audit of the use of SFRD funds
3	Optimization of budgets and management of joint village councils and their utilities	Audit consulting
<i>Long-term goals (from 2021)</i>		
4	Inventory of the potential of the territories of the united village councils and putting the identified assets on the balance sheet	Participation in inventory, methodological support, evaluation, balance sheet generalization
5	Formation of strategies and development plans of rural united communities	Audit consulting
6	Monitoring the implementation of agreements on the social and environmental responsibility of businesses operating in the territories of village councils	Audit of integrated reporting
7	Improving economic literacy, stimulating entrepreneurial activity of peasants	Educational and information-advisory support
8	Development of small forms of entrepreneurship (farming, cooperation, green tourism, etc.)	Audit service, outsourcing

9	Capitalization of assets and potential of rural areas	Identification, evaluation, public presentation of assets
10	Increasing the investment attractiveness of the rural business	Integrated reporting consulting
11	Introduction of public-private partnership on the territory of UTC	Long-term public-private partnership agreements with an audit company. Public-private partnership consulting
<b>CAPITAL BUILDING TO ENSURE SUSTAINABLE DEVELOPMENT GOALS (CONSTANTLY)</b>		
1	Issuance of municipal bonds by communities and other	Audit of financial statements Audit of UTC development strategies and plans

Source: Developed by the authors.

As can be seen from Table 2, for all current and future goals of local governments to ensure the sustainable development of their territories in the audit system there are not only opportunities for participation (involvement), but in some cases without audit their implementation is impossible.

In the survey, UTC chairpersons agree on the need to involve the audit in the implementation and other objectives of UTC’s sustainable development. The results of the survey are shown in Table 3.

Table 3: Priority for accountants of executive committees of village councils in the areas of involving auditors in the implementation of sustainable development of UTC

No	Scope of audit and UTC cooperation	The result of the survey, %
1	Audit services in the preparation of documentation, assessment of acceptance on the balance of UTC land, property, and other assets	100
2	Audit services for inventory (detection of new ones), valuation, and balance sheet of unaccounted assets in the territory of UTC	82
3	UTC management system audit (personnel optimization)	65
4	Audit consulting for the development of strategies and plans for the development of UTC (formation of digital data from the state and prospects)	65
5	Monitoring the implementation of agreements between UTC and business on social and other obligations to work on the territory of UTC	40
6	Ensuring economic literacy of members of commodity farms and their reorganization into a farm, association in cooperatives	23
7	Support for the introduction of public-private partnership on the territory of UTC	27
8	Consulting to increase the investment attractiveness of the rural business and the potential of UTC	15
9	Audit of integrated reporting of UTC and business entities on the territory of UTC	8

Source: Developed by the authors based on the results of the questionnaire.

As can be seen from Table 3, accountants of village and settlement councils are focused on receiving audit assistance in their problematic current affairs. Due to the lack of information, the issues of audit support for sustainable development of rural communities are secondary for them. The concentration of accountants’ awareness of themselves, on their problems is the same institutional factor as the in-house audit system. Such an institutional basis for both the audit system and the system of UTC executive bodies inhibits the sustainable development of rural areas.

Thus, both according to the institutional theory and the effectiveness of some pilot projects for the development of rural UTCs (where there is thorough consulting support through grants), we should expect significant effectiveness from the introduction of the public-private partnerships between local governments and the audit system.

First of all, it is advisable to find out the share of rural UTCs in the total number of communities in Ukraine. In this way, it is possible to interpret various country-wide statistics, information from ministries and agencies that are somehow involved in the

decentralization and development of communities, especially in rural areas.

In Table 4 rural and settlement communities are defined as the basic level of administrative-territorial organization (ATO) of Ukraine. Recognition of communities as local self-government, as the basic level of ATO, corresponds to the current legislation of Ukraine. However, Table 5 focuses on rural and township communities, which cover not only the lion's share of Ukraine, parts of settlements (more than 27 thousand), but also account for 72.2% of all existing communities in Ukraine. Thus, for further calculations of the effectiveness of the audit institute in ensuring sustainable development of rural areas, a coefficient of 0.7 (from 72.2%) is taken. Conditionally call it the coefficient of the share of rural communities ( $C_{src}$ ).

$$C_{src} = \frac{\text{Village and settlement councils, units}}{\text{All communities, units}} \quad (1)$$

*Mathematical calculation 1:*

$$C_{src} = 1060/1469 = 0.7$$

Table 4: Basic level of administrative-territorial organization of Ukraine: rural and settlement communities

Base level	Quantity, units	Specific weight, %
Communities, total (including Kyiv)	1,469	100.0
of which are urban	409	27.8
of which rural and township	1,060	72.2
Localities that are part of communities:	28,221	100.0
Settlements	1,960	6.9
Villages	26,261	93.1

Source: Generalized by the author according to the data [18].

The first thing that worries (and should be the impetus for the involvement of the audit institute) are the problems of receiving from the reformed district councils, village, settlement council's communal property, land plots on their balance sheets. Table 5 by the figures show the scale of the problem of such work.

Table 5: Problems of transfer of property to communal property of communities as of 31.12.2020

No	Transfer of property (inventory objects)	Indicator	
		Number	%
1	Across Ukraine		
	* must be transferred	22,757	100
	* actually transferred	1,063	4.7
2	incl. in the Vinnytsia region	177	16.7
	in the Sumy region	2	0.2
	in the Chernihiv region.	0	0.0

Source: Generalized by the author according to the data [18].

According to the results of this study and other expert developments, the problem is not only the accounting of the assessment and balance of these inventories but also the lack of UTC (generally in rural areas) specialists who are able to draw up such documents during the relevant commissions. As can be seen from Table 5, at the beginning of 2021, out of 22.8 thousand such facilities, only 1,063 or 4.7% were put on the balance of UTC.

*Mathematical calculation 2:*

$$1) \quad 1,063 / 22,757 * 100\% = 4.7\%$$

In agricultural areas (with the sole exception of the Vinnytsia region) the situation is even worse.

At first glance, the situation with the transfer of agricultural land plots to rural UTCs seems a bit better (Table 6).

At the end of 2020, 1,251 such plots with a total area of almost 2 million hectares were transferred to rural UTCs. However, according to public statements of the leadership of the State Geocadastre of Ukraine about 10 million hectares. agricultural lands are outside the accounting system. The need to identify them in the process of continuous and joint with the State

Geocadastre and local governments inventory of all agricultural lands on the territory of communities is discussed for many years. Thus, in the scientific report "Circulation of agricultural land according to the village-preserving model of the agrarian system of Ukraine" [16] (which in 2017 was not just approved by the Congress of the Association of Farmers and Private Landowners of Ukraine and the Council of the Agrarian Union of Ukraine). and taken by them as a strategy of activity) scientists have painted an algorithm for such an inventory, evaluation, and balance of shadow land communities.

Table 6: Transfer of agricultural land plots from state to communal ownership of communities as of 31.12.2020

No	Region	Indicator			
		number of communities	specific weight, %	thousand hectares	specific weight, %
1	Ukraine, total	1,251	X	2,003	X
	<i>including</i>				
2	Vinnytsia region	48	3.84	73	3.64
3	Zakarpattia region	44	3.52	49	2.45
4	Luhansk region	25	2.0	53	2.65
5	Chernivtsi region	47	3.76	8	0.4

Source: Calculated by the author according to the data [18].

Thus, as of December 31, 2020, only about 20% of agricultural land was transferred to rural communities (2 million hectares out of 10 million hectares), the transfer of another 8 million hectares is the subject of cooperation between UTC and audit companies.

*Mathematical calculation 3:*

$$1) \quad 2 \text{ million hectares} / 10 \text{ million hectares} * 100\% = 20\%$$

To calculate the value of land, it is advisable to adopt the methodology and techniques developed by scientists of the NSC "Institute of Agrarian Economics". Algorithms for such calculations were proposed by scientists in the scientific report "Capitalization of the national wealth of Ukraine: the value of agricultural land" [17]. According to him, as of January 1, 2019, the fair (market) value of 1 hectare of agricultural land in Ukraine was only 1078 USD. Scientists note that this minimum price in comparison with the European Union is due to the state of Ukraine's economy and the problems of its institutional environment. During the period from 2018 to the end of 2020, nothing has changed in Ukraine. Therefore, it can be argued about the issue of putting on the balance of rural communities' agricultural land assets in the amount of at least 8.6 billion USD (8 million\* 1078) or about 240.8 billion UAH.

*Mathematical calculation 4:*

$$1) \quad 8 \text{ billion hectares} * 1,078\$ = 8.6 \text{ billion USD}$$

$$2) \quad 8.6 \text{ billion USD} * 28 \text{ UAH per USD} = 240.8 \text{ billion UAH}$$

Of course, with regard to property complexes that are transferred to communities, their value calculations are quite conditional. Because in contrast to agricultural land, which in inventory and value is more or less the same in Ukraine, it is a variety of types of such property (buildings, structures, equipment, etc.), their condition, physical and moral deterioration, and more. Therefore, the cost of such an inventory object for 3 million UAH is conditionally accepted. taking into account the physical and moral condition of such facilities and the demand for them in rural areas.

Therefore, according to the Table. 5 refers to the acceptance of the balance of rural UTC property worth about 46 billion UAH. This amount is calculated based on the fact that such property in Ukraine should be transferred in the amount of 21,694 units. Based on the conditional assessment of the object – 3 million UAH, and taking into account  $C_{src}$  0.7.

*Mathematical calculation 5:*

- 1) 22,757 items – 1,063 items = 21,694 items
- 2) 21,694 items \* 3 million UAH = 65,082 million UAH
- 3) 65,082 million UAH \* 0.7 = 45.56 billion UAH. ≈ 46 billion UAH

Thus, in general, it is a question of accepting on the balance of rural and settlement communities' real estate objects (with equipment) in the amount of at least 287 billion UAH, where, of course, agricultural land is now the main resource and asset.

*Mathematical calculation 6:*

- 1) 240.8 billion UAH + 46 billion UAH = 287 billion UAH

And as found out above, in such work, community leaders and accountants have significant difficulties and need to work with audit firms.

The next "audit" assistance in solving the problems of local self-government is the difficulties in UTC in drawing up the use of budget funds of the State Fund for Regional Development. According to [18], in all incomes of Ukrainian communities in 2020, these funds are 32 % (Table 7). If we analyze the budgets of communities in rural areas, it is already half of their income. Table 8 shows the data of four such regions.

Table 7: Community revenues in 2020: total and share of transfers from the state budget

No	Region	Total revenue	Transfers	
			million UAH	%
1	Ukraine, total	425.9	135.9	32
	<i>including</i>			
2	Volyn region	10.2	4.9	48
3	Zakarpattia region	11.9	6.6	55
4	Luhansk region	6.6	2.9	44
5	Chernivtsi region	8.1	4.5	56

Source: Generalized by the author according to the data [18].

According to the Accounting Chamber of Ukraine (Table 8), during inspections of the legality and efficiency of the use of SFRD funds, the biggest problems are in rural regions (Kirovohrad, Kherson, Cherkasy, and other regions). Table 9 demonstrates just such regularity on the checked regions.

Table 8: Summary information on the legality and efficiency of the use of SFRD co-commissions according to the audited by the Accounting Chamber of Ukraine, 2017-2018

No	Region	Funds were used in violation of the law		Inefficient use of funds		
		total, million UAH	specific weight, %	total	incl. uneconomical	specific weight, %
A	1	2		3	4	5
1	where the audit was conducted, in total	196.5	X	158.4	90.5	X
	<i>including</i>					
2	Kirovograd region	25.8	13.1	789.0	71.8	79.3
3	Odessa region	15.3	7.8	44.4	0.3	0.3
4	Khmelnytsky region	10.4	5.3	1.2	-	-
5	Kherson region	62.3	31.7	0.3	-	-
6	Cherkasy region	36.8	18.7	12.1	5.8	6.4

Source: Generalized by the author according to the data [18].

The Accounting Chamber of Ukraine uses the method acceptable to it [19] to calculate the risks of inefficient use of SFRD co-commissions. At present, they make up 16.5%.

$$A_{pt} = E_{is} * (A_{fi} * N_{pp} * A_{fi} * N_{fi} / E_{rc} * N_{tp} * E_{rcp}) \quad (2)$$

where:

- $A_{pt}$  – the probable total amount of the Fund's funds used inefficiently;
- $E_{is}$  – total cash expenditures at the expense of the Fund for 2017-2018;
- $A_{fi}$  – the amount of the Fund's funds used in violation of budget legislation established in 11 regions;
- $N_{pp}$  – the number of projects in respect of which the use of budget committees with violations of budget legislation has been established;
- $A_{fi}$  – the amount of funds of the Fund used inefficiently (uneconomically, unproductively, ineffectively);
- $N_{fi}$  – the number of projects in respect of which the inefficient use of the Fund's funds has been established;
- $E_{rc}$  – verified cash expenditures at the Fund's expense in 11 regions;
- $N_{tp}$  – the total number of projects for which the Fund's expenditures have been verified.

The budget of Ukraine for 2021 provides for 1305 million UAH for the development of rural territorial communities, of which according to the methodology of the Accounting Chamber of Ukraine may be estimated inefficient and in violation of the law used about 215 million UAH. In addition, given the lower professional qualifications of managers and accountants of rural communities (compared to urban), these risks can be calculated at 25 %, i.e. for 2021 in the amount of 326.3 million UAH.

*Mathematical calculation 7:*

- 1) 1,305 million UAH \* 0.165 = 215 million UAH
- 2) 215 million UAH \* 25 % = 326.3 million UAH

Of course, the cooperation of rural communities with the audit institute will help reduce such risks. This means that annually hundreds of millions of budget funds (transfers) will not be withdrawn, but used in favour of sustainable rural development. Another manifestation of audit participation in ensuring the sustainable development of rural areas is the optimization "by independent auditors" of community management budgets, optimizing the number and staff of their utilities. The importance and recklessness of such cooperation are evidenced by the following.

According to the results of the study, it was found that in a significant part of rural UTCs the salaries of their heads reach about 30 – 35 thousand UAH per month, village elders – 25-30 thousand UAH. In some UTCs, even accountants have company cars with full-time drivers. At the same time, there are "no" funds for staff units of rural paramedics, teachers, etc. For the community, such "distortions" are presented as state decisions, not village council decisions. Hence, the problems of transparency and publicity in the use of community funds are obvious, and they cannot be solved without the institution of an audit.

Unfortunately, there are already many cases of distribution of 2 hectares of land for personal farming by the decision of the Soviets, which massively steals land resources transferred from the State Geocadastre to communities. The community does not know about such "legal" but cynical actions of its elected officials. And here without an external audit and public presentation of his report (conclusion), too, cannot do.

In addition, as can be seen from Table 9. It is in rural UTCs that the percentage of expenditures for the maintenance of the management staff in all their incomes is quite large - from 20 to 30. The share of wages in the expenditures of the general fund is from 60 to 80 %, respectively. That is, every year it is expedient to use almost 100 million UAH, of which at least a quarter is used inefficiently.

*Mathematical calculation 8:*

- 1) 425.9 million UAH \* 0.7 = 298.13 million UAH
- 2) 298.13 million UAH \* 0.3 = 89.5 million UAH

Table 9: Some indicators of execution of local budgets of UTC for 2019

Rating	Region	UTC	The share of expenditures for the maintenance of the management staff in the revenues of the general fund,%	The share of wages in general fund expenditures,%
From the first	Kirovograd	Marianivska	10.0	33.8
Of the latter	Donetsk	Andrievska	25.3	60.9
	Odessa	Novokalchevska	20.6	71.7
	Volyn	Zhydychynska	26.2	74.8
	Kherson	Konstantynivska	28.0	78.3

Source: Generalized by the author according to the data [18].

Next, we consider promising (Table 2) areas of audit participation in ensuring the goals of sustainable development of rural areas.

The most important, both in terms of the scale of work and the consequences for the sustainable development of rural areas, is the inventory of the potential of the UTC territory and the placement of the identified assets on the balance sheet. We are talking about the diversity of natural resources (subsoil, water, forests), brands of the territory, infrastructure and human potential, and so on. That is, everything that exists on the territory of the UTC, but is not posted to its balance sheet. This work is currently characterized only by the beginning of the formation of appropriate methodological support. In 2020 NSC "Institute of Agrarian Economics" developed guidelines for an inventory of assets and resource potential of local communities [20].

At the National Academy of Sciences, the Institute of Environmental Economics and Sustainable Development has determined the value of Ukraine's natural wealth alone at 1.06 trillion UAH [21]. That is, for rural UTCs, we are talking about natural assets worth at least UAH 500 billion, and taking into account another potential – up to 700 billion UAH.

Of course, the identification, valuation, and placement on the balance sheet of UTC of such assets are the work of many years. However, for this study, such scale and semantic complexity indicate the unconditional need for UTC to cooperate on this issue with the audit institute. To calculate the cost of such audit services, a notional amount of 20-50 thousand USD is accepted for one UTC. Thus it is a question of the volume of services in 852 million UAH.

#### Mathematical calculation 9:

- 1) 1,060 items \* 82% = 869.2 items
- 2) 869.2 items \* ((20+50)/2) thousand USD = 304.2 thousand USD
- 3) 304.2 thousand USD \* 28 UAH per USD = 852 million UAH

Almost 2/3 of their managers and accountants hope for the help of auditors (audit consulting) in the development of plans for the development of rural UTCs (Table 3). If the minimum cost of such service (initiative audit) is estimated at UAH 140,000 (USD 5,000), then the market volume is at least 96.5 million UAH.

#### Mathematical calculation 10:

- 1) 1,060 items\* 65 % = 689 items.
- 2) 689 items\*0,14 million UAH = 96,5 million UAH

Important participation of the audit institute in ensuring the sustainable development of rural areas is the control over the implementation of agreements of socio-economic responsibility between UTC and the business that operates in their territory. Of course, this type of agreement does not exist now. However, according to the current legislation, large enterprises (in the industry they are agricultural holdings) and medium-sized

enterprises must publish audited reports. One of the components of this is the management report, which according to the recommendations of the Ministry of Finance of Ukraine [22] should disclose the socio-economic responsibility of business.

According to the results of 2019, the agricultural sector accounted for 11.6 % of Ukraine's gross domestic product and about half of its exports. According to these indicators, "rural areas" should account for at least 20% of the audit services market. In fact, according to the Audit Chamber of Ukraine in 2019, the industry accounted for only 6.8% of audit services [23]. Based on the aggregate market of such services in 2019 in the amount of UAH 2.9 million, in rural areas, business entities worth almost UAH 380 million remain not covered by the audit obligation.

Subject to compliance with the provisions of this law (on which the BPOA and the State Tax Service of Ukraine are working), the audit market will increase by 380 million UAH. But such an audit is hindered by the parliamentary corps of rural UTCs (representatives of large and medium-sized businesses). A more decisive position of BPOA and the State Tax Service on the issue of mandatory audit further opens opportunities for UTC requirements for compliance with social and environmental requirements as well as other significant economic entities for the territory. It is possible to predict an additional volume of such a market in 2022-2025 in the amount of up to 100 million UAH. Thus, the total amount of audit participation in ensuring sustainable development of rural areas (in terms of monitoring compliance with economic, social, and environmental management conditions) is at least 480 million UAH annually.

#### Mathematical calculation 11:

- 1) 380 + 100 = 480 million UAH

Sustainable development of rural areas (as evidenced by the experience of developed countries) is impossible without the formation of a significant layer of small business, the middle class. Hence, increasing the economic literacy of the population, supporting the formation and development of small businesses, cooperation is the most important task of both local governments and the institute of the audit.

The scale and routine of this work are evidenced by research and government decisions. Thus, only for the period from 2010 to 2017, the number of farms decreased by 10 thousand. Now their number is about 46.7 thousand, of which 33.7 are active [24]. For example, in neighboring Poland and other European Union countries, this figure exceeds 1 million units.

In 2017, the order of the Cabinet of Ministers of Ukraine № 664-r approved the Concept of development of farms and agricultural cooperation for 2018-2020 [24]. Among the main expected results:

- Increase in the number of farms by 10%;
- Increase in the number of agricultural service cooperatives established by the farm by 40-50 units, etc.

It should be noted that in Ukraine, out of 1098 agricultural service cooperatives as of 01.04.2017, only 590 units actually carried out economic activity [24]. The Government Concept [24] envisages the annual formation of 15 new objects of primary processing of agricultural products on the basis of cooperatives. In general, this is an extraordinary problem for Ukraine in achieving the goals of sustainable development. Large and most medium-sized agricultural enterprises are aimed at producing export-oriented monocultures. The share of raw materials in Ukraine's agricultural exports reaches almost 100 %. At the same time, the domestic food market is half-filled with imported products of dubious quality. In the European Union, agricultural cooperatives provide 57 % of dairy products and 42 % of fruit and vegetables. And in countries such as Austria, Denmark, the Netherlands, and Sweden (with the world's

highest happiness index), farmers' cooperatives produce 90 % of dairy products and more than 50% of fruits and vegetables. Thus, in comparison with the EU countries, Ukraine has not millions of farms and thousands of cooperatives, but only 34 thousand and 0.6 thousand, respectively. This is a huge threat to the sustainable development of its rural areas.

Despite the crisis of farming and cooperation, there are still about 4 million households in rural areas producing a variety of agricultural products. Of these, according to expert estimates, about 0.5 million are active producers of marketable products that can support the farming business [25]. In the structure of employment of the population aged 15-70 in the village, employers (entrepreneurs) are only 2 %, self-employed – 30 %, and employees – 68 %. In addition, scientists note changes in the level of diversification of agricultural production in 2011-2016: enterprises during this period lost 3.9 %, while households grew by 2.2 % [25].

Thus, out of 4 million households and 30% of the self-employed in rural areas, the goals of forming at least one million entrepreneurs in rural areas in the near future seem quite realistic.

It is expedient to tie a cost estimation of the scale of this work to two levels of indicators. The first is the growth of GDP in rural areas; the second is the growth of tax revenues to local budgets. Table 10 shows the structure of local budget revenues (excluding transfers from the state budget). As can be seen from the above data, it is from active entrepreneurship (payment of wages, increase in sales) is formed more than 2/3 of local government revenues. In 2020, this is already 74.9 %. However, the decrease in the share of revenues from the single tax is alarming, which indicates the stagnation of small business development in rural areas: from 20.6 % in 2017 to 14.4 % in 2020.

According to the NSC "Institute of Agrarian Economics", today in rural areas work about 45 thousand legal entities - business entities [25]. There are 34 thousand farmers and almost 10 thousand companies and private enterprises (medium enterprises) among of them. The latter is not all taxpayers. Given the almost million increase in single taxpayers (of course, in smaller amounts, which will follow from the area of land cultivation and production of commercial households and service cooperatives) it seems reasonable to expect an increase in filling local budgets by at least half.

Table 10: Structure of own revenues to local budgets without transfers from the state budget, %

No	Source, type of income	Year			
		2017	2018	2020	
				Rural UTC	Ukraine
<i>From active rural entrepreneurship</i>					
1	Personal income tax	40.6	56.9	60.5	61.3
2	Single tax	20.6	15.8	14.4	13.1
	Together	61.2	72.7	74.9	74.4
<i>Passive income</i>					
1	Land fee	21.0	14.8	12.6	10.8
2	Excise tax	11.8	7.4	6.6	5.4
3	Real estate tax	1.9	1.8	2.1	2.0
4	Others	4.2	3.7	3.7	7.4

Source: Generalized by the author on the basis [18].

According to the author's estimates, in 2020 own revenues to rural local budgets will amount to about 100-200 billion UAH (unfortunately, there is no such statistical information in Ukraine, so this figure is based on the fact that such revenues in all communities are about 800 billion UAH). Thus, it is a question of involvement of institute of audit to at least 150 billion UAH of increase of budgets of rural UTC.

Entrepreneurial activity of the rural population, growth of the number of business structures to 1 million subjects of commodity management (in comparison with 50 thousand now) will promote the growth of GDP of agriculture. In 2019, this figure was 11.6% of the country's GDP and almost UAH 365 billion, of which about half was produced by households.

Therefore, we can expect an increase in the productivity of those who will change their status to a farm, at least twice. Based on the fact that out of 4 million households, 1 million will double their productivity (this is 25 %), this is expected to increase GDP by 45.6 billion UAH.

*Mathematical calculation 12:*

- 1) 365 billion UAH \* 0.5 = 182.5 billion UAH
- 2) 182.5 billion UAH \* 0.25 = 45.6 billion UAH

Thus, playing an important social role in the development of rural entrepreneurship, the audit institute will be involved in the growth of the rural economy by at least UAH 45.6 billion and the annual increase in the replenishment of local budgets in the amount of UAH 150 billion. It is clear that without the cooperation of UTC and audit companies it is impossible to achieve these indicators of sustainable development.

The issue of capitalization of the potential of rural areas and their investment attractiveness is central to the formation of sustainable development. As noted in the scientific report "Capitalization of the national wealth of Ukraine: the value of agricultural land" by scientists NSC "Institute of Agrarian Economics", today in the national accounts of Ukraine is practically not taken into account its natural capital. Thus, the total number of agricultural lands in the national accounts of Ukraine reflected such assets in the amount of only 150 million USD, while according to expert estimates should be at least 25 billion dollars. USA [17]. But more important is something else. Even at an estimate of 25 billion. USA Ukraine has an extremely low capitalization of this asset. Researchers note that the current capitalization of agricultural land in Ukraine is only 2.5 % of the capitalization of companies such as Amazon, Microsoft, Apple, and others. Scientists state that "For Ukraine when launching a free land market, it is an economic horror of inevitable non-equivalent accounting, non-equivalent assessment and exchange is a horror for the fundamental world and domestic economics" [17, p. 30].

Thus, the study allows us to consider from at least two positions the expected effectiveness of the involvement of the audit institute in rural development. First, without such involvement, the realization of most of the current goals and long-term goals of sustainable development of rural UTCs is impossible in terms of both qualitative and quantitative parameters of work. Secondly, it is an opportunity to calculate the integrated indicator of the expected effect of the efforts of the audit institute to achieve the goals of sustainable development of rural areas. The study allows you to calculate it by the formula:

$$E_e = (E_{vpc} / C_{ma}) * C_{ca} \quad (3)$$

where:

- $E_e$  – expected effectiveness from audit engagement to sustainable development of rural areas;
- $E_{vpc}$  – the expected volume of "primary capitalization" of rural areas;
- $C_{ma}$  – the cost of the audit market in rural areas;
- $C_{ca}$  – the coefficient of the audit contribution to the volume of "initial capitalization" of rural areas (conditionally accepted at the level of 0.1).

The calculation of the expected volume of "primary capitalization" of rural areas (this is the achievement of all three current goals of sustainable development and from 1 to 5 prospects (Table 2) is carried out according to the formula:

$$E_{vpc} = (C_p * C_{src}) + C_1 + E_{ar} + E_{cm} + C_{aa} + G_{dpg} + G_{irc} \quad (4)$$

where:

- $E_{vpc}$  – the expected volume of "primary capitalization" of rural areas;

- $C_p$  – the cost of acceptance on the balance of property complexes;
- $C_{src}$  – the share of rural communities;
- $C_l$  – the cost of acceptance on the balance of land;
- $E_{ar}$  – the effect of avoiding the risks of inefficient use of SFRD funds;
- $E_{cm}$  – the cost of the effect of saving management costs;
- $C_{aa}$  – the cost of acceptance on the balance of natural and other assets;
- $G_{dpg}$  – gross domestic product growth;
- $G_{irc}$  – income growth of rural communities.

Thus, the calculated scale of joint efforts of local governments and audit companies to ensure the basic conditions (“initial capitalization”) of sustainable development goals (from Table 2) reaches 1182 billion UAH.

#### Mathematical calculation 13:

$$E_{vpc} = (65 \text{ billion} * 0.7) + 240.8 \text{ billion} + 0.326 \text{ billion} + 0.1 \text{ billion} + 700 \text{ billion} + 45.6 \text{ billion} + 150 \text{ billion} = 1,182 \text{ billion UAH}$$

To calculate the value of the audit market in rural areas, the costs that local governments and rural businesses will incur to attract an audit to achieve sustainable development goals are calculated:

$$C_{ma} = C_{ai} + (C_{mi} * C) \quad (5)$$

where:

- $C_{ma}$  – the cost of the audit market in rural areas;
- $C_{am}$  – the cost of mandatory audit;
- $C_{ai}$  – the cost of the initiative audit;
- $C$  – coefficient at level 5 (five years – the optimal term of work for the implementation of tasks on the “initial capitalization”).

#### Mathematical calculation 14:

$$C_{ma} = (852+95.6) + (380+100) * 5 = 3,347.6 \text{ billion UAH}$$

Thus, the domestic audit system annually expands the market of its services by at least 3.35 billion UAH, of which the initiative audit (947.6 million UAH – for consulting support of UTC development plans, 852 million UAH – for consulting support of identifying and setting the balance of potential rural areas) and mandatory audit of UAH 2,400 billion (medium-sized businesses – 380 million UAH, and in addition another 100 million UAH – a promising annual audit market for other businesses to comply with community requirements for social and environmental management).

The expansion of the audit services market, provided that they are provided by local audit firms in a public-private partnership should also be attributed to the expected effect of involving the audit institute in rural development. After all, jobs will be created in the regions for highly qualified auditors, which will also enable the development of other entrepreneurial activities in the countryside (through training, business outsourcing), additional sources of replenishment of local budgets. However, to calculate the expected efficiency from the involvement of the audit to ensure sustainable development of rural areas ( $E_c$ ), the indicator  $C_{ma}$  is calculated separately (and its value is taken in the amount of 3.35 billion UAH).

Thus, for 1 UAH of costs to involve the audit institutions in the implementation of current and long-term goals of sustainable development (from Table 2), 35.3 thousand UAH is expected to increase the “primary capitalization” of rural areas.

#### Mathematical calculation 15:

$$E_e = (E_{vpc} / C_{ma}) * C_{ca} = (1,182 / 3,35) * 0,1 = 35,3 \quad (6)$$

Thus, the high efficiency of cooperation of local governments with the audit system in the formation of basic conditions for sustainable development of rural areas is obvious. At the same time, the use of the mechanism of public-audit partnership requires incentives and management, which is impossible without the use of a certain system of control and definition of indicators of the state of such cooperation.

The model of measuring the state of the public-audit partnership between UTC and audit firms for sustainable development is as follows:

$$\sum_{t=1}^n A_{ppp} \geq N_{rsc} \quad (7)$$

where:

- $A_{ppp}$  – the number of PPP agreements (GAP) with rural and urban communities;
- $N_{rsc}$  – the total number of rural and settlement communities.

The calculation of indicators is proposed to be carried out according to the formula:

$$I = \frac{\sum_{t=1}^n A_{ppp}}{N_{rsc}} \quad (8)$$

The proposed levels of identifiers are determined by region and Ukraine as a whole. As for the audit system, they are used for decision-making by the ACU, BPOA and the regional offices ACU. As for regional policy, sustainable development policy - they are a guide for decisions of relevant Ministries and departments, regional and district councils. The limits of the indicators are as follows:

- 1) Up to 0.25 – unsatisfactory level;
- 2) 0.25-0.5 – satisfactory;
- 3) 0.5-1 – good;
- 4) more than 1 – excellent.

Of course, now both in Ukraine and in the regions, such an indicator has an unsatisfactory level, based on data [18].

The conducted research allows offering other indicators of measuring the level of audit involvement in ensuring sustainable development of rural areas. Such calculations can be based on the measurement of audit participation in the provision of both current and long-term baseline goals to achieve sustainable development in Table 4. For example, for current purposes:

$$\sum_{t=1}^n N_{at} \geq \sum_{t=1}^3 A_{fpc} \div A_{fsfrd} + A_{kldppp} + A_{ms} \quad (9)$$

where:

- $N_{at}$  – the number of audit tasks under the GAP agreement;
- $A_{fpc}$  – audit of the formation of land and property complexes of communities;
- $A_{fsfrd}$  – audit of the effectiveness of the use of SFRD funds;
- $A_{ms}$  – management system audit.

Of course, measuring the status and management of the audit of sustainable rural development requires the introduction of appropriate reporting from local governments and audit companies. The scale and, most importantly, the effectiveness of the audit component in achieving the goals of sustainable development justify such reporting. However, this is the subject of further research.

## 5 Conclusion

Thus, the study proposes new approaches to measuring the effectiveness of the involvement of the audit institutions in the formation of UTC basic conditions for sustainable development of rural areas through the calculation of the total effect of such partnerships and cost recovery for audit services.

Establishing the total effect of the acceptance on the balance of UTC land and property complexes, natural and other assets of rural areas, reducing the risks of inefficient use of funds from the State Fund for Rural Development, optimizing management costs, increasing rural incomes and GDP growth is set at 1,182 billion UAH, five-year market (volume) of public audit partnership in rural areas – in the amount of 3.35 billion UAH, payback of 1 UAH for audit services – 35.3 thousand UAH, confirms the importance of involving the audit system in ensuring sustainable development and significantly accelerate the formation of basic conditions (“primary capitalization”) of sustainable development of rural areas.

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#### Primary Paper Section: A

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