Greater role of depreciation in innovative development of construction business production potential

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Abstract. The paper discusses current status of capital assets for construction, and proposes methods and ways to make depreciation more important in related reproduction investment processes.

1 Introduction

Further development of the non-financial sector of economy largely depends on considerable growth in production of investment resources that help to increase corporate capital, output capacity and types of production facilities. This is particularly true about civil construction businesses that work to create capital assets for virtually every sector of national economy.

However, in a country like Russia, considering its established structure and present situation with the fixed assets in the sector, what with their wear and tear and obsolescence, the current amount of investments (the share of which shrunk 2.3 times between 2000 and 2015 to the current 2.9% [1] of the national total), this is insufficient to enable an efficient structural policy of retrofitting and development of key production assets, and therefore to deal proactively with problems that confront the sector. As a result, the whole set of activities in the civil construction sector is now unable to even as little as reproduce the fixed assets.

Consequently, in the recent 15 years, the sector's bulldozer fleet dwindled 4.4 times; the figure is 1.8 times for excavators, 2.9 for rubber-tired cranes, 2.2 for truck-mounted cranes, etc. At the same time, the share of building machines with expired service life and exhausted resource has grown by factor of 1.5-2, and according to 2015 reports such equipment accounted for 46.4% of all bulldozers, 30.9% of excavators, 45.4% of rubber-tired cranes, 36.2% of truck-mounted cranes, etc. [2]. Meanwhile, the share of capital assets of the construction sector in the national total has shrunk by nearly a half to 1.2% [1]. As a result, both by its investment activity level and by the condition of capital assets, the civil construction sector remains among the least prosperous business directions. Yet the recent 5-7 years have seen a transition in the construction sector from loss of production potential and withering capital assets, to ever-accelerating asset purchase, commissioning and

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expansion helping to develop and improve the sector's plant and logistics, and to resolve its problems successfully.

2 Research Methodology

According to research, own corporate funds – depreciation and profits – are increasingly used by businesses as the main source of investments to reproduce the sector's capital assets. However, due to the time interval between when depreciation is charged and used, dramatically higher prices of construction equipment, and also because sizable part of depreciation is misused by businesses, depreciation charges really used to renovate their capital assets are enough (in fact, merely reproduce) by only up to 50%. As a result, depreciation charges fail to not only to expand but to merely reproduce the assets at this time.

Bearing this in mind, it is important to have an unbiased look at whether the effective system and the methods used to charge depreciation for capital asset reproduction are consistent with the sector's current requirements and growth, whether they can contribute to its production and engineering potential, asset expansion and reproduction; we also need to identify the methods and ways for its future evolution.

Economic literature offers four methods to charge depreciation for capital asset reproduction: the linear method, the diminished balance method, cost retirement method by total years of service life, cost retirement method proportionate to volume of product/work. Yet the long-standing practice of the construction sector remains to charge depreciation on production expenses on a regular basis throughout the entire service life of the asset. But this established system of depreciation does not work for build investment resources for more accelerated renewal and reimbursement of capital assets; and in some cases of early retirement of assets for various reasons it may even cause incomplete depreciation.

Should we examine international practices, most nations have the rule that the owners of production assets may adopt accelerated depreciation, particularly in respect of actively used assets such as machines, equipment, and motor vehicles, ensuring their reproduction and renewal by 80% up. The point and advantages of the accelerated depreciation method is that it anticipates wear and obsolescence of equipment, encourages fast return of investments to purchase it and creates financial conditions for timely replacement of equipment with advanced and more powerful solutions, in order to raise the product quality, cut costs and boost output capacity.

According to international experience and publications, accelerated depreciation is better adapted to the principles of market economy; it encourages improvement of the process of capital asset reproduction and replacement on an advanced and innovative basis. The method expands corporate investment ability in order to create new facilities, retrofit old ones, and replace exhausted assets. Efficiency of accelerated depreciation is also supported by positive experiences of Russian businesses in financial leasing [3].

So, as research demonstrates, it would be reasonable to lift the restrictions of mandatory depreciation scales and expand considerably the practice of accelerated depreciation; now it accounts for a meager 12% in the construction sector. This decision would help construction businesses make the process of capital asset reproduction more efficient, speed up turnover and retire many machines and equipment with expired service life – up to 30-50% of some equipment types by early 2016.

Internationally, many countries use both the progressive and regressive depreciation methods: charges are either cumulative or exhaustive. Research dating back from the Soviet Union also confirms that performance of construction machines does not change in proportion to their age. During the first 18 to 24 months of operation, a machine's performance keeps growing, although slightly, then reaches and stays for a while on a

plateau, and finally begins progressive descent. Certainly, performance and wear is not the same thing, but the two closely correlate in essence. This means that we should make transition from the regular to irregular depreciation method as actual performance of machines and equipment declines throughout their respective life cycles.

The above is also supported by our own research that established the output capacity of construction machines to remain virtually without change during the first 2 or 3 years of their service life, and declines at a cumulative rate as the machine ages. We therefore propose a new and more pertinent depreciation method based on the logistic curve, which describes evolution of multiple economic processes and more adequately represents the real wear and obsolescence of capital assets, and thus also understands that depreciation is calculated based on the following dependence:

$$Y = \frac{A}{1 + exp(a - bx)} \tag{1}$$

Where, Y – extent of wear; A – original cost of the equipment; x – time in operation (here assumed equal to rated service life of fixed assets based on their wear and obsolescence); a, b – exponential function parameters.

This dependence is widely used in the international business practice to analyze product life cycle, which is indeed relevant for the task at hand. This function's positive feature is that it emulates dynamics at the very onset of process development, that becomes first manifest gradually and then builds up like an avalanche (with positive speed and acceleration) to point x = a/b, whereupon growth rate stalls and the rate peters out.

As we established based on our previous research about certain construction machines (excavators E-652, bulldozers D-686, tower cranes KB-160, truck cranes 7.5 tons, rubber-tired cranes for 16 tons etc.), from available records after ten years of operation, relations between their performance and time in use was also described with curves that represented irregularly declining output capacity along with the machine's wear [4].

3 Results and Discussion

Analysis of the above dependencies demonstrated that during its first two or three years in operation the entire group of machines in question works without the slightest loss of performance, and then failures begin. The greatest performance loss in most construction machines typically begins after four or five years of operation.

An important condition for more efficient depreciation costs used to reproduce fixed assets, even as the related calculation systems and methods improve, is to maintain solvency, particularly in the environment of financial volatility and rampant inflation. To this end, we propose: 1. the depreciation funds should remain on a deposit account, accruing interest at least at the official Bank of Russia interest rate; 2. the business group should establish an associated depreciation foundation for production growth; the fund can be used as the business units agree, to purchase machines and equipment, retrofit and reconstruct their production facilities, etc. [5].

The role of depreciation as the main source for reproduction and renewal of fixed assets in the construction sector, for adoption of innovative technologies and advanced equipment is also undermined by the fact that only some 45-50% of depreciation funds is used directly for reimbursement and accumulation (as they should), while the other half of actually accrued depreciation funds is misused by construction businesses (as working capital, remuneration, access road building, other purposes). This means that the funds are used to finance activities unrelated to reproduction of assets [6]. This must not be tolerated, particularly in the current environment what with investment shortages and exhausted fixed

assets; this certainly calls for a federal government level decision to enforce target use of such funds.

The way we see it, the situation was created in 1997 when the Federal Government by its Decree 1672 refused to enforce target use of depreciation funds, and businesses were no longer responsible for reasonable use of such accounts. The decision had been supported by a number of academics who insisted that we had to reject government control and enforcement of depreciation rules. However practice has now proved that the decision aborted all economic sense from depreciation charges as the target source for reproduction and renewal of fixed assets in production. This is why a federal-level rule on target use of depreciation funds would become a major investment trigger not only for reproduction of capital assets, but also for the construction sector's production potential as a whole.

4 Conclusion

Thus, in the light of the current situation with capital assets as described above and the need to engage depreciation funds in reproduction, reimbursement and accumulation, we believe the following would be expedient:

1. Changing the effective system of straight-line depreciation, largely leaving such practices only for a group of specific objects;
2. Expanding the practice of accelerated depreciation considerably;
3. Adopting the preferable method of logistic-curve depreciation that adequately represents real wear and obsolescence of capital assets, and evaluates depreciation better (at least as a pilot project, to begin with);
4. Preserving depreciation funds against inflation;
5. By federal government's act, ban on misuse of depreciation funds.

References

1. *Russian statistical Yearbook* (Rosstat, Moscow, 2015)
2. Russia in figures (Rosstat, Moscow, 2015)
3. M.I. Leshchenko, *The basics of leasing* (Finance and statistics, Moscow, 2004)
4. E.P. Pankratov, O. Pankratov, *Fixed assets construction: the reproduction and update* (Economics, Moscow, 2014)
6. E.P. Pankratov, O.E. Pankratov, Construction Economics **3**, 53 (2015)
7. O.E. Pankratov, Construction: Economics and management **2**, 64 (2015)
8. I.I. Veretennikova, *Depreciation and amortization policy* (Finance and statistics, Moscow, 2004)
9. O.S. Kovalevskaya, T.A. Morgunova, Vestnik of NTU **2**, 45 (2007)
10. G.M. Mamekov, *The state and prospects of renewal of basic production assets in the agricultural and construction* (By Gil, 2010)
11. E.P. Pankratov, Construction Economics **3**, 74 (2015)