

Circular economy and energy

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ABSTRACT

The circular economy is the opposite of the concept guided by the principle of "take, produce, spend and throw away". The circular economy model implies a change in the paradigm of resource management in an efficient and smart way. Such a concept is based on eco-innovations, eco-design, advanced technologies, energy efficiency and the use of renewable energy sources. The production method used in the linear economy is unsustainable and creates large amounts of waste, the disposal of which is based on the mistaken belief that resources are inexhaustible, as well as that the space for waste disposal is unlimited. It is a new economic model that ensures the sustainable management of resources, the extension of the life of products with the aim of reducing waste, and the increased use of renewable energy sources. In contrast to the linear economy, this is a business concept in which resource and energy flows are maintained in a closed-loop model, where products are tried to circulate as long as possible in a circular cycle. The emphasis is on the production and design of products that can be easily disassembled into parts, do not contain hazardous substances, and will have a long life and be easily repaired.

Keywords: circular economy, aims, concept, optimization, finance.

RESUMEN

La economía circular es lo opuesto al concepto guiado por el principio de "tomar, producir, gastar y tirar". El modelo de economía circular implica un cambio en el paradigma de la gestión de recursos de una manera eficiente e inteligente. Este concepto se basa en las ecoinnovaciones, el diseño ecológico, las tecnologías avanzadas, la eficiencia energética y el uso de fuentes de energía renovables. El método de producción utilizado en la economía lineal es insostenible y crea grandes cantidades de residuos, cuya eliminación se basa en la creencia errónea de que los recursos son inagotables, así como de que el espacio para la eliminación de residuos es ilimitado. Se trata de un nuevo modelo económico que garantiza la gestión sostenible de los recursos, la ampliación de la vida útil de los productos con el objetivo de reducir los residuos y el mayor uso de fuentes de energía renovables. A diferencia de la economía lineal, se trata de un concepto de negocio en el que los flujos de recursos y energía se mantienen en un modelo de circuito cerrado, donde los productos se intentan circular el mayor tiempo posible en un ciclo circular. Se hace hincapié en la producción y el diseño de productos que puedan desmontarse

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fácilmente en piezas, que no contengan sustancias peligrosas y que tengan una larga vida útil y puedan repararse fácilmente.

Palabras clave: economía circular, objetivos, concepto, optimización, finanzas.

RESUMO

A economia circular é o oposto do conceito guiado pelo princípio de "pegar, produzir, gastar e jogar fora". O modelo da economia circular implica uma mudança de paradigma da gestão dos recursos de forma eficiente e inteligente. Este conceito baseia-se em inovações ecológicas, concepção ecológica, tecnologias avançadas, eficiência energética e utilização de fontes de energia renováveis. O método de produção utilizado na economia linear é insustentável e gera grandes quantidades de resíduos, cuja eliminação se baseia na crença errônea de que os recursos são inesgotáveis, bem como de que o espaço para a eliminação de resíduos é ilimitado. Trata-se de um novo modelo econômico que assegura a gestão sustentável dos recursos, o prolongamento da vida útil dos produtos com o objetivo de reduzir os resíduos e o aumento da utilização de fontes de energia renováveis. Em contraste com a economia linear, este é um conceito de negócio em que os fluxos de recursos e energia são mantidos em um modelo de ciclo fechado, onde os produtos são tentados a circular o máximo possível em um ciclo circular. A ênfase está na produção e design de produtos que podem ser facilmente desmontados em peças, não contêm substâncias perigosas, e terão uma longa vida útil e serão facilmente reparados.

Palavras-chave: economia circular, objetivos, conceito, otimização, finanças.

1 INTRODUCTION

The concept of circular economy emphasizes the 6R practices, namely, reuse, recycle, redesign, remanufacture, reduce, and recover [1]. The usage of circular economy will empower the re-entry of the recovered things into the supply chain or the environments, subsequently reducing the utilization of new assets and minimizing last waste era. The exertion, at the mechanical and locale level, for illustration, can be encouraged through the mechanical advantageous interaction, which the trade of warm, water, and/or any appropriate materials is empowered between the partners. From the method frameworks designing point of view, the utilize of handle optimization and handle integration instruments and/or techniques is valuable to associate the industry and cities in an coordinates nexus, which all of the specified sources or streams can be methodically harnessed.

1.1 AIMS

The CE (Circular Economy) is an elective course to all encompassing maintainability, in spite of the fact that it is still in an early stage of selection [2]. Created to emulate the energy and fabric stream administration demonstrate in organic frameworks, its supporters position the CE as an elective to the current take-make-waste extractive mechanical demonstrate. CE points to rethink development, centering on positive society-wide benefits. It involves slowly decoupling financial movement from the utilization of limited assets and planning squander out of the framework. Supported by a move to renewable energy sources, the circular demonstrate builds financial, normal, and social capital. The esteem of the CE stems from its express center on the economy. Compared to sustainable advancement (which is broadly seen as an natural activity, indeed in spite of the fact that by definition, it isn't), the dominance of financial considering inside CE concepts is clearly unmistakable.

The CE is characterised by its capacity to decrease the input and utilize of common assets; diminish outflow levels; diminish profitable fabric misfortunes; increment the share of renewable and recyclable assets; and increment the durability of items. It is based on three straightforward standards: plan waste and contamination out of the framework; keep materials and items in utilize as long as conceivable and as economically as possible; and recover characteristic frameworks.

In spite of the CE's relative novelty, its unambiguous and application-oriented nature may be a positive in cultivating action toward sustainability at nearby, national and worldwide levels. The CE is maybe still a road less voyage. But, practically equivalent to the German Autobahn, the CE may be a smooth, straight, obstacle-free, high-speed expressway to supportability. As exemplified in numerous spaces within the European Union (EU)—the transcendent promoter of the CE at present—the CE isn't fair another favor term for squander administration. The CE would offer assistance to diminish virgin asset extraction/input for financial forms, whereas moreover diminishing the related natural impacts. As restricted to other financial models, the utility of the CE has been unmistakably demonstrated in applications within the EU. Appropriately, one later estimation has proposed that CE hones such as chemical renting, supplement recuperation in agribusiness, materials substitution within the development division, and shared proprietorship models in transport frameworks may diminish up to 7.5 billion tons of CO₂e universally. This would bridge half of the existing outflows hole to reach the 1.5 °C target as sketched out beneath the Paris Understanding.

The CE would moreover make imaginative trade models. Meaning, other than producing benefits, the CE would make work opportunities—in other words, it contributes to social supportability targets. Concerning financial angles, concurring to the Ellen MacArthur Foundation, a move to a CE would diminish net uses on assets by €600 billion per year, improve asset efficiency by 3%, and create €1.8 trillion per year of net benefits within the EU by 2030.

In light of its origins and the compatibility of its transformative instruments, the CE model's applicability appears all inclusive. Clearly, the CE gives an awfully viable choice to treat the societal metabolic clutter modern civilisation endures from. Its flexibility in understanding formative and natural challenges at the same time is additionally worth considering when advancing the CE as an compelling apparatus in accomplishing the UN's SDGs. Given the expected seriousness of approaching asset and natural emergencies, the CE appears to be one of the finest elective ways to follow.

Concurring to the OECD (2019), the fabric concentrated of economies—in specific in OECD countries—is set to decay (by 2060); moreover, development within the reusing segment (i.e. utilize of auxiliary materials) will outperform that of the mining segment as reusing gets to be more price competitive than mining.

1.2 CONSUMPTIONS

Consumptions of energy, water, and materials in day by day exercises are made for different purposes [1]. That said, such utilizations may not be diminishing. Certain sources of energy, e.g. coal and oil, may not be the unbounded sources. Additionally, these sorts of fuel may emit greenhouse gas (GHG) which contributes to the worldwide warming phenomenon. There are parts within the world that confront basic water push. Separated from the common accessibility of the water sources, the event of water push may also be ascribed to the unsustainable hone to oversee water. Thus, the minimization of freshwater utilization is one of the imperative endeavors to look into. Certain fabric may also be limited in terms of the availability. For example, phosphorus sources from the phosphorus mining are anticipated to be exhausted by the end of this century. This would require certain component to play down the utilization of unused materials whereas empowering the recuperation, reuse, and reusing of the utilized materials.

1.3 CONCEPT

The concept of circular economy advocates the minimization of new, modern materials or utility consumption [1]. Through certain techniques, energy, materials, and water consumption may be diminished. As a substitution or an elective (at slightest) for the straight economy, the circular economy concept does in line with the worldwide exertion to decrease the GHG emanation and to progress maintainability. The highlight on supportability for each component is checked within the 6th, 7th, and 12th United Countries Sustainable Development Goals (UNSDG's) which are composed as the taking after:

- 6th agenda – Clean water and sanitation (water)
- 7th agenda – Affordable and clean energy (energy)
- 12th agenda – Responsible consumption and production (materials)

In terms of execution, the circular economy will require certain mechanism(s) and platform(s) to translate the pushed concept into viable conditions. At the mechanical scale, the usage of mechanical beneficial interaction advances the maintainability exertion at interplant level. The mechanical beneficial interaction, i.e. the trade of materials and other important utilities, e.g. squander warm, water, etc., is empowered among the businesses.

Executing mechanical beneficial interaction offers natural and financial benefits. Through the stream exchange(s), utilization of new assets can be minimized, which incorporate lower utilization of routine fuel, water, and virgin material(s). As by-product(s) and/or waste(s) can moreover be reused and reused, the era of last squander to be arranged can be diminished. These highlights will decrease the natural impression of the industry or enterprise. The GHG emission can be diminished, and these endeavors do bolster the Paris Agreement which needs concerted activities at the worldwide scale. Financially, the productive utilize of assets and utilities will offer fetched investment funds. To certain degree, the offering of reusable or recyclable by items or squanders will produce extra pay for the industry or enterprise.

1.4 OPTIMIZATION

Concurring to the United Nations, the concept of circular economy is characterized as the system or the show which items and materials are 'designed in such a way that they can be reused, remanufactured, reused or recouped and hence kept up within the economy for as long as possible' [1]. The scale or level execution of the concept

can be made either at the nation, locale, city, household, industry, or community level. Within the setting of this segment, the scale of talk is made centering at the mechanical level. The concept advocates the 6R hone, specifically, reuse, reuse, overhaul, remanufacture, diminish, and recover.

The energy-related movement will include the fuel supply and/or sourcing, the energy era handle, the conveyance of the produced energy to the conclusion client, and the utilization of energy by the conclusion client. Renewable assets, e.g. sun based and biomass, can be utilized to diminish or supplant the utilization of fossil fuel. With the progress of innovation, through the update and/or remanufacture hone, the effectiveness can be progressed, and the misfortunes too can be diminished by means of the recover, reuse, and reuse hones, e.g. recuperation of squander warm. The conclusion client can advantage from overhaul and decrease hones as well.

Water-related movement will include the water supply and/or sourcing, water treatment generation prepare, conveyance of the treated water to the end client, utilization of water by the conclusion client, and releasing of the utilized or wastewater. Water harvesting can be connected to decrease the utilization of freshwater. Certain asset recuperation can be performed amid the treatment handle of the water stream. In common, there are various openings to apply the circular economy hone within the biological system or supply chain of water. They will empower the decrease of freshwater utilization whereas holding the quality of water utilized concurring to the directions.

Through optimization, the hones of circularity can be progressed. This will decrease the utilization of new assets and GHG outflow, subsequently advancing maintainability.

1.5 WATER SECTOR

From the perspective of the water division, conservation of water assets encompasses a crucial significance [3]. In spite of the fact that ponders carried out with a circular economy approach center on energy effectiveness and squander lessening, reuse, reusing, and recovery, it ought to be pointed out that the water division moreover contains a basic part within the move to a circular economy. In truth, endeavors such as squander diminishment, reuse, reuse, and recuperation are moreover utilizing activities within the water and wastewater segment. In this manner, the water sector including both freshwater and wastewater offers numerous choices, all through the CE execution handle. Applications such as expanding wateruse effectiveness, giving feasible freshwater,

deliberation of sea water by desalination, smart wastewater collection and treatment options, reusing and reuse of wastewater, valorization of treatment plant slime, etc. may be considered among the conspicuous choices.

Within the water segment, a conventional utilization design is abstracting freshwater from distinctive water assets (surface water, groundwater) and transmitting water to the (intensive) utilization ranges (i.e., towns, cities, and metropolitans) and in the event that required treating it with diverse levels some time recently dissemination. After being consumed for different purposes (urban, mechanical, or rustic), the wastewater is collected by sewerage and released into receiving environment with or without treatment due to the current legislations of the nations. This is often a kind of direct economy-based conventional approach and is now not considered economical; instep, a circular economy-based arrangement is prescribed as an inventive and promising approach. The most logic behind the circular economy in water administration is to play down water asset utilization, maximize wastewater reuse/recycling, enhance fabric recuperation as much as conceivable, and give financial benefits in all stages. Among them, reuse of wastewater can:

- (i) Help to reduce the requests on freshwater supplies and eventually increment the accessible water assets
- (ii) Provide financial benefits by means of lessening the transfer costs and water taken a toll for deliberation
- (iii) Enable reusing of profitable materials such as supplements in wastewater which comes about with asset preservation and financial picks up (i.e., sludge transfer taken a toll, fertilizer cost)
- (iv) Generate energy as a by-product from wastewater treatment (sludge treatment by anaerobic assimilation or by burning or with other progressed strategies such as pyrolysis, gasification, etc.)

1.6 Technology

Humankind has been in an exertion to progress life quality by appearing ceaseless advancement since antiquated times [4]. The perception taken after by the imitating of nature and the utilize of normal assets is at the center of all these endeavors. At the side this aggregate advance, the concept of the economy has emerged as a result of the interaction of distinctive communities and individuals over time within the different measurements of common gain. Especially since the primary ages, commercial exercises

utilizing common assets, which were plenteous within the world at that time, shaped the premise of the economy. In any case, the utilize of as it were normal assets in these exercises in that time, comparative to today's current meaning, reminds us the concept of bioeconomy. At that time, humankind provides their nourishment, materials, and energy needs in different areas (development, devices, transportation, etc.) from renewable crude materials and renewable assets. Other than the essential financial exercises carried out by utilizing characteristic assets, nature itself was moreover used in different regions such as working plants and transportation through ships. In addition to all these, the nearness of the sun makes rural exercises conceivable which the basic foods are gotten. These bioeconomy-based exercises proceeded for a long time within the world. Be that as it may, amid this period, humanity utilized normal assets too much. This circumstance caused irreversible annihilation for nature, particularly within the civilization settlements. Subsequently, it has been caught on that indeed in case as it were characteristic assets are utilized in all financial exercises, this is often not sustainable.

Be that as it may, with the advance in technology, the utilization of fossil fuels as crude materials has expanded significantly over the a long time, and particularly after the World War II, rough oil has gotten to be the essential source for all businesses, particularly the chemical industry. Accordingly, it took the primary put by supplanting coal, which was the foremost expended fossil fuel within the industry until 1965. A while later, the utilize of fossil powers expanded exponentially with the expanding human populace in arrange to meet the ever-increasing human and social needs. Nowadays, 90% of the whole worldwide industry is subordinate on petroleum. Especially in terms of energy, today's add up to utilization has come to unfathomably tall sums. In expansion, this require for petroleum as a crude fabric not as it were has been constrained to energy and transportation but too has expanded for creating chemical industry items such as paint and polymer.

2 SEPLS

Changes taking put at the nearby level are directing a move within the studied SEPLS (Socio-Ecological Production Landscapes and Seascapes) from the conventional agrarian framework to the current one, where the local occupants are creating a unused relationship with their environment based on the persistent advancement of modern dreams [5]. In this sense, bottom-up execution of green framework components rises from

needs recognized by the community with respect to their prosperity and conducted through a Neighbourhood Association. Particular activities are centred within the recovery of riparian and timberland environments as multifunctional greenways. Clean-up of dumped waste, recuperation of legacy destinations and instructive exercises are created to energize all encompassing sees for the change towards a circular economy at the neighborhood level, counting business openings. Key components are the association of the community, the improvement of a arrange of associations, and collective authority. Institutional support by the local and territorial government is seen, in spite of the fact that, as fundamental, and its nonattendance may cause restrictions to the change potential of the association.

The endeavors created at the territorial level addressing transformative alter are basically statutory, top-down in character, with the transposition of orders coming from upper levels being an critical inspiration for green framework usage. This see is complemented by open interest to coordinated bottom-up points of view and dreams. As such, it may be a reference point for recognizing and creating learning circles. As execution at the regional level is related to spatial arranging, there's a solid reliance on organization and administration structures. In this sense, boundaries forced by the need of communication between organizations, shortages in sectorial coherence, short-term sees and sensibility to changes in organization plans prove the require for institutional change. Such obstructions may moreover influence activities created at the local level, depriving them of organization support. Moreover, they may block basic errands such as appraisal of the key intrigued of bottom-up initiatives, sectoral coordination, direction requirement, or valuation of budgetary openings. Moreover, to confront the challenges included within the transformative change, an fundamental part of the unused administration plans would be the recognizable proof of the need, open and common intrigued of bottom-up activities adjusted with maintainability objectives to warrant their viable execution.

2.1 FINANCE

The transition to a green economy has ended up an speculation thought, which gave begin to re-channeling of money related assets for the modernization of the economy, energy effectiveness, and the improvement of high-tech businesses [6]. Beneath the umbrella of green plan and battling the climate alter the method of division into immaculate and tainted divisions and technologies is going on. There's an purposeful to

create a clear refinement between the innovations which are considered worthy for future advancement, and those which ought to not exist any longer. A parcel of wrangles about and endeavors are made to reach agreement on which innovations ought to be put in both records.

In spite of the accomplished understanding of the require for move toward a green economy, a bound together vision of what is “green” and what isn't, has not been however come to. In arrange to clarify this issue, the biggest players are shaping a uncommon control that characterizes the rules of the diversion in this unused developing advertise. Its center components are the scientific classifications of green ventures containing criteria for financial activities and advances that are proposed to be considered “green.” The objective of scientific classifications is to supply clear rules for speculators and other individuals of the commerce community, in which course the monetary streams ought to be diverted.

Nowadays very a huge number of activities on the advancement and application of green scientific categorizations are being actualized at the universal and national levels. A few scientific classifications are as of now in utilize, others are at the distinctive stages of planning. The driving part in this prepare has a place to universal commerce affiliations, fundamentally the International Capital Markets Association (ICMA) and Climate Bond Initiative (CBI), as well as the biggest world economies. Due to the measure of their economies, such nations can bear themselves to make their claim green financing frameworks, focused on on accomplishing their national goals—within the generally system of “green” and “climate” motivation.

Green fund is frequently caught on to be collection of financing measures which can be seen as a subset of maintainable fund [7]. The capital stream of green back is utilized to back climate relief and adjustment measures, in arrange to encourage the change to a low-carbon economy. Beneath the goals set by United Nation Sustainable Development Goals (SDGs) and the Paris Agreement, financing feasible development is recognized as a major challenge that should be tended to with collective endeavors. The Paris Agreement inquires for “[m]aking back streams reliable with a pathway towards moo nursery gas emanations and a climate-resilient development.” Feasible fund incorporates financing green technologies and ventures, but too financing of other maintainability measures, and potentially moving towards inquiring for each venture, in case it can be considered reliable with a long-term economical way. To supply the perusers with a viewpoint on green back surrounded within the progressively imperative

maintainable back talk, this segment looks at economical monetary framework, administrative improvements for maintainable fund and the changes ahead for banks.

3 CONCLUSION

The circular economy means the transition from the existing linear economy to a circular economy. Everything can be reused in another way or divide into substances that can become part of the life cycle. Strength is in diversity, modularity and adaptability, and all energy should come from renewable sources. By taking resources from nature, everything that is needed can be produced, and then it should be ensured that what was taken from it is returned to nature in an acceptable form. Recycling of non-degradable substances can bring numerous new benefits, all with minimal burden on the environment in which we live. Focusing on energy efficiency and environmental sustainability is the foundation of this way of thinking, and it can be applied to all aspects of life. The main benefits of this model are economic savings, new jobs, saving resources and energy, and contributing to mitigating climate change.

REFERENCES

1. Misrol, M. A.; Alwi, S. R. W.; Lim, S.; Manan, Z. A. (2023.): „Process Optimization and Circular Economy: Bridging the Sustainable Connection Through Industrial Symbiosis“ in Oncel, S. S. (ed): „A Sustainable Green Future - Perspectives on Energy, Economy, Industry, Cities and Environment“, Springer Nature Switzerland AG, Cham, Switzerland, pp. 23. – 30.
2. Heck, P. (2021.): „Small-Scale System Solutions—Material Flow Management (MFM) in Settlements (Water, Energy, Food, Materials)“ in Weith, T.; Barkmann, T.; Gaasch, N.; Rogga, S.; Strauß, C.; Zscheischler, J. (eds): „Sustainable Land Management in a European Context - A Co-Design Approach“, Springer Nature Switzerland AG, Cham, Switzerland, pp. 277. – 278.
3. Dulgen, D.; Alpaslan, M. N. (2023.): „Reuse of Wastewater from the Circular Economy (CE) Perspective“ in Oncel, S. S. (ed): „A Sustainable Green Future - Perspectives on Energy, Economy, Industry, Cities and Environment“, Springer Nature Switzerland AG, Cham, Switzerland, pp. 386. – 387.
4. Demirden, S. F.; Kimiz-Gebologlu, I.; Alptekin, K.; Senyay-Oncel, D. (2023.): „Importance of Intellectual Property Rights for Building a Sustainable Future“ in Oncel, S. S. (ed): „A Sustainable Green Future - Perspectives on Energy, Economy, Industry, Cities and Environment“, Springer Nature Switzerland AG, Cham, Switzerland, pp. 70.
5. Díaz-Varela, E.; Fernández-Villar, G.; Diego-Fuentes, A. (2021.): „Transformative Change in Peri-Urban SEPLS and Green Infrastructure Strategies: An Analysis from the Local to the Regional Scales in Galicia (NW Spain)“ in Nishi, M.; Subramanian, S. M.; Gupta, H.; Yoshino, M.; Takahashi, Y.; Miwa, K.; Takeda, T. (eds): „Fostering Transformative Change for Sustainability in the Context of Socio-Ecological Production Landscapes and Seascapes (SEPLS)“, Springer Nature Singapore Pte Ltd., Singapore, Singapore, pp. 149. – 150.
6. Sementsov, S.; Golyshcheva, A. (2023.): „Green Finance in Eurasian Union: Should We Expect a Common Solution?“ in Devezas, T. C.; Leitão, J. C. C.; Yegorov, Y.; Chistilin, D. (eds): „Global Challenges of Climate Change, Vol.2 - Risk Assessment, Political and Social Dimension of the Green Energy Transition“, Springer Nature Switzerland AG, Cham, Switzerland, pp. 223. – 224.
7. Moslener, U.; Zhuang, M. (2020.): „Renewable Energy, Climate Change, and Sustainability“ in Böttcher, J. (ed): „Green Banking - Realizing Renewable Energy Projects“, Walter de Gruyter GmbH, Berlin, Germany, pp. 17.