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Circular Economy and its Impacts on the USA Economy: An Empirical Brief

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ABSTRACT

This empirical review examines the circular economy and its impacts on the U.S. economy, highlighting the transition from traditional linear economic models to sustainable circular practices. The study aims to elucidate the American market's role in the global shift towards a circular economy by addressing several key objectives. These include defining relevant principles within both global and national contexts and clarifying initiatives led by American entities in circular transitioning to uncover opportunities and challenges in various markets.

The empirical brief aimed at developing a comprehensive analysis of financial and technical data on economic model shared by key stakeholders and outlines significant movements within the circular economy approach. By synthesizing these insights, the review contributes to a deeper understanding of how national implementations of circular economy principles impact both local and global economic landscapes.

KEYWORDS: Circular, Sustainable, Resources, Economy, Investment, Strategies, Initiatives

1. INTRODUCTION

The term 'circular economy' has generated a lot of attention in recent years regarding long-term sustainability of the economy and environment. The development of the concept of the 'circular economy' is the result of an increasing awareness of unsustainable economic development at the cost of environmental pollution and depletion of natural resources (Sverko Grdic et al., 2020). It can be considered a response to changes in aspects of the natural and economic environment, as well as in the development models. These changes relate to trends in the development of the economy and societies that are encompassed by the concepts of sustainability, corporate social responsibility, and inclusive wealth (Voulvoulis, 2022).

Multiple studies have demonstrated that a linear economy has considerable adverse effects on the environment, highlighting the need for a shift to a circular economy. This transition can be seen as a framework with the potential to support green growth, sustainable development, and other goals by effectively addressing the environmental impacts of the linear economy (Aguilar-Hernandez et al., 2021).

Despite the significant investments, transition costs, and conflicting interests associated with transitioning to a circular economy, presents substantial long-term opportunities such as reducing the use of natural resources, creating new markets, and driving innovation. Considering these benefits and exploring the impacts, the author has chosen to provide an overview of the concept of the circular economy, with a focus on the United States of America. Additionally, this article delves into the potential impacts of transitioning to a circular economy for various sectors of the economy, including the service sector, the primary sector, and the secondary sector.

2. EMPIRICAL REVIEW

Circular economy is a systems-based approach to economic development designed to maximize resources, decrease waste and pollution, and drive the development and delivery of profitable business models, sustainable solutions, and products in an economically, environmentally, and socially advantageous manner. In a linear economy, natural resources are extracted from the soil or below the soil, and industrial products are sold to consumers or professionals for specific use. At the end of life of the product, they remain waste or are destroyed to generate heat. The characteristics of a circular mindset that differentiates it from a linear mindset are based on ten factors: (a) a decreased use of virgin bio-based resources and finite sources; (b) using resources and energy at maximum efficiency; (c) moving from just selling more products to selling more services; (d) integral product management; (e) integrating environmental performance in design and production; (f) sustainability approach; (g) eco-innovation; (h) starting to limit costs in advance; (i) eco mobilization; and (j) adopting systemic thinking (Bongers & Casas, 2022).

One of the main goals of a circular economy is sustainability, especially resource efficiency in maximizing the use of resources at each stage of the lifecycle. Resources are not simply disposed of but rather re-employed. Emphasis is placed on the minimization of inputs and maximization of value added at each stage of the product lifecycle, in addition to reducing the total quantity of waste generated. It is imperative to move from a linear value chain to a circular one with a focus on the life cycle and supply chain of products and materials (Neves & Marques, 2022).

Additionally, a circular economy aims at waste reduction and the arising costs.

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In essence, the implementation of a circular economy stimulates economic development while minimizing and replacing open-loop recycling with closed-loop, integrated value cycles. A circular economy stimulates prosperity, which departs from what people want and not from the consumption of goods and services. Circular rather than linear is profitable without relying on growth. Circular solutions need not be more expensive; they need to be more profitable (Nikolaou et al., 2021).

2.2. Key Principles and Strategies

Several key cross-cutting principles and strategies can help guide the implementation of the circular economy across different industries and systems. These guiding principles provide direction to 1) support companies moving towards greater circularity; 2) identify the key strategies for achieving transformational change; 3) allow policymakers to better understand how best to enable circular economy innovation; and 4) help researchers develop a deeper understanding of the systemic implications of circular economy thinking.

Key Principles: Developing and implementing innovative strategies to increase resource efficiency can help organizations create more value from less resource use. Design for Longevity: Incorporating circular economy concepts into the design of products or buildings can have many benefits, such as reduced energy costs from the recovery of secondary materials or the generation of new revenue streams from the repurposing of products or components. Design for Lifetime; Before End of First Life; Resource Recovery: Strategies that focus on recovering the value in products or materials that come to the end of their useful lifetime can include improved materials recovery, reverse logistics, or refurbishment. Product Life Extension: Mainstreaming product life extension can improve the resource efficiency of products or buildings. Strategies to achieve life extension include more repairable products or increased building adaptations (Marsh et al., 2022).

Innovative Strategies for the Circular Economy: The work identified a variety of innovative strategies that companies can incorporate to operationalize these principles. These strategies are Eco-Industrial Clustering, Sales-Lease-Service, Chemical Sharing, Digital Platforms, and Closing Regional Food Systems. Collaboration: Practically applying these strategies often requires a significant amount of collaboration and communication among stakeholders. Policymakers can help facilitate the adoption of various circular business models by providing financial support and creating stricter development and building codes and standards. There are large differences across the case studies, such as units of analysis, the specific strategies, the industries involved, or the level of acceptance from building occupants. This work raises additional questions regarding the context-dependency of these strategies (Asgari & Asgari, 2021).

3. CIRCULAR ECONOMY INITIATIVES IN THE USA

While the movement for circular economy indicators at the federal level has been weak in the USA, an increasing number of private and local public initiatives are promoting the adoption of business models designed to comply with circular economy principles. Circular economy efforts in the USA are being taken by private companies with the support of city and/or state governments. The USA has seen little action at the federal level to develop policy in circular economy-oriented strategies such as sustainable materials management. Circular economy drivers in the USA have all been in response to short-term company-specific economic drivers and private sector initiatives. Governments are collaborating with the private sector to identify common goals, leverage public-private partnerships, and provide a level of competitive advantage in support of the circular economy movement. This type of action in the USA is important for the adoption of circular economy policies since it has the advantage of increasing competition, expanding the practical capacity of material flow transparency, enabling general awareness building in the domain, creating high visibility showcasing aspects of circular economy modeling in practice, and building consumer, business, and stakeholder support through improvements in both economic and ecological efficiency and effectiveness (Curtis et al., 2021).

The following programs contain attributes of circular economy operational principles and maintain purposeful dialogue and development in the field as it pertains to the USA. The selected programs represent 1) a shift in business model to use more durable products, 2) the improved productivity and resource efficiency of materials used in the movement and delivery of goods, and 3) the organization of a network to further develop circular economy inventory principles and tools.

Case studies highlighted for special results include: 1) the list of companies engaged in the New Materials Initiative, and 2) business results achieved by the SmartWay program. Existing supportive research and background papers are also reviewed to further prove that there is both relevant and practical impact of these initiatives. Leaders of multiple companies, institutions, and individual participants are listed illustrating both the variety of individual champions of sustainable business (Bocken & Geradts, 2020). This shows that business case implementation can take several forms, and they stand ready to lead in the domain when and if policies will react and support their investment in circular economy initiatives. Stakeholders comprise companies, NGOs, the government, trade associations, and more traditional consulting services and academic social networks. Non-U.S. companies, as well as technical advisors for companies that initiated these programs, provide foreign expertise in two of the selected programs.

3.1. Government Policies and Programs

While no comprehensive strategy exists in the USA aiming at establishing the circular economy, various laws, policies, and programs, either traditional supply-side measures to promote eco-efficiency or quite progressive demand-side measures in the spirit of sufficiency, circulism, and eco-modernism, exist at both the federal and state levels, accompanied by an equally dispersed range of research projects. This gamut of measures and strategies introduced across a vast landscape of industry sectors and federal agencies complicates comprehensive analyses to assess the cumulative effect.

Scholars generally identify poor upscaling, inadequate regulatory inputs, and persisting subsidies as the major challenges for the application of circular economy concepts. The proliferation of public support for circular economy activities indicates a growing political will to curb these and other barriers to circularity. Highly successful American programs provide support that goes back to voluntary agreements between the public sector and individual industries or industries' associations, laying down model regulations or standards. Here, proven success stories and rapid expansion beyond the initial sectors offer encouraging signs. Their successes demonstrate the existence of a favorable policy environment. To date, however, scholarly analysis has not transcended normative proposals and food-waste projects (Guerra & Leite; Awan & Sroufe, 2022).

3.2. Private Sector Initiatives

A few collaborative initiatives and movements examine and foster circular economy concepts. Across a range of industries, companies and businesses of all sizes are integrating circular practices into their business models. Driven by the increasing awareness of the long-term impacts of resource management and their own bottom line, private enterprises are making circular economy-focused activities financially and operationally sustainable and environmentally progressive. Examples include large-scale shipping vessels adopting energy-efficient and therefore economically efficient technological solutions or collaborative efforts such as an investment fund to make recycling economically sustainable that funds diverse initiatives like the recycling of ash to make concrete and a project that aims to expand municipal recycling infrastructure. Between those two initiatives lies a continuum comprising projects that make modest modifications to one or two aspects of a process, program, or relationship, primarily for economic benefit, and those that fundamentally alter economic models, pricing structures, and even industry frameworks (Guldmann & Huulgaard, 2020).

The above-cited initiatives and projects can lead to increased opposition by market incumbents. At least two strategic responses are available in such circumstances. One is to compete and invest in new product services and innovation to keep up the pace of change or perhaps lead it. The other is to lobby regulators and foster the creation of onerous industry

standards to dissuade market entrants and solidify the status quo, at least for a time. Besides investing in new business models and innovation, the market-based approach may also necessitate the harnessing of social and market energy directed at altering consumer behavior. In the absence of broad social support and a widespread economic buy-in, industry will continue to maintain a common set of expectations and definitions that support narrow business assumptions and advantage over the broader public good. Public-private partnerships aimed at addressing social and economic factors play a critical role in the development of new services and products. Given the urgency of addressing social and environmental challenges, these transitions need to occur faster than under business-as-usual transformation.

4. ECONOMIC IMPACTS OF CIRCULAR ECONOMY IN THE USA

Improving resource efficiency in the USA by implementing a more circular economic model could have a wide range of economic impacts. A more circular economy in the USA could create jobs and lead to increased GDP growth. Currently, several studies provide empirical support for these claims. However, the results from different researchers vary; overall, they agree that a circular economy has the potential to bring multiple economic benefits.

Based on economic modeling studies, the implementation of circular economy practices across several key sectors shows future cost savings. Furthermore, it is well known that environmental performance in industry increases as companies become more resource-efficient, often reducing energy usage, emissions, and water use. Moreover, evidence also suggests that resource efficiency can increase a company's competitive advantage in the labor market by potentially attracting more highly skilled employees. By replacing virgin materials with recycled feedstocks and reducing waste and reusing components, circular economy companies are maximizing the value of the materials value chain. A greater value in the materials stream means more taxes paid, more royalties paid, and increased investments due to the higher asset value of the company. All these show that the move to a more circular economy will aid expansion, not hinder it. Innovation is essential for improving resource efficiency. Innovative activities such as research and development investments or eco-innovation may lead to productivity gains, enhanced competitiveness, new market opportunities, and thus economic growth in several circular economy sectors. (Joensuu et al., 2020).

4.1. Job Creation and Economic Growth

The transition from a linear to a circular economy is largely primarily about job creation and economic growth. Circular initiatives require skills in design, chemistry, and engineering for demanufacturing and for the use of recycled materials. In designing for circularity, new employment opportunities are likely to emerge in industries such as metal removal, metal forming, electricity generation, and fuel sales. Many circular jobs, such as exporting waste and reprocessing waste materials, will provide additional economic returns as raw material scarcity increases. Thus, a circular economy is considered a remedy for economic problems, given the potential for green job creation. The greatest potential for job creation from shifts to the circular economy lies in construction, automotive, and electronics. Sustainable, circular economic practices promote a more sustainable environment and limit further fossil fuel use. All the available data support the claim that transitioning to a more sustainable economy will cause economic expansion. The most important point for this discussion may be that a circular economy is, indeed, part of a green economy strategy, and that the green economy is understood to ultimately be a good thing for the global economy. However, the transition from a linear to a circular economy will likely have costs upfront. One possible approach to dealing with this could be to see if layoffs can be delayed by investing in worker retraining so that they can work in the cleaned-up or reclaimed sites. The potential costs and savings should undergo more detailed analysis. Irrespective of the incentives, the potential for the creation of new jobs in a new energy economy is key for continuing advocacy and interest in this subject, both generally and in the USA more specifically (Mindell & Reynolds, 2023).

4.2. Resource Efficiency and Cost Savings

A strategy that aligns closely with considering the economics of a circular economy is to focus on resource efficiency – to ensure that minimal materials and energy are consumed, and to ensure maximum resource utilization to yield cost savings. In formulating a program for resource efficiency, there are many different approaches that government can take. From a business viewpoint, the emphasis is often on the use of time and material stock. A park management team might include several other strategies – saving staff time through the use of better information or communication systems; efficient park maintenance that reduces equipment or road-building staff time. All these forms of management could potentially be uses of time. This approach is certainly cheaper than using steel-cable cars, with their long-lasting construction and climatic changes. Therefore, there will be savings in construction, maintenance, and purchase costs.

A circular economy can occur through strategies such as dematerialization and waste minimization that help to break the link between increasing GDP and increasing resource consumption. Sustainability requires that the link between production and environmental and human harm is also broken. Business strategies that help minimize the waste of resources include the practices associated with the cleaner production approach. Several businesses and cities appear to have demonstrated the benefits of the cleaner production approach; for example, one company is now producing three times as many mobile phones as it was seven years ago but without increasing energy or water consumption, and without

increasing waste generation. A city has adopted a new recycling-based strategy that may cost today but is projected to save in seven years' time by avoiding rubbish fines to schools and can save on fewer landfills, lower transport, reduced waste license costs, and recycling revenues. It is important to note that although the end-of-pipe solution to pollution reduction was effective for reducing emissions, it has been more problematic and costly for internalizing resource efficiency. This reflects the low cost of resources rather than an indication of technology failure. To date, technology has not been widely adopted (Lazarevic & Brandão, 2020).

5. CHALLENGES AND OPPORTUNITIES

The transition to a circular economy is a disruptive change. Thus, as one might expect, it is intimately connected with a new set of challenges. These difficulties may vary by country, industry, or group, but most literature on the issue has identified some recurring themes. For instance, lack of awareness, infrastructure that is not prepared, and unviable economic structures have been highlighted as significant barriers. Above, the article discussed some possible solution options that could help to overcome the difficult preparation. The inherently local nature of many of these solutions means that the leading role in encouraging the move towards a circular economy is being played by innovative cities and tech companies, which look to both cut costs and tap new revenue streams. When these city-based solutions prove themselves on a small scale, they may find their way into state or national systems and further accelerate the spread of circular economies. One thing is clear: this is a difficult change to make, but if successful, the opportunities are massive.

Overcoming the challenges of circular economies is no easy task, and the list of opportunities that presents itself once that is achieved is a promising one. On a macroeconomic level, a successful move to more circular operations has the potential to grow the national economies of supply-chain-centered countries, the US in particular, by a full percentage point over the next 20 years. Building a circular economy is a good way to help address climate change, helping to cut more than half of the emissions problem in the period up to 2050.

The circular economy makes good environmental sense. With the global economy now around 90 percent linear, efforts to develop closed-loop models have the potential to deliver significant emissions savings. A successful transition makes up to half the reductions needed for a two-degree world. If that weren't enough, the move towards the circular economy has considerable potential for monetizing untapped assets. A recent report suggested that over US$1 trillion could be made in the global manufacturing sector simply by reusing, remanufacturing, or recycling materials (MacNeill et al., 2020)

5.1. Barriers to Implementation

While much research has demonstrated the potential and benefits of moving toward a circular economy system, considerable barriers exist standing in the way. These include system barriers such as the need for policies and regulations to change, inertia in markets, path dependencies, system costs, and so on. These are limitations on change that are often outside the control of any one actor within the system and may, in part, be the result of limitations in existing political, social, and technical infrastructure. They are also generally dependent on narrow and inflexible definitions of circular economy and can be seen as locked-in positions due to the characteristics of the system that require all elements to fit together.

Mindset barriers to change including a lack of understanding of the business case, lack of knowledge and information about how to do things differently, lack of belief in the new ideas, and lack of motivation to change business or consumption practices. These are the wider barriers to change that can restrict businesses and other regulations into new technical paths. Practical barriers such as a lack of available knowledge, methods, tools, or frameworks, access to resources such as labor, materials, or financial capital, and physical limitations that place practical restrictions on what can be done in the move forward. These are the most immediate barriers to change that could be addressed by research and development or a change in any one actor's business model or processes. To move forward, it is essential to understand and implement projects and mechanisms that can break down and move beyond these barriers. This means, for some projects, focusing on the practical activities that could get reuse off the ground or raising the business case and generating the knowledge for others at the more systemic level (Asgari & Asgari, 2021).

5.2. Potential Solutions and Innovations

Circular economy requires knowledge and acceptance of various business models. This also means that circular flows can only be organized through digital data, rendering business as usual and fragmented value chains impossible. This data exchange depends on transdisciplinary knowledge of ICT and persuading all actors while the innovations are newly emerging. Where can the potential solutions come from? Innovations can be technology-based alternatives, for example, where recycling and reuse are difficult, typically electronic chips or tangible ICT waste. If there were new ICT, for example, the old systems became warm houses as storage data servers as an alternative to mini data centers because of their cooling systems. In the long run, businesses take the top opportunities from new technologies, the green tech niches, placing them as the economy-wide winner in terms of profitability.

For ICTs to flourish, new business models and alternative service structures consisting of various multi-stakeholders

need to be developed as the basis of the future-proof economy.

Another solution is education, teaching children in schools about transitioning toward a circular model is one way forward. Far from making children become rejectionists, present challenges linked to resource scarcity and argue the necessity of a new economic business practice that is to be adopted worldwide, even without them being an actual stakeholder.

Further possible solution could be political, with a clear signal that embedded in political discourse can help spread awareness. This shift should be useful for companies and ease their adoption. More relevant norms will help to push them toward more innovative paths, useful for the entire economy. The new line is for change managers, where facilitators is the very operative word, except that unlike traditional business, collaborations and co-creations should be the very essence of the process without an underlying strategy or hierarchy. Like a moving platform, pushing possibilities of creative or flexible alternatives to reconfigure different chains. Milestones in this process are frugal innovations adjusting the seed horizon for innovation into low-tech solutions applicable to developing countries. One possible result then is to illustrate concepts from a systematic approach and move from the coating to the capability itself; therefore, the strategies within the frame are like the picture that flows into a culture and then captures the essence of the change (Serrano-Bedia and Perez-Perez2022).

CONCLUSION

In conclusion, there are significant opportunities for the transition to circular economy models to generate economic, social, and environmental benefits in the USA. There is strong evidence to suggest that developed economies need to transition to less resource-intensive and more resource-efficient production, and there are many social and economic benefits of doing so. Indeed, the transition to a circular economy is essential to counteract harmful economic and environmental trends and to ensure a sustainable future with inclusive opportunities for human prosperity, social welfare, and dignity.

While achieving the switch to a circular economy is likely to initially produce significant costs, the system in the long run will begin to substitute to stimulate increased rates of sustainable business activity and encourage innovation, producing a prosperous future at all levels of private, public, or civil society.

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