Elena Simina Lakatos
E-mail:simina.lakatos@ircem.ro
Doctor, Institute for Research in Circular Economy and Environment "Ernest Lupan"
Cluj-Napoca, Romania
ORCID ID: *0000-0003-0096-4494*

Sorin Dan Clinci
E-mail:dan.clinci@ircem.ro
Architect, Institute for Research in Circular Economy and Environment "Ernest Lupan"
Cluj-Napoca, Romania
ORCID ID: *0000-0001-5310-6376*

Viktor Koval
E-mail:victor-koval@ukr.net
Professor, Southern Scientific Center of National Academy of Sciences of Ukraine and Ministry of Education a nd Science of Ukraine, National Academy of Sciences of Ukraine, Kyiv, Ukraine
ORCID ID: *0000-0003-2562-4373*

Gheorghe Daniel Lakatos
E-mail:daniel.lakatos@ircem.ro
Doctor, Institute for Research in Circular E conomy and Environment "Ernest Lupan"
Cluj-Napoca, Romania
ORCID ID: *0000-0002-3280-9061*

CREATING LIVABLE CITIES THROUGH SUSTAINABLE BUILT ENVIRONMENTS IN THE CIRCULAR ECONOMY

Abstract: *Urban landscapes are undergoing a transformative phase as they navigate the transition to resilient, circular cities. Cities, inherently complex systems, necessitate sustainable and resilient strategies to address multifaceted challenges. A prominent solution emerges in the form of the Circular Economy (CE), which emphasizes prolonging the life cycle of products through sharing, recycling, reusing, and repairing. Historically rooted in industrial ecology, CE's diverse implementations span across countries, from Germany's innovative waste management initiatives to China's developmental paradigms. The potential of CE is profound: it promises GDP growth, significant reductions in carbon dioxide emissions, and a decrease in raw material consumption. As the global population increasingly gravitates towards urban hubs, cities become the epicenters of sustainable change, with places like Amsterdam and Barcelona leading the charge. These "circular cities" epitomize sustainability, resilience, innovation, and growth, offering holistic benefits from minimal raw material consumption to cross-disciplinary innovation. However, the path to achieving circular urban systems isn't devoid of challenges. Striking a delicate balance between rigorous environmental mandates and urban comfort*

remains a primary concern. For the seamless integration of CE, a collective approach is crucial, involving policymakers, researchers, and the general public. This paper delves into the intricacies of the CE, its implications, challenges, and the potential roadmap towards resilient urban futures.

Keywords: *sustainability, built environment, circular economy, livable cities*

JEL classification: *O2, O250, R4*

ელენა სამინა ლატაკოს
E-mail:simina.lakatos@ircem.ro
დოქტორი, ცირკულარული ეკონომიკისა და გარემოს
კვლევის ინსტიტუტი "ერნესტ ლუპანი"
კლუჟ-ნაპოკა, რუმინეთი
ORCID ID: *0000-0003-0096-4494*

სორინ დან კლინცი
E-mail:dan.clinci@ircem.ro
არქიტექტორი, ცირკულარული ეკონომიკისა და გარემოს
კვლევის ინსტიტუტი "ერნესტ ლუპანი"
კლუჟ-ნაპოკა, რუმინეთი
ORCID ID: *0000-0001-5310-6376*

ვიქტორ კოვალი
E-mail:victor-koval@ukr.net
პროფესორი, უკრაინის მეცნიერებათა ეროვნული აკადემიის
სამხრეთ სამეცნიერო ცენტრი და უკრაინის
განათლებისა და მეცნიერების სამინისტრო,
უკრაინის მეცნიერებათა ეროვნული აკადემია,
კიევი, უკრაინა
ORCID ID: *0000-0003-2562-4373*

გეორგე დანიელ ლაკატოსი
E-mail:daniel.lakatos@ircem.ro
დოქტორი, ცირკულარული ეკონომიკისა და გარემოს
კვლევის ინსტიტუტი "ერნესტ ლუპანი"
კლუჟ-ნაპოკა, რუმინეთი
ORCID ID: *0000-0002-3280-9061*

სიცოცხლისუნარიანი ქალაქების შექმნა მდგრადი სამშენებლო გარემოს მეშვეობით ცირკულარულ ეკონომიკაში

აბსტრაქტი. *ურბანული ლანდშაფტები გადის ტრანსფორმაციულ ფაზას, რადგან ისინი გადადიან მდგრად, წრიულ ქალაქებზე გადასვლაზე. ქალაქები, არსებითად რთული სისტე-*

მები, საჭიროებენ მდგრად და გამძლე სტრატეგიებს მრავალმხრივი გამოწვევების გადასაჭრელად. გამოჩენილი გამოსავალი ჩნდება ცირკულარული ეკონომიკის (CE) სახით, რომელიც ხაზს უსვამს პროდუქტების სასიცოცხლო ციკლის გახანგრძლივებას გაზიარების, გადამუშავების, ხელახალი გამოყენებისა და შეკეთების გზით. ისტორიულად ფესვგადგმული სამრეწველო ეკოლოგიაში, CE-ს მრავალფეროვანი განხორციელება მოიცავს ქვეყნებს, გერმანიის ნარჩენების მართვის ინოვაციური ინიციატივებიდან ჩინეთის განვითარების პარადიგმებამდე.

CE-ს პოტენციალი ღრმაა: ის გვპირდება მშპ-ს ზრდას, ნახშირორჟანგის ემისიების მნიშვნელოვან შემცირებას და ნედლეულის მოხმარების შემცირებას. მას შემდეგ, რაც გლობალური მოსახლეობა სულ უფრო მეტად მიზიდავს ურბანული ჰაბებისკენ, ქალაქები ხდებიან მდგრადი ცვლილებების ეპიცენტრები, სადაც ლიდერები არიან ისეთი ადგილები, როგორიცაა ამსტერდამი და ბარსელონა. ეს „წრიული ქალაქები“ განასახიერებს მდგრადობას, გამძლეობას, ინოვაციას და ზრდას, გვთავაზობს ჰოლისტურ სარგებელს ნედლეულის მინიმალური მოხმარებიდან დისციპლინურ ინოვაციამდე. თუმცა, წრიული ურბანული სისტემების მიღწევის გზა არ არის გამოწვევებს მოკლებული. მკაცრ გარემოსდაცვით მანდატებსა და ურბანულ კომფორტს შორის დელიკატური ბალანსის დამყარება უმთავრეს საზრუნავად რჩება. CE-ის უწყვეტი ინტეგრაციისთვის გადამწყვეტია კოლექტიური მიდგომა, რომელიც მოიცავს პოლიტიკოსებს, მკვლევარებს და ფართო საზოგადოებას. ეს ნაშრომი სწავლობს CE-ს სირთულეებს, მის შედეგებს, გამოწვევებს და პოტენციურ საგზაო რუკას გამძლე ურბანული მომავლისკენ.

საკვანძო სიტყვები: *მდგრადობა, აშენებული გარემო, წრიული ეკონომიკა, საცხოვრებელი ქალაქები*

JEL კლასიფიკაცია: *O2, O250, R4*

Introduction and review of literature

Cities are challenged with the requirement for, or lack of, a clear definition of the circular economy from a city viewpoint as they transition to the stage of resilient and circular cities. Cities are dynamic, complex systems that have implications beyond of only the economy and circular economy [1].

Resilience is defined as a system's capacity to resume its stable equilibrium state following a shock. The circular economy supports cities in maintaining that equilibrium by giving stability and opportunity for future generations to live in a sustainable environment. A sustainable ecosystem requires resilience because it offers a fresh viewpoint on sustainability. Considering the city as a complex system, resilient planning and design are an essential component of sustainable urbanization strategies [2].

Circular economy (CE) is a method of urban planning and management that offers an alternative to the conventional approach. The circular economy concept has roots in industrial ecology and management, environmental and ecological economics, and corporate sustainability. There have been a number of attempts and implementations at various sizes since 1989, when the idea first surfaced in a global magazine. For instance, Germany established a new law in 1996 called the "Closed Substance Cycle and Waste Management Act" to end the waste cycle. Early on, Japan adopted a similar program, and since 2008, China has employed the circular economy idea as a development strategy [3].

The "circular economy" is a manufacturing and consumption model that stresses sharing, renting, reusing, repairing, and recycling old things for as long as possible. The life cycle of items is prolonged in this way [4].

An developing idea that is viewed as an alternative to the present linear economy is the circular economy (CE) [5]. Its influence is seen to be important today more than ever. Governments have started looking for alternatives as a result of the present environmental catastrophe and the accompanying economic unpredictability. China has employed CE to successfully combat inefficient systems and urban pollution [6]. The European Union (EU) is encouraging it due to its outcomes.

The Ellen MacArthur Foundation (EMF), the EU, China, Google, and other international players are advancing CE-friendly laws, technology, and research. Since CE is distributed across several levels and sectors, as would be anticipated in an economic system, its definition has been modified for each. As a theoretical basis in the literature, there are numerous studies that approach the circular economy from different perspectives and points of view, analysing how it works. Production and consumption patterns are part of economic activities along the value chain that have an impact on society and the environment in emerging nations. To move away from linear material usage and repurpose any materials that are discarded, bringing them back into the material cycle, is therefore necessary for the transition to a circular economy (CE) [7].

The use of CE might, in theory, improve living conditions and the environment for city dwellers and ecosystems as a whole. The city's ability to function as a living organism is in danger due to the rising amounts of industrial and municipal (solid) waste [8]. Additionally, it makes it more difficult for cities to address the socioeconomic issues brought on by ineffective garbage management. Materials can retain their circularity when they are re-introduced into the supply chain reducing the amount of waste disposed of in nature. Thus, investing in a circular waste management system has social as well as environmental benefits.

The circular economy (CE), which promises to produce more sustainable operations, is rising in favor on a variety of fronts. In this situation, cities are putting into action a range of programs designed to help them become sustainable circular systems.

As urban populations increase, cities work to achieve sustainability standards. According to UN-HABITAT, although this number fluctuates depending on how a city's limits are defined, urban areas are responsible for 70% of the world's greenhouse gas emissions [9,10]. Since 66% of the world's population is predicted to live in cities by 2050 [11], authorities are taking action to promote sustainability, and the circular economy (CE) model is one that is gaining traction. The basic goal of CE is to create systems that solve closed material and energy cycles that preserve the value of resources in the economy and go beyond linear "take, make, throw" economic paradigms [12].

A more sustainable economy, sometimes known as growth from within, is the outcome of CE. However, for this to happen, firms must work together and be transparent [13]. For this, society has to be more engaged, knowledgeable, and skilled. It must be durable, versatile, and able to accommodate innovation [14]. The circular economy may have a big influence on the economy and the environment. According to estimates, a CE's systemic adoption may result in a 7% rise in the European Union's gross domestic product (GDP), representing savings of €600 billion annually, benefits of €1.8 trillion annually, and the creation of 170,000 employment by 2035. Additionally, by 2030 and 2050, the CE may cut carbon dioxide emissions by 48% and 83%, respectively. The use of raw resources might be decreased by 32% to 53% throughout the same time period [15]. Currently, discussions about climate change, the depletion of fossil fuels, and energy security highlight the need for a more durable environment. A sustainable built environment is essential to decreasing greenhouse gas emissions and addressing the climate issue because it protects and improves people, places, and the natural environment.

The construction, use, and disposal of the built environment contributes directly or indirectly to many

of the most prevalent and well-known global environmental issues, including eutrophication, soil erosion, acid rain, greenhouse global warming, and ozone depletion. For instance, the built environment uses around 40% of all primary energy in various EU Member States and 30% of all primary energy in the US. As a result, the operation of buildings accounts for a large portion of the effects of energy (coal, oil, natural gas, and uranium), extraction and processing, building and operating power plants, associated transmission lines, and transportation (trucks, trains, barges, and ships). The dispersion of the built environment throughout the terrain is a major factor in the impact of automobile production, use, and disposal. As a result, the effects of buildings go much beyond the actual limits of the buildings and infrastructure. In a similar vein, 40% of all resources mined in the US are used to develop or maintain infrastructure [16].

Terms like sustainable construction, sustainable and sustainable architecture, and ecological design may all be used together to further define the notion of a sustainable built environment, in addition to its link with green buildings. Sustainability refers to the broad range of actions taken to create a sustainable environment and is what comes to mind when you think of a sustainable constructed environment. Sustainable building, which got its start as a global movement in 1993, is "the creation of a healthy built environment based on ecologically sound principles." It considers the entire built environment's life cycle, including planning, design, building, operation, refurbishment, and retrofitting, as well as the destiny of the materials after the end of their useful lives. Sustainable architecture establishes a set of principles to lead this new path and considers resources such as land, water, energy, and building materials [16].

The conventional demand-side and governmental (local and central) agencies do not only shape and impact the built environment. The built environment is significantly impacted by the financial sector at the stages of design, building, management, and renovation. In connection to a number of concerns, including energy efficiency, the closing of material cycles, the quality of design, and urban development, it has a significant impact on the achievement of sustainable development principles [17].

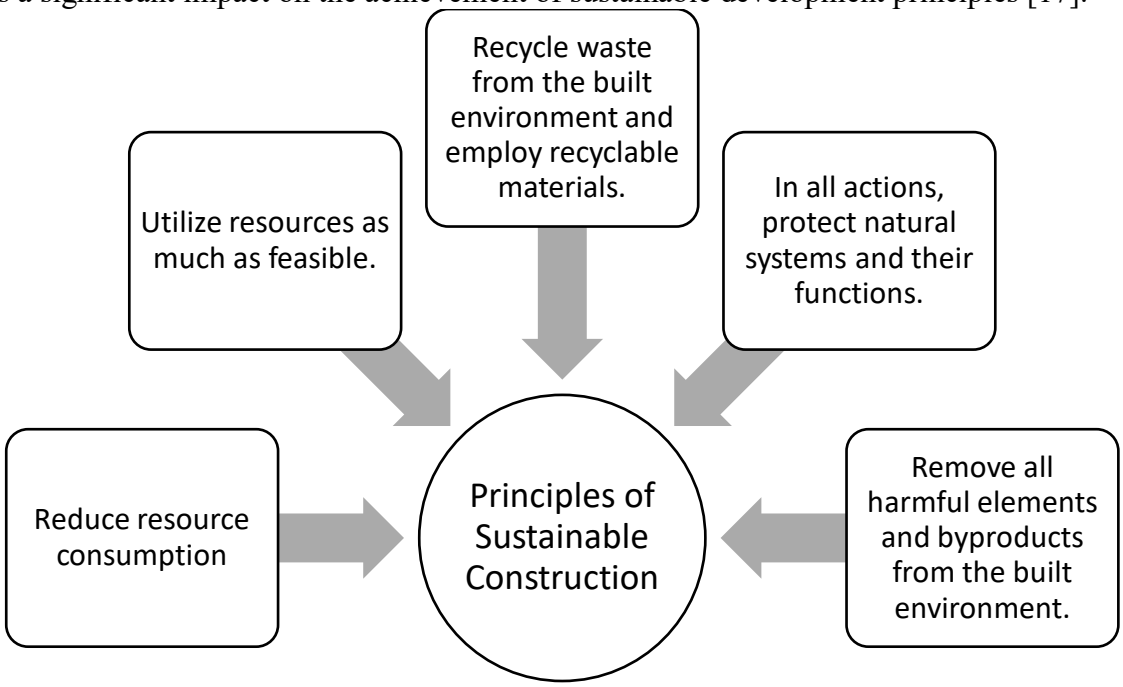

Figure 1. Main principles of sustainable construction (adapted , [16])

Sustainable construction is based on a set of guiding principles that have been produced by many of the organizations active in greening the built environment. The National Association of Home Builders,

the U.S. Green Building Council, and state and municipal governments are among the prominent organizations in the United States that are promoting the development of green buildings [16].

Methodology

This study aims to see how we cane creating livable cities through sustainable built environments in the circular economy. Our goal is to look at all of this aspects mentioned in the research papers in order to gain a better understanding of the current university context and how this new approach might aid in the implementation of circular economy approaches.

The following table lists a variety of measures that can help individuals and government make the transition to a sustainable media.

Table 1. Different types of policy tools that can be used to achieve sustainability goals [16].

Instruments of Regulation	• Technology-based standards: Requirements that specify an authorized technology for a specific industrial process or environmental issue and place a strong emphasis on the development and use of preventative measures. • Performance-based standards are requirements that outline a company's obligations in terms of the issues it must resolve or the objectives it must reach, putting an emphasis on the result and avoiding overt prescription.
Financial Instruments	• Direct payments depending on the quantity and quality of a pollutant are called emission charges and taxes. • Products that produce pollution during production, consumption, or disposal (such as batteries, insecticides, or fertilizers) are subject to charges and taxes. • User fees: Payments made to cover the cost of group services. They are typically employed to fund local government entities, such as those responsible for the collection and treatment of solid waste and sewage water. User fees are payments for the use of a natural resource (such as a park, fishing pier, or hunting area) in the context of natural resource management. • Marketable (tradable, transferable) permits are environmental quotas, licenses, and maximum rights given to commercial actors by a competent body. • Deposit-refund systems: payments paid at the time of product purchase (for instance, packing). When the product is returned to the dealer or a specialist treatment facility, the money (deposit) is fully or partially recovered. I).
Tools For information	• Public awareness campaign: an effort to increase public understanding of environmental concerns. • Programs for the distribution of technological knowledge are given to producers in an effort to influence their production practices in a more environmentally friendly direction. (For instance, demonstration programs and information services). • Environmental labeling programs: the dissemination of data on the environmental performance of goods that have been approved by independent parties or the manufacturers themselves in accordance with specified standards.

Tools for voluntary policy	• A program developed unilaterally by an enterprise and/or a corporation without the involvement of a public body is known as a unilateral commitment or statement. • A program including a legal agreement between a governmental entity and a company or commercial group. A negotiated agreement or commitment. • Selective regulation, often known as a public voluntary program, is when governments set the rules for the policy but let businesses decide whether or not to participate.

The conventional demand-side and governmental (local and central) agencies do not only shape and impact the built environment. The built environment is significantly impacted by the financial sector at the stages of design, building, management, and renovation. In connection to a number of concerns, including energy efficiency, the closing of material cycles, the quality of design, and urban development, it has a significant impact on the achievement of sustainable development principles. Therefore, it is also vital to include those groups of actors—financial stakeholders—who have a significant impact on the operation and consequences of the real estate and construction markets [17].

Therefore, it is also vital to include those groups of actors—financial stakeholders—who have a significant impact on the operation and consequences of the real estate and construction markets.

Results

The findings from the case studies of Amsterdam, Rotterdam, Barcelona, Glasgow and Hague are discussed in this section. The instances contain the respondent's opinions, and for each city, a selection of the efforts that were found are described [18-24].

- *Amsterdam*

Investment opportunities in CE activities have been made possible by the Dutch "Nederland Circulair6" program, which was launched in 2015 by the city alderman. The Amsterdam sustainability agenda incorporates CE along with energy, resistance to climate change, and air quality. Thus, the Amsterdam Strategic Advisor on Sustainability noted that the EC agenda is made more effective by a comprehensive action programme in which "circularity" is a key component.

Policymakers define CE broadly, and the city's approach incorporates all of the circular city concepts specified in the ReSOLVE framework. The project map shows a fairly equitable distribution of policy measures, with procurement and infrastructure used for certain sectors and collaborative systems, commercial aid programs, and knowledge building activities used for many. For example, the AMS Institute is a prominent research and institutional partner focusing on long-term solutions to urban challenges.

Supporting these directions, the Dutch circular economy consultant pays special attention to how to implement the circular economy at city level. He develops benchmarking studies on the city's physical resources, providing governing bodies with ideas for handling the city's resources more correctly.

Policymakers offer nuanced views on CE and recognize its complexities. Despite, or maybe because of, its pioneering position, Amsterdam's Strategic Advisor for Sustainability concedes that "experimentation" is required because it is a new field for them and "some things [about CE] we really just don't know yet." According to the strategic advisor for sustainability, he makes a point about the limited tools, but also says they make the most of what little they have. He speaks of the funding strategy as opportunistic. He expresses a desire to develop places with energy resources, and to develop and stimulate existing projects through the policy instruments they benefit from. It also discusses the idea of a city of the future, while the idea of a sustainable city is still in its infancy.

In the city, several experiments are taking place. Free zones can be seen as experimental approaches

located in the declining post-industrial areas of Buiksloterham, where waste collection models and water sanitation can be tested. In 2016 Amsterdam was named Fab City8, in the idea of new opportunities for investigating a new urban dynamic with dispersed urban production systems developed by new technologies. Also within the city there is a completely circular catun, called "De Ceuvel" [18].

Other strategic concerns (providing employment and housing for a growing population) were prioritized in Amsterdam's spatial plan. It did, however, promote the establishment of waste/bio-clusters in the port, allowing for local looping operations. Financial incentives were provided through the Circular Innovation Programme. The spatial layout also promoted the utilization of residual heat and the preservation of green wedges in the city (all of which are critical for CD). These actions, as well as the establishment of a CE in Amsterdam, were aided by the Sustainability Strategy and the Circular Vision and Roadmap, both of which include CD objectives and were carried out through the Learning by Doing program [19].

- *Rotterdam*

Policymakers in Rotterdam see CE as a tool for developing sustainable and creative businesses.

Making efforts apparent has been demonstrated to have a positive ripple impact on the growth of innovative solutions in Rotterdam. Rotterdam's Project Manager for Urban Development, for example, emphasized the city's portfolio of efforts to bring the city's vision to reality, such as specific collaborations with firms to keep the agenda current and generate additional funds for future projects. They believe that by increasing their awareness, they will inspire other stakeholders in the area to develop innovative methods to produce additional value. Better Future Factory's 'circular upcycle tool', intended to manufacture tiles from garbage, is one example, as is City Lab 010, which serves as a collaborative platform to connect and support collaborations.

Rotterdam has been collaborating with the Port of Rotterdam (Europe's largest port) on biobased initiatives in particular, as well as establishing numerous Green Deals. The bio-based economy is supported, and the Port of Rotterdam has dedicated vast areas in the port and city to bio-based economy operations [20]. The Bio-based Delta Alliance, for example, targets three major areas of activity: green raw materials, green building foundations and greening the processing sector. Community-led efforts, such as the Blue City, have also been identified, and pilot projects, such as the 'green waste stream,' are ongoing to explore solutions for garden waste reuse [18].

- *Barcelona*

Barcelona aspires to be a self-sufficient area by 2050 and plays a facilitative role in that endeavor. Its smart city master plan was launched from the top down, and it has involved rebuilding the transportation system, installing smart lighting, and implementing intelligent heating and cooling systems. Energy, waste, and water savings have been generated as a result of large-scale implementation programs.

The smart and circular projects of the city are inextricably interwoven. This link can be seen in the Fab City idea, which gained momentum in 2011 under the leadership of Tomas Diez, who encouraged an urban paradigm suited to sustainable self-sufficient communities. In 2014 the project to build self-sufficient urban blocks was implemented, which have the advantage of being connected to a network, related to transport, water, waste and heating systems.

This experimental method to fostering self-sufficiency through a new vision of urban production. By involving the deputy mayor and sending information, instead of distributing resources, ways of harnessing the benefits of new digital technologies are envisaged, ultimately to meet local needs. The City Hall encourages the concept of a commercial as well as public Fab Labs ecosystem.

Though the smart city has emerged as the city's high level policy and has been begun top-down, there is a change to more proactively incorporate residents since this is regarded as a constraint to prior initiatives. The respondent highlighted how prior city-led programs were extremely academic, alienating people, whereas circular is more innovation-focused, which is regarded appealing. The city has a well-

known commons movement that promotes peer-to-peer and collaborative economic activities. For example, since 2014, a local community (headed by the Makea tu Vida10 collective) has been actively investigating the circular economy (using an open source method). Its purpose is to bring together the digital cultural revolution with the economic desire for closed-loop material cycles. Citizens have assisted the creation of policy recommendations for a collaborative economy through the Barcelona commons movement, which are being reviewed by the Barcelona municipal administration and have also been forwarded to the European Parliament. The city's economy is made up of 10% cooperatives, representing the city's individuality. The city's self-organization is evident: "The citizen is smart and empowered," and "the culture is that the citizens will do it" [18].

Each case presented highlights a model of learning and good practice. The first case, Amsterdam, offers an innovative perspective on policy use. Rotterdam highlights the benefits of making plans resilient to multiple policy cycles. Barcelona presents a top-down approach, later adjusted to focus more on citizens' views.

- *Glasgow*

The Scottish government released its first sustainability policy in 2002. Environmental goals, such as reducing greenhouse gas emissions by 80% by 2050, have been in place since 2007. The Climate Change (Scotland) Act was approved in 2009, and Scotland's Zero Waste Plan was announced in 2010, resulting in the formation of Zero Waste Scotland, a government-funded organization aimed at driving change toward a waste-free society. As a result, the mission has been proposed by the national government, and Glasgow is creating expertise to pull the change. The main objective for Glasgow was to collect information and develop a knowledge base to support businesses in establishing circular business models, therefore cooperation platforms and knowledge development efforts are prioritized.

The Glasgow Chamber of Commerce hired the same Amsterdam-based consultant Circle Economy to conduct a City Scan in order to build a vision and action plan for promoting CE, which will be tightly connected with the Glasgow Digital Plan (through the city dashboard). In 2013, Future Glasgow, an open data platform that "uses data and technology to make city life safer, smarter, and more sustainable," was established. This involves examining the city's site potential for renewable energy development and monitoring energy use to identify potential benefits from energy retrofitting in various types of Glaswegian dwellings. Open Glasgow supports this by emphasizing digital information and making data more accessible to industrial prospects and the broader sector.

An extremely important part of the transition phase is the quality of life, from the perspective of how people go about their daily business, the space they live in, and the state of the city's population. A better waste management and a more efficient use of the city's resources could increase the quality of life of the inhabitants, whether it is to enjoy a better life with a better living, the possibility to have more green spaces and airier areas of the city.

The Green Business Network was established by the Glasgow Chamber of Commerce and the city government to help and link companies. The Scottish Institute for Remanufacturing was created in 2015 and is housed by the University of Strathclyde. Its mission is to co-fund collaborative initiatives that allow reuse, repair, and remanufacturing. Because of the nature of Scottish Industry (high value machinery from industries such as oil and gas), remanufacturing is expected to have a high potential, and the CE is a key lever in Scotland's manufacturing plan [18].

- *The Hague*

The Hague municipal administration has established a sustainability objective of reducing its impact to climate change to zero by 2040. The municipal council understands the need of sustainability, however there seems to be a lack of political ownership across departments. Nonetheless, The Hague's sustainable program coordinator indicated that they just initiated a whole new employment program in 2016 in order to make progress toward their goal. The program manager hired a new director who had "sustainability

in his genes" and a passion for urban metabolic processes, enabling them to drive the CE agenda from the top down.

An thorough research was conducted to establish what would be required to achieve carbon neutrality in The Hague by 2040. Because it was discovered that this would need unreasonable financial resources, the emphasis has turned to expediting business efforts. As a result, the person in charge of the program sees their role as one of facilitation rather than principal 'financier' of CE initiatives It generates occasional purchases, but its primary aim is to organize city citizens and bigger stakeholders.

Despite enthusiasm from authorities, The Hague has failed to formalize a precise vision for CE and has no actual CE objectives or official strategy. This suggests because there are actually a few committed politicians, though their comprehension of what CE signifies for the town is somewhat unclear due to the novelty of the concept and the municipality's lack of direction. The program supervisor indicated the requirement for specific examples of what a circular city may look like and what sorts of activities it might include. They are unclear of what adjustments to make and believe an eventual goal of a circle city would assist them in a variety of ways, including creating a direction, persuading top public workers of the significance of CE, and interacting with the city's numerous other stakeholders. They feel that the marketplace is vital in moving into a circular city, but that describing why is difficult [18].

Conclusions

Many old economic industries have vanished or are struggling to resurface, producing considerable employment and societal problems. The establishment of a new economic model based on the circular economy has the potential to provide new possibilities and jobs. The emphasis on existing asset management and accompanying services might create new employment that cannot be removed through automation or delocalization, as is the case with many industrial operations. Furthermore, new technologies are enabling known as e-government: the accessibility of huge quantities of knowledge reviewed based to specific needs allows for rapid choice-making, quick and assertive communication with citizens, and the change of substantial quantities of accessible data into developments in the standard of life and competitiveness.

The concept of circularity management becomes dynamic as a result of continuous changes, necessitating an open and adaptable strategy. This is compatible with what happens at the company, over instance, with the open innovation model, in which innovation no longer happens in a planned and 'closed' way, but rather grows through the development of an ecosystem in which start-ups, tech collaborations, and partnerships with academic institutions connect and contribute to new approaches.

References

Williams, J. (2019). Circular cities: Challenges to implementing looping actions. Sustainability, 11(2), 423.

Cartalis, C. (2014). Toward resilient cities–a review of definitions, challenges and prospects. Advances in Building Energy Research, 8(2), 259-266.

Lakatos, E. S., Yong, G., Szilagyi, A., Clinci, D. S., Georgescu, L., Iticescu, C., & Cioca, L. I. (2021). Conceptualizing core aspects on circular economy in cities. Sustainability, 13(14), 7549.

European Parliament (2023). Circular economy: definition, importance and benefits. Available at: https://shorturl.at/klpqT

MacArthur, E. (2013). Towards the circular economy. Journal of Industrial Ecology, 2(1), 23-44.

Petit-Boix, A., & Leipold, S. (2018). Circular economy in cities: Reviewing how environmental research aligns with local practices. Journal of Cleaner Production, 195, 1270-1281.

Hannon, E., Kuhlmann, M., & Thaidigsmann, B. (2016). Developing products for a circular economy. McKinsey&Company, Retrieved April, 21, 2020.
Girardet, H. (2017). Regenerative cities (pp. 183-204). Springer International Publishing.
HABITAT, U. Hot Cities: Battle-Ground for Climate Change. 2011.
Seto, K. C., Güneralp, B., & Hutyra, L. R. (2012). Global forecasts of urban expansion to 2030 and direct impacts on biodiversity and carbon pools. Proceedings of the National Academy of Sciences, 109(40), 16083-16088.
United Nations (2014). World Urbanisation Prospects Report. United Nations.
Pearce, D. W., & Turner, R. K. (1989). Economics of natural resources and the environment. Johns Hopkins University Press.
Williams, J. (2019). Circular cities. Urban Studies, 56(13), 2746-2762.
MacArthur, E. (2015). Towards a circular economy: business rationale for an accelerated transition. Greener Manag International, 20.
MacArthur, E., Zumwinkel, K., & Stuchtey, M. R. (2015). Growth within: a circular economy vision for a competitive Europe. Ellen MacArthur Foundation.
Kibert, C. J. (2001). Policy instruments for sustainable built environment. J. Land Use & Envtl. L., 17, 379.
Lützkendorf, T., Fan, W., & Lorenz, D. (2011). Engaging financial stakeholders: opportunities for a sustainable built environment. Building Research & Information, 39(5), 483-503.
Prendeville, S., Cherim, E., & Bocken, N. (2018). Circular cities: Mapping six cities in transition. Environmental innovation and societal transitions, 26, 171-194.
Williams, J. (2023). Circular cities: planning for circular development in European cities. European Planning Studies, 31(1), 14-35
Rotterdam, G. (2014). Begroting 2015. Rotterdam: Bestuursdienst Gemeente Rotterdam, Directie Middelen en Control.
Barragán-Escandón, A., Terrados-Cepeda, J., & Zalamea-León, E. (2017). The role of renewable energy in the promotion of circular urban metabolism. Sustainability, 9(12), 2341.
Nandi, S., Hervani, A. A., Helms, M. M., & Sarkis, J. (2023). Conceptualising Circular economy performance with non-traditional valuation methods: Lessons for a post-Pandemic recovery. International Journal of Logistics Research and Applications, 26(6), 662-682.
McKinsey Global Institute (2016). Urban world: the global consumers to watch.
Cavaleiro de Ferreira, A., & Fuso-Nerini, F. (2019). A framework for implementing and tracking circular economy in cities: The case of Porto. Sustainability, 11(6), 1813.