

## REPRODUCTION OF FIXED ASSETS

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**Abstract:** The relevance of research is conditioned by objective need for management of reproduction processes. Fixed assets turnover takes place through depreciation charges in which respect the depreciation policy is one of the methods of managing its reproduction. Theoretically depreciation is a source of simple reproduction, whereas in practice it can be a source of extended reproduction due to time shifting of depreciation reserve generation and replacement of fixed assets. In fact however it does not resolve even the objectives of simple reproduction due to inappropriate use. The research is directed at revealing new tools of depreciation policy, and grounding the distribution of functions of state and economic entities in management of fixed-assets reproduction. The paper specifies the role of depreciation policy as a tool for reproduction management, identifies the peculiar features of economic and accounting approach to understanding of depreciation essence and their discrepancy in settling reproduction objectives. It was established that despite the theoretical existence of the uniform, progressive and digressive methods of

depreciation, presently there is not a single depreciation method in Russia referring to the progressive ones. It was suggested to introduce into practice the inflation indexation of depreciation, which refers to progressive methods – the depreciation norm grows in time interval of charging thereof. Project proposals were simulated and correlated with the actual data on the example of agricultural organizations of Kostroma oblast in Russia. It was established that depreciation indexation by 8% per year will indirectly raise the amount of state subsidies by 1.7% without direct payments through reduction of taxable base and amounts of taxes withdrawn. The method of indexed depreciation is attractive for economic entities. In this respect the state can use an additional tool of economic regulation: to oblige the enterprises selecting this method to use the depreciation reserve as per designation. Introducing the proposed depreciation method into practice allows resolving a number of objectives simultaneously: secure protection of depreciation reserve from inflation, fulfill the functions of simple and extended reproduction through depreciation. Indexed depreciation

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being one of the forms of state support can be introduced selectively, for instance for agricultural manufacturers only. The presented method is a tool of state support that does not refer to the measures influencing directly the production enhancement and trade restriction, and does not have hindrances for usage as per the rules of the World Trade Organization.

**Keywords:** reproduction, fixed assets, depreciation policy, state support

## 1. Introduction

Fixed assets turnover takes place through charging of depreciation. In the process of use fixed assets transmit their value by installments to the created product in form of depreciation charges. Depreciation charges are included in the expenses of production (cost of products), then pass into price and return in form of revenue. Enterprises are obliged to accumulate depreciation charges by saving them from revenue to depreciation reserve, which in its turn shall be used to reproduce fixed assets.

Depreciation reserve has a dual economic function ensuring the process of both simple and extended reproduction. The possibility of extended reproduction is conditioned by the fact that charging of depreciation has a constant and continuous nature and depreciation is spent to refund the wear of fixed assets discretely at the end of

their useful life. Using depreciation reserve for increment of fixed assets is possible due to time shifting of the process of transmitting value to the product and using the funds to replace items of property in kind.

The procedure of generating depreciation reserve is determined by the depreciation policy. Depreciation policy can be considered at two levels: state and economic. At the economic level (level of enterprise) the objective consists in selecting the most acceptable and efficient methods from the available ones for specific economic conditions. Depreciation strategy shall reflect the relevant stage of production development, scientific and technical progress, qualitative and quantitative composition of fixed assets, as well as financial capacity of the enterprise. In modern conditions, the depreciation policy is an effective tool of financial management [1].

Depreciation policy shall be formed basing on the analysis of efficiency of its options in accordance with the strategy of the enterprise, available forecasts of the technical and economic development of certain fields and state economy on the whole [2].

State functions include the development of depreciation groups of fixed assets, methods of depreciation charging, and requirements to fixed assets accounting and taxation. At both levels, the main criterion of efficient depreciation policy shall be the fullest correlation of the depreciation formation

regularities and processes of value wear of the items of fixed assets broadly defined with due account for functional moral depreciation.

The main concern is that presently there is no control over the designated use of depreciation reserve. Enterprises often use it for other purposes. As a result, the economic entities have no proper funds not only for extended but also for simple reproduction. Depreciation being theoretically a source of simple reproduction, in practice can be a source of extended reproduction due to time shifting of depreciation reserve formation and replacement of fixed assets. In fact however due to inappropriate use of depreciation reserve it does not resolve even the problems of simple reproduction.

## 2. Materials and Methods

Discussions about depreciation reserve and accumulations made in it are held in the majority of research and methodological papers devoted to reproduction of fixed assets. Creating depreciation reserve in modern conditions does not implicate any single-sourcing, long accumulation or strict designated use. In conditions of freedom and economic independence each economic entity can spend the available funds quickly and efficiently for purchasing new assets (adding other sources of finance), as well as spend funds for other purposes.

In the paper of Sukhareva L.A. [3] basing on the summary of investigations of a number of authors it is concluded that depreciation reserve today has nothing in common with the process of recovery of main assets and represents only contra-asset account, i.e. it is meant to precise the balance on active accounts.

This situation cannot be considered to be acceptable. According to Krivova E.S., recovery of the reproduction function of depreciation should become one of the priority objectives of depreciation policy [4].

In order to form the material and technical base for production it is required to have the relevant institutional environment that allows taking into account the interests of the state and economic entities. One of such institutes is the depreciation policy of the state the efficiency of which serves as a factor for creating favorable conditions when generating depreciation reserve, which is the primary source of investments to fixed assets. Benefits of investment nature and appropriate depreciation policy are the key methods of alleviating tax burden, whereas revenue and accumulated depreciation as of today are basically the only sources of financing the investment activity of enterprises [5].

The interest of the state is to motivate production development through the mechanism of tax depreciation, replacement

and modernization of equipment, which eventually encourages the growth of national economy and increase of tax revenues in the budget [6].

Among state duties at macro level Ovod L.V. specifies the need to create conditions for designated use of depreciation charges [7].

In the paper of Kontsipko N.V. it is emphasized that in order to raise the interest of enterprises in pursuing an efficient depreciation policy the legislation amendments are required regarding the issues of generating a separate depreciation reserve and designated use thereof (to ensure designated use of accumulated depreciation). Resolving these issues will enable to charge depreciation more rationally and use efficiently which will result in more intensive renewal of worn-out fixed assets and consequently will provide the production process with additional financial resources which will promote the economy growth in Russia in general [8].

To resume state control over generation and designated use of depreciation reserve is proposed by Sayfieva S. [9], Sokolov M. [10], Lukinov V. [11] and Tikhonova E. [12].

It could be an efficient measure of motivating the reproduction of fixed assets. However in conditions of market relations and predominance of private ownership of production assets, execution of such measures

involves certain difficulty, since the owner is entitled to take economic decisions by him/herself and within his/her proprietary responsibility, including the decision on generation of the enterprise capital. Consequently, the state should develop the tools that motivate designated use of depreciation reserve, namely depreciation methods attractive for commodity producers, by selecting which while forming proper depreciation policy the enterprise would voluntarily take decisions regarding control and designated use of depreciation.

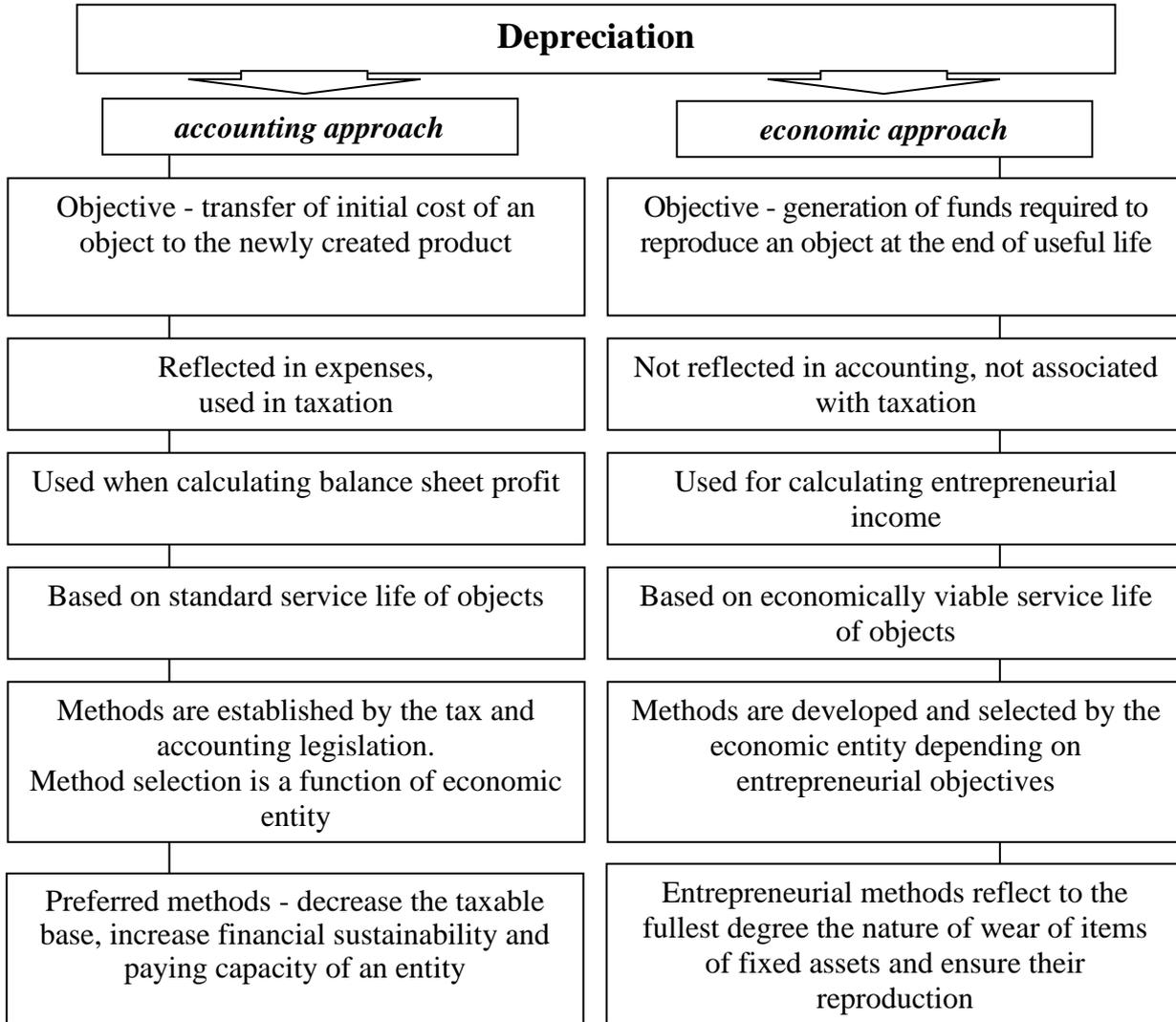
In scientific economic literature, various classifications of depreciation charging methods can be observed. Some authors describe scientific and theoretical methods. Thus, in the papers of Konkin Yu.A. [13], Semin A.N. and Chuzhinov P.I. [14] theoretical methods of depreciation are described: proportional, cumulative, and regressive (including the method of dual regression). In the paper edited by D. Bauer and Kharlamova G.N. three methods of determining depreciation charges are specified: progressive, straight-line and digressive [15]. Other scientific and methodological sources specify depreciation methods accepted in accounting: linear, declining-balance method, method of writing off value according to the sum of digits of the years of useful life, method of writing off value

in proportion to the volume of production (operations).

In our opinion in order to avoid ambiguity of classifications and interpretations of depreciation, the economic and accounting approaches to understanding of expenses including depreciation should be distinguished depending on the target objectives. Accounting (explicit) expenses are actual expenses of an enterprise for payment of obtained and used production resources. The main point of the economic approach consists in record keeping of alternative costs, i.e. market cost of resources, which are the property of the enterprise, along with the accounting costs. These costs are not involved in payments of the enterprise to other private or legal entities and are not reflected in accounting records.

Economic costs serve for the economic comparing of alternative options, taking managerial decisions, pricing, determining entrepreneurial income etc.

When forming and using fixed assets, both accounting and economic processes take place. On the one hand, it is required to transfer funds to supplier, account items on the balance, and include cost into expenses in form of depreciation. On the other hand, in the process of using fixed assets there is an entrepreneurial objective to reduce expenses, receive maximum returns, and reproduce an object upon the end of its useful life. In this regard, there appears accounting and economic notion of depreciation. Their primary attributes and designation are represented on the scheme (Fig. 1).



*Figure 1 — Distinctive features of economic and accounting approach to the main point of depreciation*

From the point of view of the accounting and economic approaches there appears a contradiction in reproduction objectives of depreciation. Accounting depreciation serves to transfer the cost of fixed assets by installments to the newly created product. Depreciation accumulated notionally upon the end of useful life of an object will equal to the initial cost thereof. In conditions of inflation, it will not ensure simple reproduction.

From the economic point of view, the reproduction role of depreciation consists in formation of the reproduction source, i.e. the cost at which new object can be purchased after expiration of useful life of the previous object. The economic approach allows theoretical summarizing all available kinds of depreciation methods, describing the regularities of charging of depreciation, and is significant for resolving basic managerial tasks.

From the economic point of view, in general terms depreciation charging methods can be divided into three groups: progressive, uniform (linear) and digressive (regressive).

Let us describe different depreciation methods in form of the function  $y = f(x)$ , where  $y$  – is an annual depreciation in rubles;  $x$  – is a year of equipment operation (Figure 2).

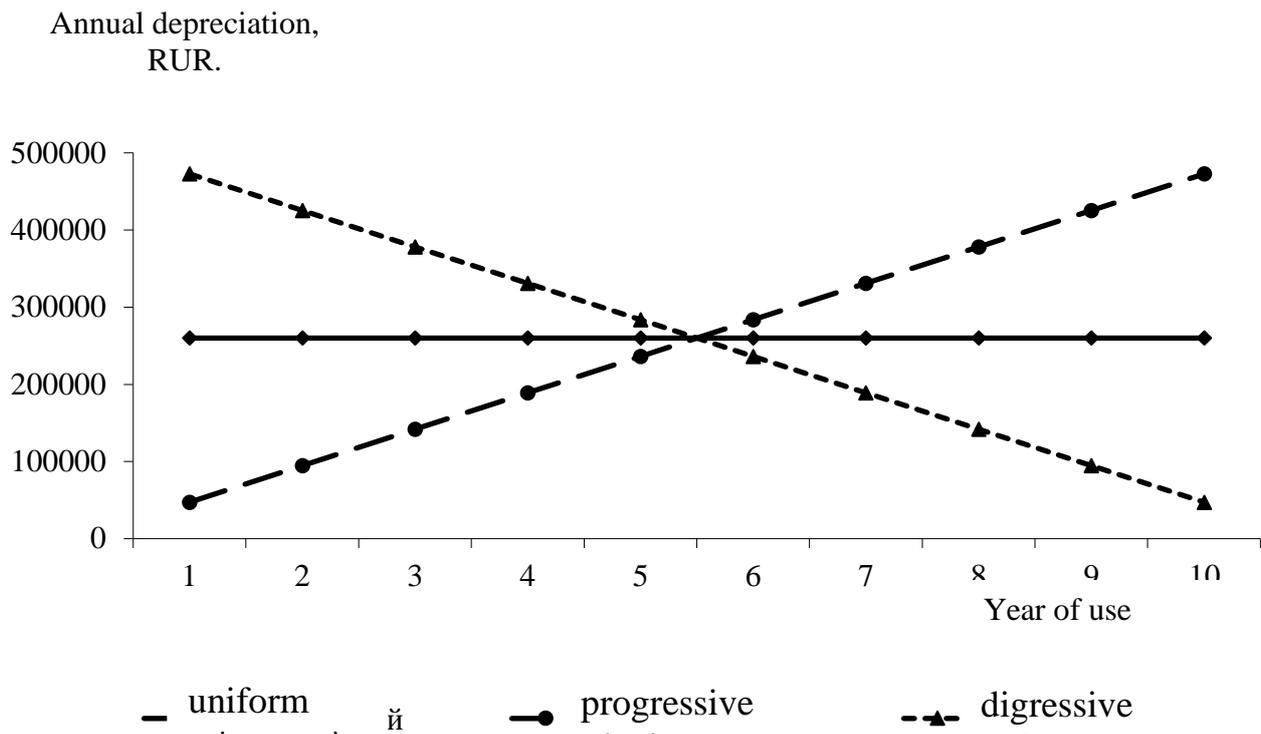


Figure 2 — Economic methods of charging of depreciation

An example shows depreciation calculation at the initial cost of an object of 2600 thous. RUR and standard operation life of 10 years.

Uniform methods are described by the function  $y = \text{const}$ . The progressive ones can be characterized by both linear and non-linear (poly-nominal) positive relationship. Digressive methods are expressed by linear or poly-nominal inverse negative relationship. Each method can theoretically combine great varieties.

The accounting approach has an exclusively applied meaning for resolving specific economic objectives: charging and disclosing depreciation in bookkeeping, further use thereof when calculating costs and tax assessment. For these purposes certain methods of charging of depreciation are enshrined in law at state level [16]. Presently there is not a single method of charging of depreciation referring to progressive method in the Russian book-keeping practice (Figure 3).

Annual depreciation, RUR.

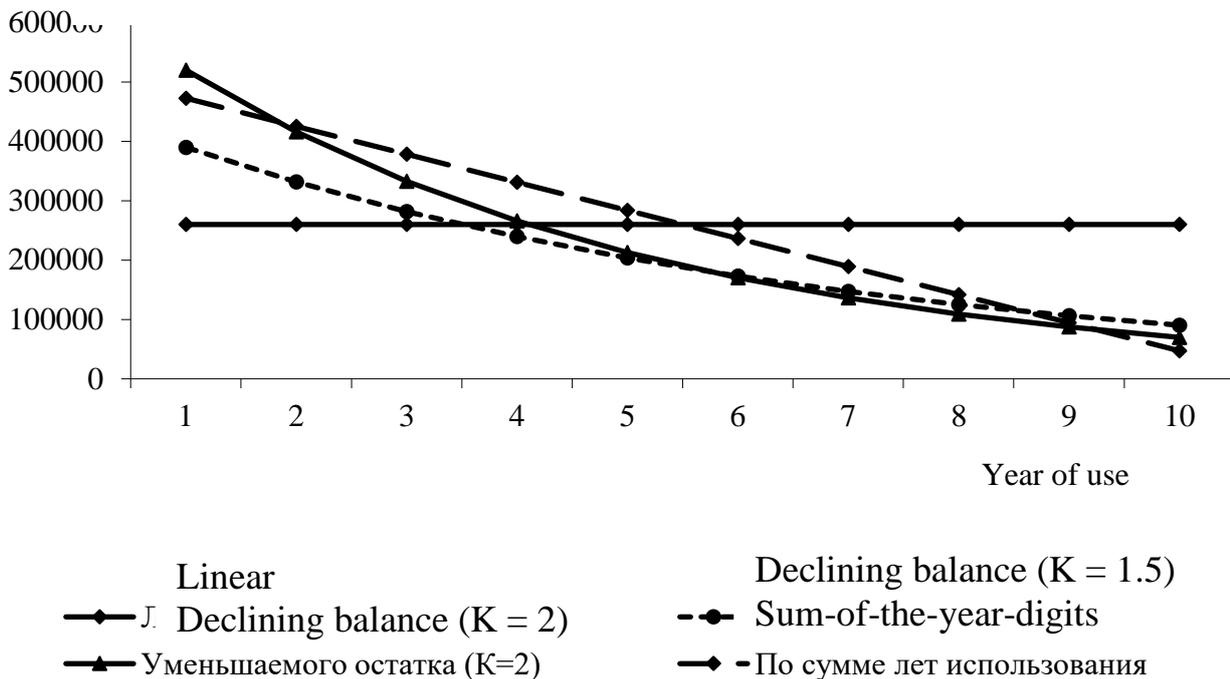


Figure 3 — Accounting methods of charging depreciation

Annual depreciation charges can increase in years only when using the method of writing off value in proportion to the volume of production in case of progressively growing production volumes. In the meantime, irrespective of the dynamics of production volumes the progressive method is the most appropriate in case if the enterprise takes an intermediate-term credit to finance the project. In the first 3...5 years the costs include credit interests and large depreciation amounts during this period will result in reduction of paying capacity. After payments for credit finish the increase of depreciation charges on the contrary will allow decreasing the taxable base. However using the progressive depreciation methods makes no economic sense in conditions of high inflation since it

delays accumulation of depreciation resources and causes loss in value thereof.

Generalization of a number of research and practical papers allows concluding that all three kinds of depreciation are applied in the global economic practice: linear (constant, uniform); increasing (progressive); accelerated (digressive, declining, decelerated) [17, 18, 19, 20, 21, 22]. Different terms depend on peculiarities of translation. The most widespread are the methods of linear and accelerated depreciation which is considered to be one of the factors of reproduction and economic growth. These methods are applied in Greece, Switzerland, Austria and France [17, 18]. The law in Germany does not stipulate any specific depreciation methods, and enterprises are more independent in this

issue. In practice the straight line method and declining balance method are used most often. Digressive depreciation is applied in relation to the fixed assets which are competitive, do not have analogues and are little subjected to functional moral depreciation [18]. Consequently the use of progressive depreciation is on the contrary viable in conditions of high rates of scientific and technical progress and quick moral ageing of equipment.

Moreover, according to Tikhonova E.V., when specifying the methods for charging of depreciation the state encounters a problem of inflation due to which the money received through depreciation is often not enough for renewal. Therefore it is so pressing to find the method that would encourage renewal and the enterprise would receive the discounted value of fixed assets for renewal that is the initial cost thereof adjusted for inflation [12].

### 3. Results

On the basis of conducted research the following recommendations are proposed to improve depreciation policy:

- on state level: diversifying depreciation methods; introducing the progressive method into practice; encouraging commodity producers for designated use of depreciation reserve;

- on regional level: consulting and scientific support of activity of agricultural enterprises for them to understand the economic approach to charging of depreciation and take appropriate economic, managerial, organizational and investment decisions;

- on the level of enterprise: assessing value wear and asset replacement value with the purpose of efficient entrepreneurial decisions for reproduction thereof; selecting optimal methods of charging of depreciation.

New style of the Russian economy functioning in conditions of an open world economic system, severe competition of domestic agriculture with the foreign suppliers of raw materials and food, and high rates of technical progress prove the priority need for technical and technological modernization of agrarian sector, strengthening of state protectionism with the simultaneous observation of standards and rules of WTO with respect to internal state support. Management of the fixed assets reproduction in such conditions can be implemented in the first turn by means of depreciation.

As a result of the research conducted [23] it was established that despite the theoretically generally accepted role of depreciation in the reproduction process, in practice in Russian agriculture it does not resolve even the issues of simple reproduction of fixed assets. The main concerns of

dysfunction of the depreciation reserve are as follows:

- small depreciation amounts due to large factual useful life of fixed assets;
- loss in value of depreciation amounts in conditions of inflation;
- inappropriate use of depreciation reserve.

There are a number of barriers in eliminating these problems. Firstly, renewal of fixed assets and overcoming the wear is prevented by the lack of investments among the sources of which the renewal function shall be fulfilled by depreciation. Technologically backward production does not allow receiving sufficient profit to make net investments. Without investment sources agricultural organizations get stuck in a loop thus and cannot fulfill reproduction.

Secondly, the proposals of a number of scholars to oblige enterprises through administrative measures to use depreciation in accordance with designation encounter civil and legal restrictions protecting owner rights to handle one's own assets at one's sole discretion.

Thirdly, the measures aimed at increasing depreciation raise skeptical attitude of some scholars and practitioners since they incur growth of costs, and at constant product prices which is conditioned in its turn by competition demands, cause decline in profits and all associated parameters of economic

performance. Also concerns are raised by possible tax gap for the state in case of depreciation growth due to reduction of taxable base of enterprises. These barriers can be overcome through the proposed economic-reproduction concept of generating the depreciation policy at different levels of management.

None of the scholars denies that depreciation in the economic sense should not just reflect the transfer of initial cost to expenses, but serve for reproduction of an object upon expiration of its useful life. It is obvious theoretically, whereas in practice normal reproduction process is impossible since the reproduction cost upon expiration of useful life of an object essentially exceeds the generated amount in the depreciation reserve, the main reason for which is inflation.

The key principle of the economic-reproduction approach to depreciation is that depreciation should form a source for reproduction. For this purpose when determining depreciation, one should take into account the annual growth of price for labor tools caused by inflation.

The annual indexation of depreciation by the value of official price index for respective type of manufactured goods shall be quite a simple method in practical use. Let us name the proposed method of charging of depreciation as "indexed." The annual

depreciation in the first year  $D_1$ , RUR/year, is determined as follows:

$$D_1 = \frac{BV \cdot N_d}{100} \cdot i_1, \quad (1)$$

where  $BV$  — book value of an object, RUR;

$N_d$  — norm of depreciation charges,

%;

$i_1$  — annual price index for a given group of objects of fixed assets in the first period (against the previous year).

Depreciation norm in the generally accepted form is a value inversely related to useful life time:

$$N_d = 100 / T, \quad (2)$$

where  $T$  — standard life time, years.

Depreciation in the second year  $D_2$ , RUR/year is determined as follows:

$$D_2 = \frac{BV \cdot N_d}{100} \cdot i_1 \cdot i_2, \quad (3)$$

where  $i_2$  — price index for a given group of objects of fixed assets in the second period (against the previous year).

Annual depreciation,  
RUR.

In general form the annual depreciation

$D_n$  is calculated as:

$$D_n = \frac{BV \cdot N_d}{100} \cdot \prod_{n=1}^T i_n, \quad (4)$$

where  $i_n$  — annual price index for a given group of objects of fixed assets in the  $n$  period (against the previous year).

Depreciation for the standard life time of an object  $\sum_{n=1}^T D_n$ , RUR, will equal to:

$$\sum_{n=1}^T D_n = \sum_{n=1}^T \frac{BV \cdot N_d}{100} \cdot \prod_{n=1}^T i_n = BV \cdot \prod_{n=1}^T i_n \quad (5)$$

Graphic interpretation of depreciation calculated by progressive method looks as follows (Figure 4).

The example shows the calculation of depreciation of the combine harvester with the initial cost of 2600 thous. RUR, standard life time of 10 years and annual actual price indexes for combine harvesters for a ten-year period [24].

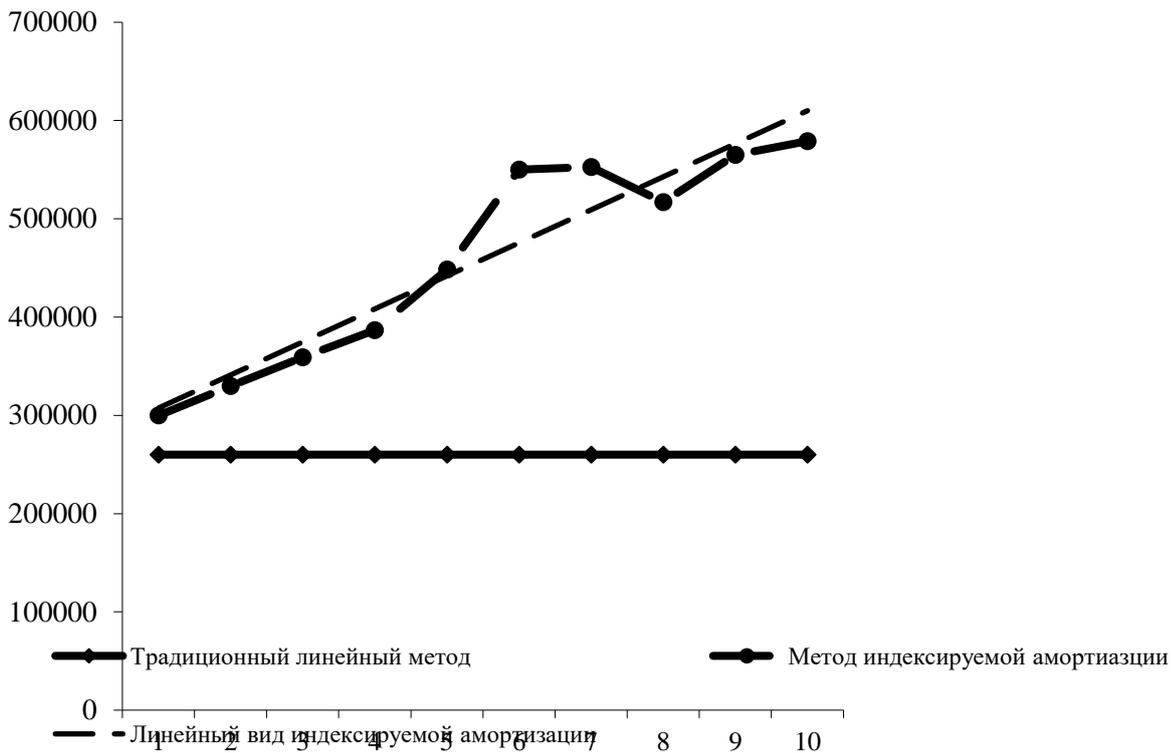


Figure 4 — Comparison of the annual depreciation amounts upon linear and indexed methods of charging of depreciation

In order to simplify the model, there can be accepted an annual uniform indexation value, on the level of an average actual value for the last 3...5 years for instance:

$$\sum_{n=1}^T D_n = BV \cdot \bar{i}^{-T}, \quad (6)$$

where  $\bar{i}$  — annual average inflation index for the period  $T$  (in form of coefficient).

When using this method, depreciation will be protected from inflation through the annual indexation thereof. The indexed method of charging of depreciation should be officially established on state level. The proposed method will refer to progressive

methods which are still absent in the Russian practice.

One of the apparent problems of progressive depreciation is the risk of production expenses growth and consequently decline in profits. Profit maximization as a behavior pattern of a company is long admitted to be one of the least rational in the long-term period in foreign science and practice. In the Russian economic way of thinking profit still comes to the fore when economic entities determine the targets. Designated use of profit and its role in the reproduction process consists in generating accumulation and consumption funds. The accumulation fund in its turn is a

source of investment into extended reproduction mostly in form of labor tools. The consumption fund is partially aimed at reproduction of living labor (in form of material incentive and social benefits to employees) and partially at capital consumption by the owners (in form of interest, dividends etc.).

Profit maximization is an efficient strategy only in case of rational behavior of the capital owners. However in practice the pursuance of profit growth often does not go along with adherence to principles of production development, public and social responsibility; short-term financial objectives come to the fore at the expense of strategic investment decisions. Maximization of added value called “Japanese model” is internationally recognized as the most efficient economic strategy of behavior. Sio K.K. states “When a company maximizing profit enters a direct competition with a company

maximizing added value, its chances are scarce” [25, p. 40]. The Japanese model is based on economic culture which is based on the understanding of importance of coordinated relations between the members of society: between employees, owners and managers, between state and business. The model of maximizing added value in our opinion is the priority one for the Russian agriculture, and achievable due to the preserved socio-economic way of thinking of farmhands and agrarian entrepreneurs.

Namely added value in its economic essence is a reproduction source. Having extended the model of added value by an external source in form a difference between funds paid and obtained from the state we will get a cumulative reproduction source that we will specify “*reproduction profit*” [26]. Graphical interpretation of the reproduction profit model looks as follows (Figure 5).

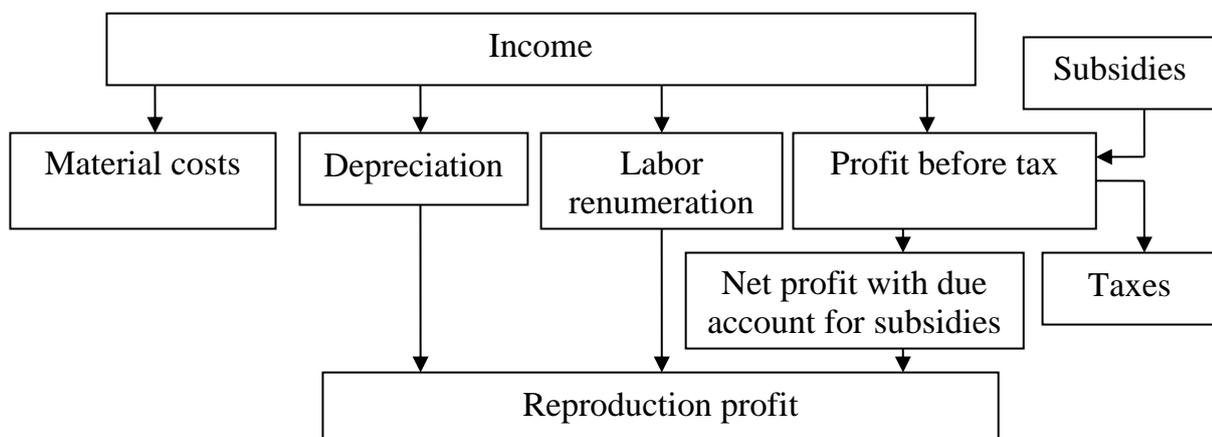


Figure 5 — Deterministic factor scheme of generating reproduction profit

Let us investigate the consequences of depreciation growth: change of the reproduction profit of enterprises, observance of interests of all economic entities: capital owners, workers, consumers of goods, state. Let us specify in the model an initial assumption that in highly competitive environment the producer does not set a goal and practically does not have a possibility to raise prices for final products. At permanent prices and amount of products (and profit as a consequence) and stability of other expenses (materials costs and labor remuneration), growth of depreciation will result in reduction of gross profits, but interests of consumers in form of price and amount of products are not violated. Let us represent the reproduction profit in form of deterministic factor model:

$$RI = D + LR + P - T = D + LR + (1 - R_{PT})P$$

(7)

where  $RI$  — reproduction income;

$D$  — depreciation;

$LR$  — labor remuneration with accruals;

$P$  — profit (with subsidies, before tax);

$T$  — profit tax,

$R_{PT}$  — profit tax rate (in form of coefficient).

Let us consider an example of changing the reproduction income upon depreciation indexation using actual data on the activity of agricultural organizations of Kostroma oblast in Russia (Table 1).

*Table 1 — Strategies for managing the reproduction income of agricultural organizations through depreciation policy*

Parameter	Actually (2017)	Upon depreciation growth by 8% (in accordance with inflation level)	Upon depreciation growth by 15 % (illustrative example)
Profit, mln. RUR.	8301.54	8301.54	8301.54
Cost of sales, mln. RUR.	7237.52	7287.44	7331.12
Depreciation, mln. RUR.	624.00	673.92	717.60
Labor remuneration with accruals, mln. RUR.	1397.05	1397.05	1397.05
Profit before tax with due account for outright subsidies, mln. RUR.	535.16	485.23	441.55
Including subsidies	306.73	306.73	306.73
Amount of profit taxes paid, mln. RUR.	47.59	43.15	39.26

Reproduction income, mln. RUR.	2508.62	2513.06	2516.94
Net state support (subsidies minus taxes paid), mln. RUR.	259.14	263.58	267.47

Price index for manufactured products purchased by agricultural commodity producers made 108% in 2017 against the level of the previous year [24]. The amount of taxes paid by agricultural organizations of Kostroma oblast makes 8.9% on average since the majority applies the unified agricultural tax, insufficient part of income is charged as per the profit tax rate (20%), some manufacturers apply a simplified taxation system or pay tax for imputed income. An example shows different options: depreciation growth by 8% and 15%. The value of net state support is determined as an amount of subsidies minus withdrawn taxes. As a result of depreciation growth by 50 mln. RUR (8%) the reproduction income gain made 4.5 mln. RUR, since decline in profits is not fully identical to depreciation gain, but declines by the amount of paid taxes. This amount respectively increases the amount of state net support. Upon depreciation growth by 15% the reproduction income growth will make 8.3 mln. RUR with growth of state net support by an equivalent amount.

#### 4. Conclusion

Thus, the amounts of depreciation indexation are an indirect tool for subsidizing the agricultural production by the state. The method of indexed depreciation is attractive from the point of view of an agricultural enterprise. In this regard the state can use an additional tool of economic regulation: to oblige the enterprises selecting this method to use depreciation funds in accordance with designation thereof. These requirements by no means violate the rights of an owner, since the decision on selecting the depreciation method is taken on one's own and voluntarily. There should be preserved a possibility of selecting a method of indexed depreciation according to a separate type, fixed asset group, observing only the generally accepted requirement that application of one of the methods of charging of depreciation for a group of homogeneous items shall be fulfilled during the whole period of their useful life.

Introducing the proposed depreciation method into practice allows resolving a number of tasks simultaneously: secure protection of the

depreciation reserve from inflation and fulfill the functions of simple and extended reproduction by depreciation. Indexed depreciation being one of the forms of state support can be introduced selectively for instance for agricultural commodity producers and small enterprises only. The presented method is a tool of state support that does not refer to the measures influencing directly the production enhancement and trade restriction, and does not have hindrances for usage as per the rules of the World Trade Organization.

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