

PRINCIPLES OF CIRCULAR ECONOMY
IN THE PROFESSIONAL MANAGEMENT OF CONSTRUCTION PROJECTS

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The article discusses the main definitions of the Circular Economy, given by foreign and domestic authors in the framework of the world economy. Aspects of definitions of the Circular Economy in construction, features of industry differences are considered. The main problems of the widespread dissemination of the principles of a circular economy in construction are identified. Three main directions of practical application of the principles of circular economy in construction are highlighted - the processing of building materials, the economic efficiency of reuse and the principles of energy efficiency in the design, construction and operation of buildings and structures.

Keywords: Circular Economy, Construction, Management, Sustainable Development Goals.

ПРИНЦИПЫ ЦИРКУЛЯРНОЙ ЭКОНОМИКИ
В ПРОФЕССИОНАЛЬНОМ УПРАВЛЕНИИ СТРОИТЕЛЬНЫМИ ПРОЕКТАМИ

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В статье рассмотрены основные определения Циркулярной экономики, приведенные зарубежными и отечественными авторами в рамках мировой экономики. Рассмотрены аспекты определений Циркулярной экономики в строительстве, особенности отраслевых отличий. Выявлены основные проблемы по повсеместному распространению принципов циркулярной экономики в строительстве. Выделены три основные направления практического применения принципов циркулярной экономики в строительстве - переработка строительных материалов, экономическая эффективность повторного использования и принципы энергоэффективности дизайна, строительства и эксплуатации зданий и сооружений.

Ключевые слова: Циркулярная экономика, строительство, менеджмент, цели устойчивого развития.

INTRODUCTION

The construction sector has been the world's largest consumer of raw materials since years. Construction and building activities together account for 36% of global energy use and 39% of energy-related carbon dioxide (World Green Building Council, 2017). Construction and demolition waste are one of the most voluminous waste streams generated in Europe. It accounts for almost 30% of all waste generated in the European Union (European Commission, 2018). Although buildings are more and

more constructed with sustainable features and components, improvements are still not keeping up with the growing built environment and rising demand for energy services [1].

Proposing measures to address obstacles on Earth in terms of improving waste management and considering the diversity of positions in Member States, it is clear that the ring economy in the construction sector does not end in waste management, including the full "life cycle" of the process constructive. For this reason, already when we have on the table a building project, whether it is a bridge, a path or a building, we have already actually signed or planning space taking into account current circumstances situation. And what can be used in future scenarios so that the maximum duration of the project must be included [2]. We will do the same when the designer make the building design. It will improve the use of construction and planning products to reduce the production of construction and demolitions, water, electricity and heating consumption, the use of elements must be provided when standard construction is appropriate. Potential dismantling, and use products after use can be reused, recycled and at the social level, must be taken into account that the use of buildings requires. This durability leads to the economy, energy saving and resources during the usage phase, it must be possible to modify or adapt construction with it. The needs of users are ideally, the building that has been built for a particular use (such as a hospital) is able to adapt to another use (such as office or school) if neighborhood conditions require that, in the end to proceed with the downloadation of this new form. It requires a change Social and legislation in vision of private business to be products (buildings and construction in general) are strong over time, maintaining their benefits and level [3].

RESULTS AND ITS DISCUSSION

There are numerous definitions of the Circular Economy that vary from region to region, author to author. In China Circular Economy is promoted as a top-down national political objective. Although in other areas and countries as USA, European Union and Japan and it is used as a tool to design bottom-up environmental and waste management policies. The ultimate goal of promoting Circular Economy is the devision of environmental pressure from economic growth.

There is a comprehensive definition: «Circular Economy is an economic system that targets zero waste and pollution throughout materials lifecycles, from environment extraction to industrial transformation, and to final consumers, applying to all involved ecosystems. Upon its lifetime end, materials return to either an industrial process or, in case of a treated organic residual, safely back to the environment as in a natural regenerating cycle. It operates creating value at the macro, meso and micro levels and exploits to the fullest the sustainability nested concept. Used energy sources are clean and renewable. Resources use and consumption are efficient. Government agencies and responsible consumers play an active role ensuring correct system long-term operation» [4].

More generally, circular development is «a model of economic, social and environmental production and consumption that aims to build a sustainable society that is no longer linear» [5] but based on the principle of a Circular Economy and more autonomous, sustainable and in tune with the issue of environmental resources.

«The Circular Economy is a framework of three principles, driven by design: eliminate waste and pollution, keep products and materials in use and regenerate natural systems. It is based increasingly on renewable energy and materials, and it is accelerated by digital innovation. It is a resilient, distributed, diverse, and inclusive economic model» [6].

Thus, Circular economy as another economic concept often associated with sustainable development, the achievement of the Sustainable Development Goals and a Green Economy, but which goes beyond the latter. Indeed, instead of thinking only about reducing the environmental and environmental impact of industry and the amount of waste, it aims to transform our economy into a regenerative one. Indeed, the goal is to make the economy as closed as possible, thinking of new processes and solutions to optimize resources, eliminating dependence on limited resources.

As mentioned above (Harvey, 2014; Piketty, 2014) is «the sustainable development suite, which seeks to maintain continuous economic growth, and for this it is necessary to maintain and increase

production and consumption» [7] (the variables are part of the GDP calculation), and thus the flows of matter and energy. As for Elaine MacArthur definition is «the transition from a linear model to a circular model, which is based on the maximum possible reuse of all objects, repairing them when they have any damage and, as a last resort, recycling them» [8].

The transition to a Circular Economy will require systemic changes in specific sectors. Systemic changes in the construction sector will relate to the industrial production of building elements, smart urban planning, shared use of residential and office space and the construction of energy-efficient.

The construction sector is one of the world's largest waste generators. The ring economy shows a useful solution to reduce the environmental impact of industry and construction is very important for the economy of every country. It provides 18 000 000 direct jobs and contributes about 9% of the EU GDP and the main causes of environmental impact are found in the consumption of non-renewable resources and generate pollutant residues, both of which are growing at an accelerated pace and decide on the cycle economy can be made at operational levels (A certain process of production) and tactical (associated with entire processes) and strategy (associated with the entire organization). It may be concerned with both construction companies as well as construction projects (where construction is one of the stakeholders) and can dismantle outstanding buildings, and then establish new building elements that can be used to create new buildings and free space for new development and normative construction systems are useful for creating new buildings. In the future, enjoy the allowance to dismantle and reuse ingredients easily (expired buildings) [9].

Another concept that supports the circular economy in construction is "cradle to cradle," was coined by Swiss architect Walter R. Stahel in the 1970s. Refers to the need to use materials that are durable over time that do not end up being discarded when their use is over, but can be completely reused for something new once the function for which they were designed is no longer needed. According to McDonough circular economy is full life cycle of the process constructive, that's why we consider that it really starts when we have at table a construction project whether it is a bridge, a road or a building and we have already at that stage forecasting or planning space taking into account current conditions. Michael Braungart is working to improve the use of construction products and planning in such a way as to reduce the production of construction and demolition waste, and water consumption, the use of elements must be provided when modular construction is appropriate. In industrial construction there is a potential disassembly, and use of products after use can be reused or recycled.

«The building industry is responsible for considerable environmental impacts due to its consumption of resources and energy, and the production of wastes» [10]. Considering the aspect of Circular Economy in Construction we suggest a next scheme (Figure).

The development of this direction prospects are due to the following:

- Firstly, a feature of construction waste, which can be recycled repeatedly, so when processing concrete, secondary crushed stone is obtained, and from waste containing bitumen they make: mastic, powder and bitumen-mineral mass, which are used in the manufacture of roofing materials and road works; reinforcement is reused in construction, and asphalt after heat treatment is reused for road works

- Secondly, economic efficiency, since recycling technological cycle is shorter than manufacturing, less money and time is spent on waste processing than on a full production, starting with the process of extracting natural materials. Thus, the introduction of the principles and business models of the circular economy into the activities of construction organizations will not only reduce environmental damage, but also reduce the cost of construction and other materials.

- Thirdly this is usage of Eco-neutral technologies and Energy Efficient includes Energy Efficient project's design [11], eco building materials, low energy consumption, green energy production and lean operation.

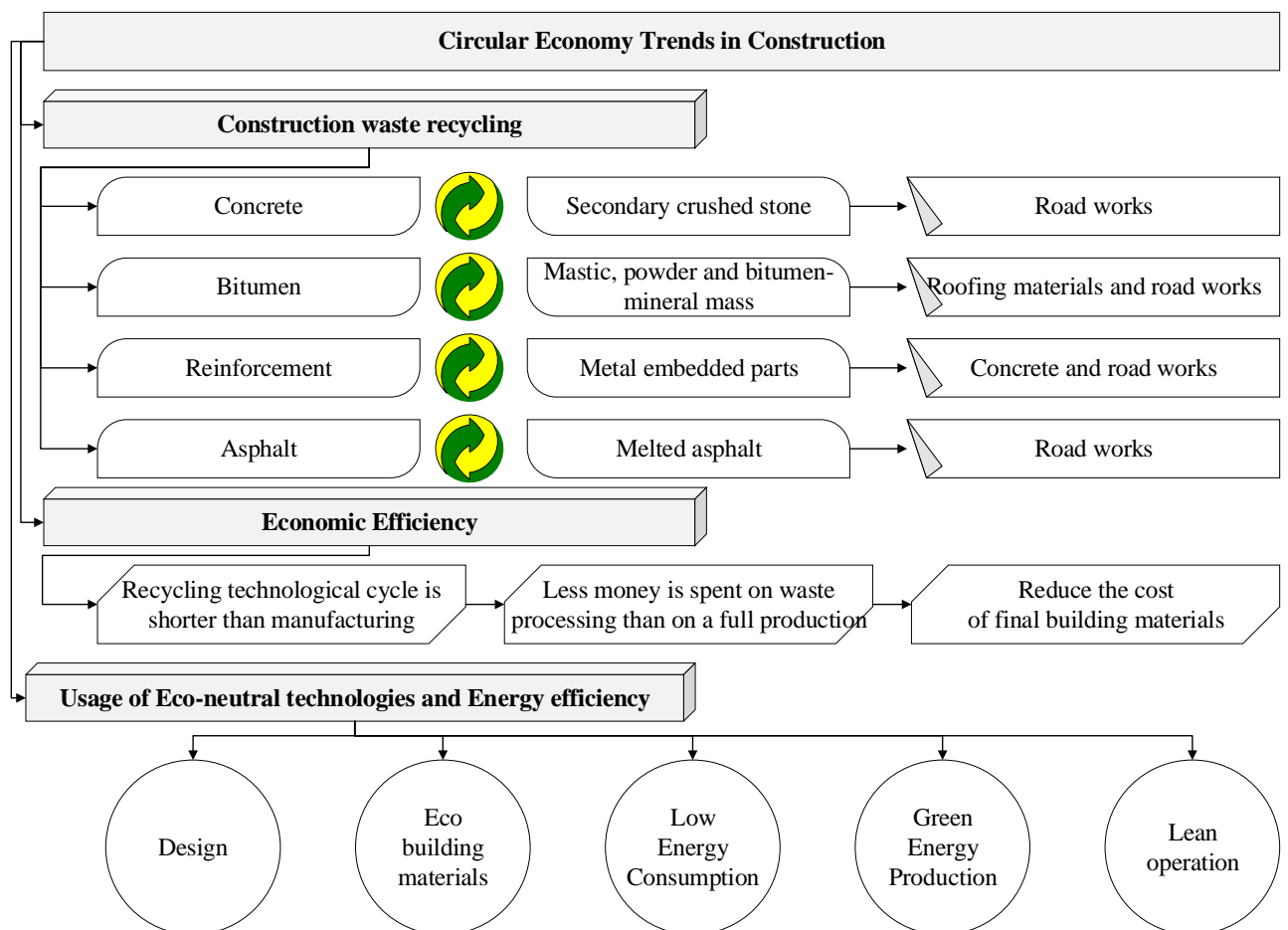


Figure – Circular Economy Trends in Construction
Source: The author's own development\

CONCLUSIONS

Article discusses analysis of challenges and obstacles to implementation the Circular Economy in the built environment. Challenges are related to the change in the organization construction process. The most important barriers identified are lack of knowledge and awareness of generalization of building processes, fragmented supply chain and lack of incentives at the start. As it was mentioned Circular development is defined as a model of environmental, social and economic production and consumption that aims to build a sustainable society. It is based on a Circular Economy model and aims to develop recyclable and sustainable resources in order to protect society from waste. The goal is to enable economies and societies in general to become more independent, sustainable and in tune with the issue of environmental resources.

In order to achieve the above-mentioned tasks, the authors identified three directions of development of the construction industry in the field of circular economy - the processing of building materials, increasing the economic efficiency of construction production and the introduction of energy efficiency principles in the design, construction and subsequent operation of buildings and structures.

It should be noted that the current period of the circular economy in construction needs transformation. A circular economy should be built, first of all, and developed on the implementation of practical aspects at all levels of aggregation, while at each level there should be its own short-term and long-term goals and objectives.

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