The assessment features of the third type permitted use land plots

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Abstract. The article deals with the problem of assessing agricultural land used for the placement of objects (buildings, structures, structures) used for the production, storage and primary processing of agricultural products. The problem is that the owner who has provided (sold) a land plot for an object can rightly claim a part of the future profit that arises from the synergistic effect of adding two assets - land and improvements. The work purpose is to formulate a methodology for assessing agricultural land located under buildings, taking into account the synergistic effect and their properties. In the course of the study, two approaches were considered for determining the entrepreneur's profit for the evaluated objects: first, on the basis of the economic results of the agricultural enterprises activities; secondly, on the basis of the invested funds alternative investment possibility. It was revealed that the owner of the land that will be built up, as a co-investor of the project, has the right to add to the value of the land in the amount of the rate of return on invested capital - 26.28%. The market (in this case, the cadastral) value of the surrounding land can be obtained from the results of the assessment of lands of the first type of use (arable land, pastures, hayfields).

1 Introduction

The third type of permitted use includes agricultural land occupied by buildings, structures, structures used for the production, storage and primary processing of agricultural products [1-3].

In the rural industrial real estate market, only single objects are circulating (land plots with buildings and structures located on them), and the overwhelming majority of objects are located on the settlements lands. Separate plots for industrial real estate (outside settlements) are not for sale or offered for sale [4-8].

This situation is easy to explain. In the Samara region, outside the settlements, there is an excess of agricultural land, which is quite simple to purchase for construction by objects used for the production, storage and primary processing of agricultural products. That is, there is a buyer's market here, which, although dictating prices, is ready to pay for building land somewhat more expensive than the surrounding area (agricultural land or non-arable

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land) [9, 10]. The excess of the land value under production facilities over the value of surrounding land is ensured by the possibility of supplying communications, lower transport costs, and the availability of labor. In this situation, it is also necessary to take into account the influence of a nearby large settlement [11-15].

There are very few such plots on the open land market (both for sale and for rent) in the Samara region - single offers of agricultural land for building near large settlements. This implies a low possibility of determining the market value by comparative or income approach. This forces the appraiser to turn to indirect methods for determining the land market value [16-19].

2 Methods

The use of the allocation method to determine the land value under production facilities (the value of the building itself is deducted from the value of a single object, the remainder of the value refers to the land) faces the following difficulties that cannot be eliminated in the cadastral (mass) valuation:

- establishment of the exact full replacement cost of construction (PVS) of buildings on the estimated site (there is no information about the design features of the facilities);
- determination of the exact value of physical and economic wear and tear [20-22].

If we assume that the minimum market value of buildings outside settlements in rural areas fluctuates in the range of 500-1000 rubles/m^2, then the estimated cost of the occupied land (for example, in the Bezenchuksky district) in the amount of 2-3 rubles/m^2 is far beyond the calculation accuracy of both full replacement cost of construction (PVS) and all types of wear.

Therefore, it was decided not to use the allocation method to establish the market value of the third type permitted use land plots.

In this regard, the following calculation logic is used:

- historically, before the formation of a building or structure, there was free land (most often near the settlement border);
- on this land, an entrepreneur performed work to create an improvement and a single object was formed.

Thus, the assessment consists subject of a land plot (part of the surrounding area), as well as buildings and structures as part of the future business [23].

The owner who provided (sold) a land plot for this object can rightly claim a part of the future profit, which arises from the synergistic effect when two assets are added - land and improvements [24, 25]. A fair distribution of this asset-sharing gain can be estimated by the amount the parties contribute to the joint venture [26-28].

Thus, the value of the land plot under the object (improvement) can be estimated as the sum of the land plot value, calculated from the value of the surrounding land, plus a certain amount of added value arising from the joint investments synergistic effect in the single real estate object creation.

3 Results

In an active market, the value of the synergistic effect is defined as the difference between the initial investment in the project and the object selling cost on the market. In the market absence (i.e., the opportunity absence to sell an object), the synergetic effect can, in a first approximation, be equated to the entrepreneur's profit - theoretically, the object being sold should bring some kind of profit, otherwise it was not worth building.

Calculation of the entrepreneur's profit.

Option 1. The value of the enterprise's profit can be calculated by analyzing the economic results of the agricultural enterprises activities in the Samara region.

According to the official data of the territorial body of the Federal State Statistics Service for the Samara Region on the enterprises profitability engaged in agricultural production, the following information was revealed.

The overall profitability (by the type of activity "Agriculture, hunting, forestry in 2010, taking into account small businesses) is 5%.

The profitability (loss ratio) of non-current assets is 1.4%.

In addition, we studied the annual balance sheets, forms No. 2 and profit and loss statements for 2008-2010 for a number of agricultural enterprises in the Samara region.

Based on these documents, the activities of these enterprises were analyzed and conclusions about profitability were drawn. The return on net assets indicator reflects the return on capital invested in the company. In fact, this is similar to the entrepreneurial profit concept. Information on these enterprises is shown in Table 1.

Table 1. Extracts from balance sheets of agricultural enterprises and profitability calculation.

№	Company	Net profit (loss) of the reporting period			Average return on net assets over three years,%
		2010	2009	2008	
1	OJSC "Bezenchuksky HPP"	5197	4731	1408	37
2	JSC "Bichevninskoe HPP"		-670	-271	-2
3	OJSC "Bolsheglushitsky HPP"	8041	8411	4124	27
4	OJSC "Bolshechernigovsky elevator"	721	4186	1639	1
5	JSC "Borskagrokhimservice"	70	60	81	33
6	JSC "Bolshechernigovsky HPP"	-656	-1560	-1560	-359
7	OJSC "Klyavlinsky HPP"	43	131	660	3
8	JSC "Malyshevsky"	-134	830	64	6
9	OJSC Butter and cheese plant "Koshkinsky"	180	872	2105	1
10	JSC "Mukomol"	10804	4076	5812	42
11	JSC "Pavlovsky-Dairy Plant"	-455	2136	1804	71
12	JSC "Pestravsky HPP"	4957	2447	3559	21
13	OJSC "Podstepkinsky"	22198	29837	32723	436
14	JSC "Russky Pole"	662	-1470	-1111	53
15	OJSC "Selkhoztekhnika"	2527	1139	6602	13
16	OJSC "Sernovodsky elevator"	1129	1880		2
17	OJSC "Surgutsky"	-23705	21135	15537	2
18	OJSC "Chagrinsky elevator"	501	3804	-206	6
19	Chelno-Vershinsky MTS OJSC	11870	912	13512	17
20	OJSC "Chelno-Vershinsky elevator"	295	1409	1948	25
21	OJSC "Shentalinsky elevator"	-3272	-624	-624	-65.9
22	JSC "Utevsky HPP"		96	2883	32

Analyzing the data of balance sheets and profit and loss statements, the enterprises net assets profitability for 2008-2010 was calculated. From the data in Table 1, it can be seen that enterprises numbered 2, 6, 11, 13, 14, 21 are either clearly unprofitable, or gross errors were made in the financial statements.

Enterprises numbered 4, 7, 8, 9, 16, 17, 18 have very low profitability. A prudent entrepreneur with such a profitability will abandon the activity, preferring an alternative

investment of funds, for example, in a bank deposit, which is more profitable and carries less risks, therefore the analysis includes the following enterprises indicated in Fig. 1.

The average return on net assets left over for the analysis of the nine businesses is 27%.

The entrepreneur's profit (return on net assets) according to the first calculation method is 27%.

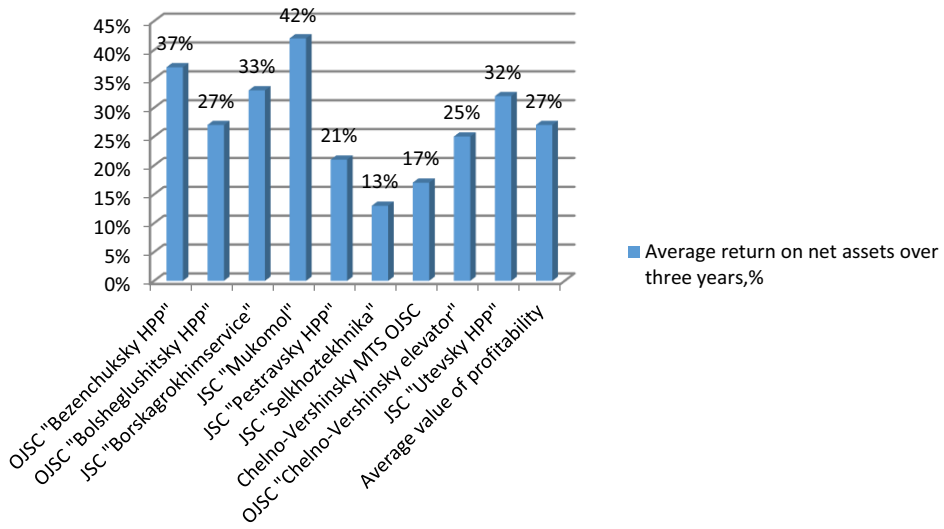

Fig. 1. Calculation of the average return on net assets.

Option 2. The magnitude of the entrepreneur's profit can be determined quite well according to the scheme proposed by the scientists of the St. Petersburg State Technical University.

An entrepreneur's profit scoring scheme, based on the assumption that an investor hiring a contractor has the ability to invest in another project that has a return certain rate. At the same time, cash flows representing the costs of acquiring a site, carrying out construction and full-scale commissioning of an object, in terms of distribution dynamics over time, coincide with cash flows for an alternative project.

The amount of the entrepreneur's profit, obtained by this method, satisfies the principle: it makes sense to invest in new construction only if the profit from the construction project is not less than the profit from an alternative project that has the same level of risk and the same duration as and new construction [15].

The formula for calculating the entrepreneur's profit can be calculated:

$$PP = n * \frac{Y_a}{2}\left(1 + n * \frac{2Y_a}{3} + C_0\left(1 + \frac{2}{3} * n^2 * Y_a^2\right)\right) \quad (1)$$

where PP - the developer's profit,%;

C_o - the share of the advance payment in the total amount of payments;

n - the number of construction years (period);

Y_a - the annual rate of return on invested capital.

The construction period n is determined according to Building Codes and Regulations (SNiP) 1.04.03-85 "Standards for the duration of construction and backlog in the construction of enterprises, buildings and structures", for an approximately identical object.

The calculation method for determining the duration of the construction of objects n is based on the functional dependence of the construction period on the cost of construction and installation works S.

For the main industries, this dependence is expressed as functions:

$$n = A_1\sqrt{C} + A_2C; \quad (2)$$
$$n = A_1\sqrt{C} + A_2; \quad (3)$$
$$n = A_1C + A_2, \quad (4)$$

where C - the volume of construction and installation work, million rubles, at prices in effect since 1984;

A_1, A_2 - parameters of the equation, determined from statistics.

The ratio of C_o is assumed to be 0.50 based on the assumption that the investor initially advances in construction 50.0% of the work total cost. The annual rate of return Y_a is set at 30%, which roughly corresponds to the estimated capitalization ratio for similar properties, taking into account the typical investment risks and the 10-year return on capital (Ring method).

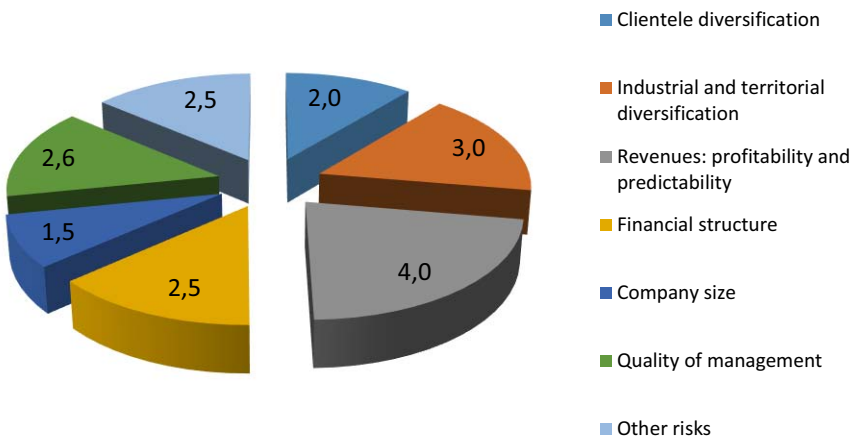

Fig. 2. Calculation of the investment risk premium.

The rate of return on invested capital for the construction industry was calculated on a cumulative basis. In this case, to build the rate, the risk-free rate of return is taken as a basis, and then premiums for special risks of the activity are added to it. The long-term GKO-OFZ rate was taken as the risk-free rate, the list and range of risk premiums - based on research materials from the Institute for Economic Development of the World Bank.

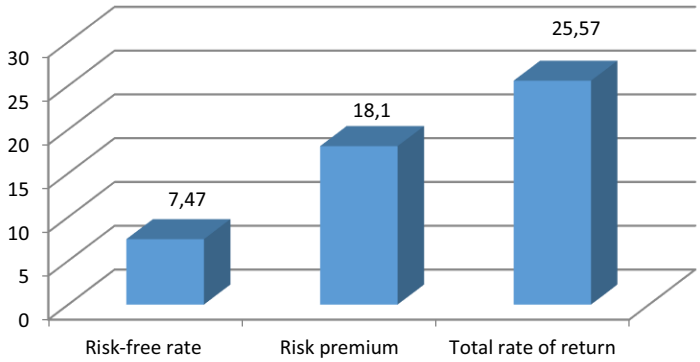

Fig. 3. Calculation of the rate of return on invested capital, %.

Based on the calculations performed, we take the rate of return on invested capital to calculate the entrepreneur's profit an in the construction industry at 25.57% (Figures 2, 3).

Both methods of calculating the the entrepreneur's profit magnitude showed similar results, therefore, for further calculation, we take the average value - 26.28%.

Thus, a project each co-investor for the agricultural facility construction can count on receiving its part of the synergetic effect (equal to the entrepreneur's profit) in the amount of 26.28%.

4 Discussion

To confirm this assumption, we will carry out two simple calculations of the construction cost of conditional agricultural production facilities and determine the share of the synergistic effect attributable to each co-investor.

The cost calculation was performed using Consolidated Indices of Construction Costs (UPVS). The aggregated indicators given in the collections are compiled in prices and rates of the base period – 1969.

Table 2. Calculation of the cost of building a cowshed.

Assessment object	Double row cowshed
Capital group	2
Climatic region	2
Total area of the assessment object, m2	1 000.00
Construction volume of the assessment object, m^3	4 600.00
Year built	2010
No. of Consolidated Indices of Construction Costs (UPVS) collection and tables	Col. № 26, table 3
An analogue characteristics from UPVS	DOUBLE ROW cowshed. Buildings without an attic space (combined coverage). Roofing roofing material for reinforced concrete. Capital group II. Central heating, ventilation, plumbing, sewerage, hot water supply, electric lighting and concrete feeders with a wooden stall frame are taken into account.
Unit of measurement	m^3
Replacement cost according to the collection, rubles/m3	14.1
Correction factor for climatic region	1.00
Correction factor for capital group	1.00
Correction factor for building volume	1.00
Other amendments	1.00
Adjusted cost of the aggregated indicator, rubles/m3 in 1969 prices	14.1
The same, in prices of 1984 (Resolution of the State Construction Committee of 11.05.83, coefficient 1.2)	16.92
The same, in 1991 prices (Letter of the State Construction Committee of 6.09.90, No. 14-D. Coefficient 1.6)	27.07
Construction and installation work index from 1991 to the date of assessment (Index of rise in the cost of construction and installation works as of the assessment date.	63.687

Data from the Center for Pricing in Construction)	
Aggregated indicator at current prices, rubles/m^3	1 724
Total for the subject of assessment, rubles	1 724 134
The same, taking into account unforeseen costs 2%, rubles	1 758 617
The same, with VAT (replacement cost excluding depreciation), rubles	2 075 168

The calculation is carried out according to the formula:

$$CC = C_v * V_{zd} * I_1 * I_2 * I_3 * PP * VAT \quad (5)$$

where: CC - replacement cost (construction cost) at the date of assessment;

C_v - the replacement cost of 1 m^3 of the assessed object in the base period 1969;

V_{zd} - the volume of the evaluated object;

I_1 - index of the rise in construction and installation costs by 1.01.84 - 1.2;

I_2 - index of the rise in the cost of construction and installation work on 1.01.91 - 1.6;

I_3 - the index of the rise in the cost of construction and installation work on the date of assessment - 63.687;

PP - the entrepreneur's profit;

VAT - value added tax (Table 2).

For the normal functioning of this building, a land plot is required, the area of which is determined taking into account the normative building density (Building Codes and Regulations (SNiP) II-97-76 "General plans of agricultural enterprises"). For cowsheds, the ratio of the building area and the standard area of the required land plot is on average (for buildings for cattle keeping) 46%.

Table 3. Calculation of profit for the owner of the land under the cowshed.

№	Parameter	Indicator
1	Density of construction of cowshed	46%
2	Built-up area under the cowshed, m2	1 000.00
3	The area required for the normal functioning of the cowshed, m2	2 174
4	The cost of agricultural land, rubles/m2 (conditionally)	2.0
5	Cost of land under the cowshed, rubles	4 348
6	Cowshed construction cost, rub.	2 075 168
7	Total cost of creating a single object, rubles	2 079 516
8	Share of land in the total value of the property	0.002090787
9	Investor profit 26.28% as a synergistic effect, rubles	546 497
10	Share of profit for the land owner, rubles	1 143
11	Market value of the land allocated for the cowshed, rubles/m2	2.53

The increase in the value of land due to the influence of the synergistic effect was 26.28% (Table 3).

Second calculation.

For the normal functioning of this object, a land plot is required, the area of which is determined taking into account the normative building density (Building Codes and Regulations (SNiP) II-97-76 "General plans of agricultural enterprises").

Table 4. Calculation of the cost of building a greenhouse.

Assessment object	Greenhouse
Capital group	2
Climatic region	2

Total area of the assessment object, m^2	1 010.00
Construction volume of the assessment object, m^3	4 000.00
Total building area, m^2	1 010.00
Construction volume of the building, m^3	4 000.00
Year built	2010
No. of Consolidated Indices of Construction Costs (UPVS) collection and tables	Col. № 26, section 2, table 149 a
Characteristics of an analogue from UPVS	Greenhouse for growing vegetables. Belt foundations made of concrete blocks and monolithic concrete; precast concrete slab walls; roof-covering-metal glazed structures; dales asphalt and unpaved; concrete pools. Capital group I. Central heating, air heating, underground pool heating, humidification system, irrigation water supply system, technological pipelines and electric lighting are taken into account.
Unit of measurement	$м^2$
Replacement cost according to the collection, rubles / m3	45.3
Correction factor for climatic region	1.00
Correction factor for capital group	1.00
Correction factor for building volume	1.00
Other amendments	1.00
Adjusted cost of the aggregated indicator, rubles / m3 in 1969 prices	45.3
The same, in prices of 1984 (Resolution of the State Construction Committee of 11.05.83, coefficient 1.2)	54.36
The same, in 1991 prices (Letter of the State Construction Committee of 6.09.90, No. 14-D. Coefficient 1.6)	86.98
Construction and installation work index from 1991 to the date of assessment (Index of rise in the cost of construction and installation works as of the date of assessment. Data from the Center for Pricing in Construction)	63.687
Aggregated indicator at current prices, rubles/m^3	5 539
Total for the assessment subject, rubles	5 594 633
The same, taking into account unforeseen costs 2%, rubles	5 706 526
The same, with VAT (replacement cost excluding depreciation), rubles	6 733 700

For greenhouses, the ratio of the building area and the standard area of the required land plot is on average 55%.

Table 5. Calculation of profit for the owner of the land under the greenhouse.

№ п/п	Parameter	Indicator
1	Density of construction of greenhouse	55%
2	Built-up area under the greenhouse, m2	1 010.00
3	The area required for the normal functioning of the greenhouse, m2	1 836
4	The cost of agricultural land, rubles / m2 (conditionally)	2.0
5	The cost of the land under the greenhouse, rubles	3 673
6	Greenhouse construction cost, rub.	6 733 700

7	Total cost of creating a single object, rubles	6 737 373
8	Share of land in the total value of the property	0.000545128
9	Investor profit 26.28% as a synergistic effect, rubles	1 770 582
10	Share of profit for the land owner, rubles	965
11	Market value of land allocated for a greenhouse, RUB / m2	2.53

The increase in the land value from the influence of the synergistic effect was also 26.28% (Tables 4, 5).

5 Conclusion

Thus, we have confirmed the assumption that the land owner that will be built up, as a co-investor of the project, has the right to add to the value of the land in the amount of the rate of return on invested capital - 26.28%.

In this case, the land market value is made up of the market value of the surrounding land (as a complete analogue of the assessed plot) and a coefficient equal to the rate of return on invested capital, i.e. for this assessment - 1.2628.

$$Ccad = Csur \bullet 1{,}2628 \quad (6)$$

The market (in this case, the cadastral) value of the surrounding land can be obtained from the results of the first type use lands assessment (arable land, pastures, hayfields).

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