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Review Article

Cyclical Ecological Economy with Reinvesting of Savings

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Abstract

The financial turnover of the cyclical ecological economy has investment and accumulative periods. Cyclical economy's financial turnover has investment and accumulation periods. During the investment period, innovative ecological modernization of the economy is carried out by effective competent management, innovative science, creative education, qualified specialists and the high-tech industry. Ecological modernization of the economy gradually increases the solvent demand of the population and contributes to the emergence of new goods and services. The economy is smoothly moving into the accumulative period. Mass robotic production and sale of new goods and services begins. There is accumulation of the capital. Over time, the population is saturated with new goods, and the purchasing demand of the population is gradually decreasing. The economy is smoothly cyclically moving into the investment period of innovative ecological modernization of the economy. The financial turnover of the cyclical economy through reinvestment of its savings increases the rate of ecological modernization of production.

Keywords: Cyclical ecological economy; Competent management; Investment period; Environmental technologies; Environmental education; Accumulative period.

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Introduction

For the first time on the cyclical economy spoke in 1970. The authorship of the approach and the titles are attributed to economists John Lyle and Walter Steiner. The idea of a transition to a new economic paradigm was developed in the materials of the Swedish non-profit organization The Natural Step, which promotes the ideas of sustainable development and in the European Commission [1]. Cyclical economics - closed-loop economics - represents an alternative to classical linear economics based on the principle of "production - use - disposal." The challenge of a cyclical economy is to use renewable resources as widely as possible and ideally to switch to waste-free production. Repeated use of the same material as raw materials will help to minimize economic damage to the environment, analysts of the Organization for Economic Cooperation and Development (OECD)-a "club" of 36 most developed countries of the world believe. In their study "Business Models of the Cyclical Economy," they looked at the major challenges and opportunities of the cyclical economy and how governments can contribute to its implementation.

The closed-loop economy, also called cyclic or circular, is based on the principle of resource reuse - the producer must understand at the stage of commodity design how it will be recycled. A product that is created within a cyclical economy should serve a long time, and the consumer should be able not to purchase, but to rent. Cyclical business models change the direction of products and materials throughout the economy, which helps to reduce the negative impact of mining, use and disposal of these materials for nature. It is not only about improving a specific production cycle or factory, but in general about changing the production and consumption process. For example, it is not easy to manage natural resources more effectively, not to use them at all. Five main directions of such business models can be distinguished.

A. The model of cyclic supply-replacement of traditional (primary) sources of raw materials with renewable or biological materials, secondary.

B. Recycling model-recycling waste and subsequent use.

C. The model of life extension-slows down the turnover of products in the economy, thus reducing the rate of generation of new wastes.

D. The shering model is the sharing of a single product by different consumers, which reduces the demand for new products.

E. Service models are built around the provision of services rather than the sale of products, stimulating the development of environmentally friendly products and responsible consumption.

Many companies combine a business model. For example, an enterprise can produce certain products, process them and at the same time provide some services within the green economy. Also, business models do not exist in isolation - if one company chooses a specific direction for itself, its partners can choose a related business model. By closing the resource chain and slowing the movement of products within the economy, cyclic business models reduce the negative effect of economic activities on the environment. For example, recycling, rather than non-renewable resources, can reduce greenhouse gas emissions by up to 90%, depending on the industry. Restoring fully used products will reduce waste generation by up to 80%. The use of some models is growing at a faster rate than the market and this is largely due to the development of technologies. In order to expand the market share of proven cyclical models, integrated solutions at the government level will be needed. Ultimately, the transition to a visibly more resource-efficient economy, in which the environmental damage associated with production and consumption is markedly lower than the current one, will require deep penetration of these cyclical business models. Government policies can play an important role in overcoming obstacles to the competitiveness of these models. For example, ensure that environmental costs of production and consumption are fully reflected.

Cyclical economy implies sustainable system of financial cyclical turnover from investment to accumulation, based on numbers. From socio-economic point of view, this means achieving the goal is based on parameters that require dynamic quantification: price, tariff, profitability, costs, liabilities, assets, returns, losses, dividend, rents, stock index, book value, wages, costs, and others. Dynamic quantitative assessment of socio-economic parameters will ensure the necessary measure, number and weight, as well as the sustainability of the system of financial cyclical turns from investment to accumulation. As it is written: "You have placed everything by measure, number and weight" in Solomon's Book of Wisdom (11:21). And how could there be anything if God You did not praise? Or how would what be not intended by God for Toboy survive? (11:26). The article deals with the financial cyclical turnover, from investment to accumulation, with ecological technological modernization, from automation of individual technological operations to complete robotics of production using artificial intelligence, providing power and resource technological cycles

Investment Period of Cyclical Ecological Economy

Investment in the economy refers to the direct acquisition of real capital, which can be expressed in some form or another. Again, investments will be used for substantial expansion, formation and reconstruction. In modern times, all processes in the economy that are connected with investment activities are very important. It is thanks to these processes that all macroeconomic indicators can demonstrate positive growth dynamics. Russia (the Russian economy), like any other country, needs capital investment. It is desirable that investments be made in industries that are currently in the process of modernization. For example, the high-tech industry, health care, agriculture, education and others. The investment sector is the most powerful tool for the whole economy, as investments allow companies to be technologically rebuilt, to recruit qualified personnel, to raise wages.

Since the main purpose of almost any investor is to make maximum profit, the state is obliged to do everything so that its conditions can satisfy depositors. In order to create a good investment climate, many countries give state support to such investors. Support may be, for example, that demand for products where funds have been invested or pleasant tax conditions for doing business have been created, etc. Investments can increase the technological and production capabilities of the economy. For example, investment in intellectual property or education can increase productivity. Investments in modern technologies can affect the growth of the productive potential of the economy. New inflows of investment, both domestic and foreign, affect the country's GDP growth. Investment is a major factor in the formation of gross domestic product, which reflects the country 's combined economic output. American economist Gregory Mankew cited investment and economic growth rates in Japan and South Korea, which had high cash injections that produced very high economic growth rates. Investment is directly related to the growth of economic and ecological indicators [2].

Investment takes the lead when it comes to ecological modernizing and developing the economy, both at the macro and micro levels. If the potential for investment is misused, the ecology of modernization of the economy and the production of new products can be negatively affected. At the macro level, investments help to expand the reproduction process, accelerate scientific and technological progress, improve the quality of products in different sectors of the economy, monitor the effectiveness of social development, and preservation of ecology. At the micro-level, investments help to monitor the activities of different enterprises, organizations that carry out completely diverse activities. Control means tracking the quality of products and services, maximizing profits, reducing costs and preservation of ecology. Investments at this level take an important place when it comes to increasing equity. After all, it is competent investments in assets of other companies and securities that help to increase profits and accumulate capital for environmental automation and robotic production using artificial intelligence.

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Robotics and Automation of Production Using Artificial Intelligence

Modern factories and enterprises have advanced far at the expense of modern technologies. Automated industrial robots are used for welding, laying, painting and other operations requiring repeated and high accuracy. Robots for high-tech work are emerging, which is on the teeth of artificial intelligence. In most cases, robots are not replacement assistants. Man is trying to create, for his robots, artificial intelligence. With artificial intelligence, robots will be able to independently assess what is happening around them and make decisions on the actions they need to take.

The development of artificial intelligence and machine learning technologies and their application in robotics allows to create useful and smart robots. Statistical methods and machine learning, including artificial neural networks of deep learning, have had a huge impact on modern robotics. Current robotics practice shows that the best results in increasing productivity can be achieved from the maximum efficiency of the bundle of robot teams and people working together to achieve a common goal. Increasing social interaction between humans and robots in everyday and working life is the subject of numerous studies of many billion-dollar industries, with the aim of increasing the degree of autonomy of robots. Industry 4.0 is focused on digital process twins. Automated production using digital twins is built on a whole set of technologies. Experts identify three types of twins: Digital Twin Prototype (DTP), Digital Twin Instance (DTI) and Aggregated Twins (DTA).

Digital twin prototype

(DTP) is a virtual analogue of a reality physical object. It includes data to comprehensively characterize the model, including information on how to create it in real-world settings. Enter the list:

A. Production requirements,

B. 3D model of the object

C. Description of materials and their specifics,

D. Performed technological plans and/or services,

E. Disposal requirements.

A DTP twin characterizes a physical object of which it is a prototype and contains the information necessary to describe and create a physical version of the object. This information includes manufacturing requirements, annotated 3D model, material specification, processes, services, and disposal.

Digital twin instance

(DTI) is a description of a physical object. In most cases, they contain:

A. Annotated 3D model that includes general dimensions and tolerances.

B. Material data based on past and present time and components,

C. Information about the running processes in all timelines, including those performed when creating the object,

D. Results of all test operations,

E. Records of performed repairs (planned, unscheduled, preventive), maintenance, replaced parts and components,

F. Operational data received from sensors,

G. Monitoring parameters (early, current and expected).

DTI twins describe a particular physical object with which the twin remains associated throughout its lifetime. Twins of this type typically contain an annotated 3D model with common dimensions and tolerances, A material BOM that lists current and past components A specification for processes listing the operations that were performed when this physical object was created, As well as the results of any on-site tests, service records, Including replacement of components, operational indicators, results of tests and measurements from sensors, current and predicted values of monitoring parameters.

Digital twin aggregate

(DTA) is a standard computing system that combines all digital twins and their actual prototypes, allowing data to be collected and exchanged. DTA twins are defined as a computing system that has access to all digital twin instances and can send them requests in random or active polling mode. The digital twin allows to reproduce all other indicators of the object by minimum key parameters. With this technology it is possible to solve various classes of tasks of diagnostics of object state, forecasting, optimization of operation, management. The digital model also contains a history of product maintenance and operation. Taken together, all of this data makes it possible to predict the behavior of a real object. In addition, it is possible to monitor and test an entire fleet of facilities and carry out analysis based on aggregated data. It is important to note that digital twins also involve machine learning technologies, Because they are essentially self-learning systems that use information from a range of sources, Including data from sensors monitoring various performance indicators of the physical object, Information from expert experts and other similar machines or car parks, And larger systems, of which the observed physical object may be a part.

Digital twins can also be created for an entire enterprise along with all its business processes. Automation methods allow you to digitize the production process and present it as a digital twin, which serves to see a situation in development, predict its end result and try to model the optimal path of development. Digital twins have become a really strong catalyst for the development of modern companies. Digital twins together with robots [3-14] significantly simplify technical support of the production process, save resources, minimize risks of errors and failures, which prolongs the period of stable operation of the company. All this allows get the maximum possible return on investments, increase competitiveness and profit, provide energy and resource production cycles and keep ecology.

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Accumulative Period of Cyclical Ecological Economy

In cyclical economy, the decision on the size and rate of accumulation is taken and implemented at the enterprise level to facilitate reinvestment of savings in enterprises. Accumulation is a process aimed at expanding the material conditions of environmental modernization in the current period and thereby increasing the opportunity for future population consumption growth. The source of accumulation is the profits of enterprises, the personal savings of workers and the funds of the State. Accumulation is a function of the owner of production. The main function of savings is to promote ecological modernization of production, meet the increasing needs of the population and reinvest savings.

The increase in accumulation is due to technical prerequisites - the possibility of mastering the world achievements of scientific and technological progress, the level of development and the structure of the national economy. Optimal accumulation is defined as the ratio between accumulation and consumption, which ensures a continuous increase in the absolute size of the accumulation fund and the consumption fund. Optimal accumulation - value variable, depends on the produced product for consumption. The higher the efficiency factor of accumulation, the greater the opportunities for growth of real incomes and consumption of the population of the country. Increasing production is the basis for meeting the growing needs of people. In order to increase the size of production, it is necessary to use part of the produced product for accumulation. Thus, the objective necessity of accumulation is due to the needs of extended reproduction of macroeconomics, in the form of capital accumulation.

At the macro and microeconomic levels, the following additional sources of accumulation are emerging in the cyclical economy:

A. Part of amortization charges accumulated in monetary form. For the needs of accumulation, free depreciation charges can be used, which will not soon be required to restore the old fixed assets of production. Additional new equipment, raw materials can be purchased for free depreciation contributions, i.e. accumulation process will be implemented.

B. Part of the required product. It is involved in savings through taxation of employees, tax contributions, sale of shares to employees of corporations and firms.

C. Public Savings Fund. The concentration and prices of capital and production have led to a powerful and extensive system for the ecological modernization of production and the public accumulation fund.

The amount of accumulation depends on many economic factors. Treat them:

A. Labor productivity and intensity, speed of capital turnover and renewal.

B. Scientific and technical progress. Replacing waste capital with new, technically and technologically new capital means that real factors of simple production are reimbursed at less cost than was necessary for their previous production. And this is already an expansion of production, or accumulation. Science and technology impart to a functioning capital a mode of expansion independent of its present value.

In practical implementation, the accumulation process takes certain forms. They are distinguished by characteristics: production and non-production, nominal and real, centralized and decentralized, extensive and intensive accumulation. Productive accumulation, or accumulation itself, includes an increase in fixed and working capital and is a source of increased production of material goods. Non-productive accumulation includes accumulation of consumer property at the population, insurance zapaks and reserves guaranteeing uninterrupted operation of a vosproizkvodstvo in macroeconomic. Nominal accumulation is a cash fund for copying, a monetary amount intended by a firm or a state to expand production. The accumulation money fund is further transformed into material elements necessary for increasing production - machines, equipment, tractors, seeds, fertilizers, that is, real accumulation. Nominal accumulation could become real only if the necessary material elements for increasing production had already been produced. Add-on value can only therefore be converted into additional capital, that the add-on product, worth more than that, already contains the real components of the new capital.

Real accumulation is a real increase in physical-in-kind form of means of production and objects of consumption. Real accumulation is determined by the following factors:

A. Size of nominal accumulation. Under other conditions, there is a direct proportional relationship between them,

B. The level of prices for the means of production. With the increase in capital asset prices, the monetary amount allocated for accumulation will be realized in a smaller amount of tangible assets,

C. Qualitative composition and assortment of means of production. In the context of the scientific and technological revolution, the available means of production must embody the latest advances in technology and technology. As a result, there will be continuous progress in industrial production,

The centralized form of economy in the market economy is constantly decreasing. Decentralized savings of firms are now becoming increasingly important. To that end, they were establishing a special savings fund from their profits, which was the most important source of decentralized capital investment; Extensive accumulation is an expansion of production on an old technical basis. In the case of extensive accumulation, additional means of production, labour resources and natural wealth are involved in the production process. Currently, the possibilities of extensive accumulation are limited.

Intensive accumulation is the expansion of production on the basis of more efficient use of available means of production and labour, mastering the achievements of scientific and technological

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progress and increasing productivity. Under the conditions of market relations, the intensive nature of accumulation becomes natural, which ensures the maximum possible growth of efficiency of the market economy. The most important task of macroeconomic development is to increase the efficiency of accumulation. The higher the efficiency of the accumulation process, the greater the real opportunities for growth of income and consumption of the population. In increasing the efficiency of accumulation, improving the efficiency of capital investments is of particular importance.

The efficiency of accumulation should be improved in the following areas:

A. At the expense of productivity growth. It increases the mass of consumption costs represented in the total public product, gross domestic product, national income, additional product (total income). This increases the volume of real savings with the constant monetary value of the accumulation fund, that is, the efficiency of accumulation increases.

B. By improving the quality of production facilities, improving their use. Scientific and technological progress increases the real accumulation per unit of value of up to full capital assets, and at the same time the efficiency of this process.

C. By improving the structure of the accumulation fund. First of all, the efficiency of accumulation is influenced by the change in its sectoral structure. Variation of the distribution of the accumulation fund between industries, agriculture and transport has a significant impact on the efficiency of accumulation. This is due to the fact that the efficiency of accumulation varies from industry to industry. Therefore, cross-sectoral redistribution of the accumulation fund alters its effectiveness. The improvement of the intra-industry structure of the accumulation fund is also important. Here, first of all, it is necessary to provide what part of the industry fund of accumulation goes to the construction of new firms, and which - to the construction and reconstruction of old enterprises. This section significantly affects the overall industry level of savings efficiency.

In economic practice, there is a whole system of measures that contributes to improving the efficiency of savings. It includes: improvement of design, reduction of time for ecological modernization of production; Coordination of the accumulation fund (capital investments) in technologically priority areas of development; Improvement of the quality of environmental modernization of production; Faster commissioning of objects of ecological modernization of production and reduction of their development time.

Reinvestment of Savings

Savings for reinvestment (RS) are the profits left at the disposal of the enterprise (retained earnings, as well as funds and reserves created by profit):

RS = NP - D,

where, NP - net profit, D - dividends.

The formula for calculating the money reinvestment ratio is:

KR = (IFA+ IWC)/(NP + BR - NCS - D) * 100%,

where KR - money reinvestment ratio,%;

IFA - increase of fixed assets; IWC - increase of working capital;

NP - net profit; BR - non-cash expenses; NCS - non-cash sales; D – dividends.

The cash flow reinvestment ratio shows that cash flows can cover the need to update the fixed and working capital used in the company ‘s current operations. The money reinvestment ratio is useful when it is necessary to determine the amount of cash flows that a company regularly invests in environmental renewal of production.

Conclusion

In rapidly changing world, the environmental characteristics of production become one of the main conditions for the success of the enterprise. Today the development of enterprises is impossible without ecological modernization of production, transition to the best available technologies. It is a global trend. The accumulated landfills should be a source of resources and energy for the industrial industry. Special attention should be paid to the creation of environmental technologies for the processing of garbage and waste. The transition to environmental technologies for the processing of garbage and waste, to environmental production and to a cyclical economy with reinvestment of savings should be the main task of all States. These activities will preserve the environment, ensure the cleanliness of air, water and food and get rid of waste and garbage [15]. A cyclical economy with savings reinvestment is a driver of clean cities and agglomerations.

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