Recourse to the Circular Economy: The Path Ahead

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1 Introduction

The twenty-first century is expected to be marked by the risks emerging from the current economic paradigm that has been guided by the proposition that the availability of natural resources is *endless* and their increasing withdrawal from nature for greater prosperity and human well-being is *unproblematic*. There has been a lack of appreciation of *planetary boundaries* for resource availability and explicit attention to the harmful impacts for nature—both as a source of matter and energy and as a sink for disposal of wastes. This has led to the concerns for *safe operating space* assuming gradually the central focus in the discourse of economic decision-making, thereby posing challenges for the neoclassical paradigm. Consequently, it is imperative to undertake measures for addressing environmental and resource-related risks for promising a *sustainable economy* in the times ahead. Unless there are concerted efforts to decouple economic growth from resource use and its impacts on the environment, the realisation of Sustainable Development Goals (SDGs) would remain elusive (WEF, 2019).

The advancements in science and technology have raised our understanding regarding the *levels* and *types* of unsustainability to a greater degree. However, despite several attempts, the world is facing formidable challenges in laying down a path to move towards a sustainable economy. One plausible explanation for this is based on a growing realisation that "sustainability is a systems problem" wherein economics, technological progress and public policy have a critical role to influence the variables (such as *stocks*, *rates* and *trade-offs*) that are fundamental to envisage such a transition. Both natural and human systems are dynamic ones that undergo transition and

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evolution over time and space. Much to the dismay, the unsustainability characterising the inter-linkages of human and natural systems continues unabated. Moreover, the emergent behaviour[1] of these systems tends to confound attempts aiming for their transition to sustainable pathways (Graedel and van der Voet, 2010).

Undoubtedly, several supply-side factors inclusive of physical parameters are crucial in the sustainability discourse. However, the demand-side factors have a critical role to play in determining how long-term sustainability would unfold. Such demand for resources is in turn influenced by the choices of economic agents—producers and consumers, whose behaviours are largely governed by the framework of institutions in which they operate. It is projected that, if the current consumption patterns continue to persist, the global demand for primary material use would touch a level of 186 billion tonnes by the year 2050. This is an alarming trend since it implies a more than doubling of the global material use in just about one-third of the twenty-first century estimated at 90 billion tonnes in 2017, which stood at a level of just 7 billion tonnes at the turn of the twentieth century (WEF, 2019).

Globally, the concept of circular economy (CE) is being put forth as an effective means to foster the preservation of natural resource base and its optimum utilisation, thereby minimising negative environmental externalities and ensuring decoupling of economic growth from environmental degradation. In this context, this chapter provides a review of the conceptual foundations of the CE as was first proposed by Pearce and Turner, and analyses the scope and methodological framework of CE in terms of its inter-linkages with other fields such as industrial ecology and ecological economics (see Sect. 2). It further provides an overview of the recent initiatives of the Government of India towards the adoption of CE in the Sect. 3. Finally, it puts forth an economic perspective towards CE and highlights some potential hindrances in its mainstreaming from the economic methodology point of view in the realm of neoclassical economic paradigm (see Sect. 4). The concluding observations are discussed in the Sect. 5.

2 Linear Versus Closed System

The neoclassical paradigm has attempted to integrate environmental problems with the broader set of economic issues under the subject of *environmental economics* and the issues regarding the exploitation or harvest of natural resources based on the economic principles along with some sustainability considerations under the subject of *resource economics*. However, its focus has been to explore the inter-linkages between the human economy and the natural environment which are assumed as being *linear*.

As a linear system, the human system is considered to be largely an independent system wherein the act of production and consumption is performed without an

[1] It refers to the one "in which even a detailed knowledge of one level of a system is insufficient to predict behaviour at a different level" (pg. 4, Graedel and van der Voet, 2010).

explicit appreciation of its inter-linkages with the natural environment. Consequently, its implications for the natural environment in terms of the inflow of matter and energy on the one hand and the outflow of wastes, on the other, remain out of the purview. The material needs of an ever-expanding human system, wherein the scale of economic activities has been growing at a rapid pace facilitated by factors such as technological advancements, globally integrated markets for goods and services and desire for the attainment of a higher standard of living for a growing population base, are considered to be the genesis of several environmental problems. In this backdrop, there arises a need to revisit such a linear system as it tends to ignore the various economic functions performed by the natural systems which are—(a) "to provide resource inputs to the productive system"; (b) "to take wastes and to convert them back into harmless or ecologically useful products"; and (c) "a direct source of utility in the form of aesthetic enjoyment and spiritual comfort" (Pearce & Turner, 1990).[2]

2.1 Dimensions of the Circular Economy

Based primarily on the work of Kenneth Boulding and Nicholas Georgescu-Roegen that had its foundations in the laws of thermodynamics and their application to economic systems, Pearce and Turner attempted integration of these three economic functions performed by the natural environment into the realm of human systems. This involved: (a) considering economy as a *closed* system wherein the economic system is not only subject to the limits or boundaries set by the natural systems, but their interactions are circular rather than being characterised by linear inter-linkages; and (b) conforming the functioning of the economic system, subject to entropy law, to a *sustainable* system wherein wastes generated get recycled. The lack of emphasis on recycling waste originating from human systems is in sharp contrast to the natural systems that have an inherent tendency of re-utilising its waste to the maximum extent; for instance, waste generated by one species is put to use for its usefulness by another species before ultimately getting absorbed given the assimilative capacity of the natural environment. These considerations led them to envision the economic system as being closed and circular for it to be a sustainable system, against being a linear and an open one. Such an economic system is what they referred to as the *circular economy.*

Further, they argued that there is nothing inherent to the functioning of economies as such that can ensure their consistency with the natural environments linked to them and to ensure that they both "coexist in equilibrium". The fundamentals to realise the CE lie in relating "the scale and configuration of an economy to the set

[2]Broadly speaking, these "can be considered as components of one general function of natural environments—the function of life support" (Pearce & Turner, 1990). According to the Millennium Ecosystem Assessment, the ecosystem services are broadly classified as provisioning, regulating, cultural and support services (Costanza et al., 2014).

of environment–economy interrelationships underlying that economy". According to them, the key objective should be to sustain an economy, and the act of sustaining involves "making it last, to keep it in being and make it endure". One can thus argue that a sustainable economy is the one that adheres to the framework of CE which in turn requires the adoption of the closed and circular system. There is no denying the fact that the ultimate purpose of a functioning economy is to create utility, but for it to be a sustainable one, there is a need to organise it as a closed and circular system, which undoubtedly would have implications for "what can be done by way of achieving that utility". Consequently, in terms of organising the economy while being subjected to the laws of thermodynamics, it becomes crucial that concerted efforts are made to deal with the aspects that are critical to the circular economy such as managing *stocks* of resources, their *rates* of harvest or exploitation, *trade-offs* in terms of continued use of a resource in an economic system vis-à-vis its ultimate disposal as wastes to the natural environment and implications for nature's assimilative capacity.

2.2 Circular Economy and Its Inter-linkages

In recent times, as the emphasis on the concept of CE has gained momentum owing to the unsustainability concerns (Ghisellini et al., 2016), there has been renewed interest in the research on its historical evolution (Winans et al., 2017; Murray et al., 2017) and conceptual inter-linkages with some of the important concepts such as *industrial ecology* (IE), *ecological economics* (EE), *sustainability* (Geissdoerfer et al., 2017), *sustainable development* (SD) (Korhonen et al., 2018; Millar et al., 2019) and *bio-economy* (Giampietro, 2019). However, the concept of CE is intrinsically linked to the field of IE and EE.

Industrial Ecology and Circular Economy: Robert U. Ayres is credited for introducing the concept of *industrial metabolism* that refers to "the whole integrated collection of physical processes that convert raw materials, energy and labour into finished output and wastes in a steady-state situation" (Ayers, 1994; Manderson & Considine, 2018). Ayers' adoption of the word—*metabolism*—given its biological interpretations, in the context of the economic system allowed him to highlight the distinguishing features among biological organisms and industrial systems. He underscored that the living organisms tend to reproduce themselves and are highly specialised ones with their behaviour undergoing evolution only over a longer time frame. Further, the life cycle of nutrients in the natural environment, for instance, hydrological cycle, carbon cycle, nitrogen cycle, etc., is a closed one (Ayers, 1994).

Such observations about the natural systems are in sharp contrast to the firms or industries in the economic system. Most importantly, these production systems are an open one, not geared towards keeping their materials cycle to be closed. Note that a system qualifies to be a closed one "if there are no external sources or sinks" and a closed system in turn "becomes a closed cycle if the system is also in steady state that is if the stocks in each compartment are constant and unchanging

at least on the average". In other words, a sustainable industrial economy is the one which goes beyond the consideration of resource availability (i.e. stock considerations) and addresses concerns for recovery, recycle and reuse of materials (i.e. flow considerations) through tracing their flow from source to sink as wastes (Ayers, 1994).

Developing on the foundations laid down in terms of the concept of industrial metabolism, the industrial ecology (IE) has evolved as an interdisciplinary field following the principles of systems thinking and underscoring the need for exploiting the interdependencies among units as well as industries, also referred to as industrial symbiosis, towards efficient secondary resource management in production systems (Saavedra et al., 2018; Bruel et al., 2019). It attempts to integrate environmental issues in the industrial ecosystem for their transformation to environmentally compatible ones. IE thus envisions industrial systems to be developed as being an analogue to natural ecological systems, wherein firms/industries move towards a closed-loop system and wastes are considered as commodities of value that are meant to be recovered, recycled and reused in the complex interconnected networks of firms/industries. It thus emphasises that unit processes and industries shall be treated as interactive systems instead of being considered as isolated components (Richards et al., 1994; Bruel et al., 2019).

It is important to note here that the literature dealing with the set of issues in the domain of IE tends to focus primarily on technical issues. The orientation towards economics and policy issues is lacking. The bibliometric analysis reveals that in the literature on CE and IE, the economic and environmental dimensions are resorted to in terms of linkages but the critical third dimension of sustainable development (SD), i.e. social sustainability, remains lacking (Saavedra et al., 2018). Undoubtedly, IE has an important role to play in facilitating the implementation of CE. The IE tools such as material flow analysis, life cycle assessment and eco-design are useful for capturing the direct and indirect environmental impacts on account of industrial processes and the associated material and energy flows. The integration of such information into policy formulation and adoption of instruments can enhance the degree of policy effectiveness with respect to the outcomes achieved through public intervention. However, given the choice of tools and techniques of IE, the nature of assessments carried out either remains predominantly descriptive or is aimed at conducting accounting exercises for material and energy flows across the value chain or intervening stages of manufacturing semi-finished or final products. Hence, there is an urgent need to bring together the economic principles and foundations of IE in an integrated manner to develop an analytical framework facilitating the transformation of industrial systems into a sustainable one, thereby enabling the transition to CE (Manderson & Considine, 2018).

Ecological Economics and Circular Economy: Ecological economics (EE) sets out a trans-disciplinary agenda to overcome the disciplinary boundaries in addressing issues regarding the allocation of resources, their distribution among different members of the society and the scale of economic activities which have a bearing on the flow of matter and energy into the human systems. The neoclassical economics framework does deal with the allocation and distribution issues, but in

particular, it is the recognition of the scale of economic activities and its implications for the life-support system on the planet earth that makes EE a distinct field from it. The subject of *environmental economics* under the realm of the neoclassical economics, as an attempt to address the issues of externalities arising from the process of production and consumption, recommends the use of policy instruments towards attaining the socially optimal level of pollution following the notion of *weak sustainability* (i.e. the notion of sustainability which allows for the substitution between man-made capital, human capital and natural capital). In contrast, EE follows the notion of *strong sustainability* which not only rules out the possibility of substitution between these different forms of capital but also among the different forms of natural capital. Also, it underscores the need to preserve the critical forms of natural capital as an essential prerequisite for keeping intact the *regulating* and *supporting* services of the ecosystem besides the *provisioning* and *cultural* services and thereby sustaining the process of life itself. It thus criticises the neoclassical perspective regarding the inter-linkages between the natural environment and the human economy which envisions them as being two independent systems (Costanza et al., 2014). It rather advocates that the human systems are only a sub-system of the natural ecosystem or biosphere, subject to the laws of thermodynamics, and their expansions shall be sought while adhering to the notion of *diversity, stability and resilience* of ecosystem (Hussen, 2013).

EE adopts a system thinking perspective for integrating socio-economic systems with the ecological systems and thus considers system analysis to constitute "a more natural scientific base and worldview for the inherently integrative trans-discipline of ecological economics than classical, reductionist science". For such an analytical framework, the definition of system boundaries and the spatial scale of an ecosystem to be analysed become vital. Therefore, to develop a comprehensive understanding of the interacting systems, it is considered crucial to study "the similarities and differences among different kinds of systems at different scales and resolutions" (Costanza et al., 2014).

Similarly, though CE has its roots in the system thinking, it is important to emphasise the relevance of the issue of scale (such as micro-, meso- and macro-level) in (a) formulating plans and programmes for its mainstreaming and (b) developing strategies given the different approaches such as top-down and bottom-up adopted towards its implementation. This necessitates further research to identify the challenges in its successful implementation at the different levels while securing participation from businesses, government and the society at large (Ghisellini et al., 2016).

3 Mainstreaming Circular Economy in India

The impetus for the current emphasis on resource efficiency (RE) and considerations of CE development in India came from the Indo-German bilateral cooperation that led to a project—"Resource Efficiency and Sustainable Management of Secondary Raw

Material". This project got funding from the German Federal Ministry of the Environment, Nature Conservation and Nuclear Safety under its International Climate Initiative (IKI) and has been implemented jointly by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH and the Indian Ministry of Environment, Forest and Climate Change (MoEFCC). The deliberations among the project partners led to the establishment of the Indian Resource Panel (InRP) in the year 2015 as an advisory body under the MoEFCC. This panel comprised ten[3] members ensuring wider institutional collaborations and was entrusted with the role "(a) to assess the existing policies about resource efficiency and secondary resource management, (b) to integrate such considerations in the flagship policies and programmes of the government and (c) to carry out a baseline assessment of the policy landscape in India to identify the gaps as well as potential synergies to inform the future policy direction/public interventions" (Becker et al., 2019).

3.1 Recent RE/CE Initiatives in India

The InRP published a policy brief entitled "Recommendations for an Indian Resource Efficiency Programme (IREP)" in April 2017 to serve as a guiding document for the policymakers to devise resource-efficient strategies in the country. This document published by GIZ was developed by the InRP in collaboration with several organisations which assisted it either in the capacity of being a consultant such as Adelphi Research Gemeinnützige GmbH (Adelphi) or as knowledge partners such as Institut für Energie-und Umweltforschung Heidelberg GmbH (IFEU), The Energy and Resources Institute (TERI), Development Alternatives (DA), VDI Zentrum Ressourceneffizienz GmbH (VDI ZRE). It outlined the broad contours of a resource efficiency programme for India given the development needs of the country and its projected material demand trajectories for the future. It laid down ten major action points for developing such strategies based on the two guiding principles—a) maximising the value creation from the natural resource base for human well-being and b) minimising costs from the exploitation of natural resources for society as a whole. It also underscored the imperativeness of formulating suitable policy measures following the life cycle approach, and through identifying key industrial and strategic sectors (also referred to as hotspot sectors), materials and encouraging multi-stakeholder participation (InRP, 2017).

On 2 June 2018, the Ministry of Environment, Forest and Climate Change (MoEFCC) signed a Memorandum of Understanding (MoU) with TERI for setting up the Resource Efficiency (RE) Cell at the ministry. The objective behind this initiative has been to establish an institutional framework that could serve as a

[3]The members were Mr. Vishwanath N. Anand, Dr. Prodipto Ghosh, Dr. Tishyarakshit Chatterjee and Mr. Rajen Habib Khwaja (former officials from the MoEFCC); Dr. Ajay Mathur (Bureau of Energy Efficiency); Dr. Ashok Khosla (Development Alternatives); Ms. Seema Arora (Confederation of Indian Industry); Mr. Ravi Agarwal (Toxics Link); Dr. Prasad Modak (Environmental Management Centre); and Ms. Sunita Narain (Centre for Science and Environment).

platform for mainstreaming concerns related to RE in the formulation of public policy and the pursuit of suitable policy goals and targets in the country. The RE Cell was also assigned the task of enabling the formulation of the RE policy in the country while adopting a system-based thinking approach and facilitating the coordination among various ministries and public/private agencies (PIB, 2018). Further, the MoEFCC reconstituted the RE Cell in October 2018 and also the InRP into an advisory committee—Resource Efficiency Steering Committee (RESC) to the Cell in November 2018 (TERI, 2019).

The MoEFCC also signed a Joint Declaration of Intent (JDI) on 2 June 2018 with the European Union (EU) for the implementation of the European Union's Resource Efficiency Initiative (EU-REI) project in India. This project aimed at facilitating the promotion of RE considerations and had a three and a half years duration ending in July 2020. Under this project, some of the key sectors identified were electric vehicles (mobility), solar photovoltaics mobility (renewable energy), building and construction, e-waste and plastic packaging for which sectoral-level assessments have been carried with support from the consortium partners such as GIZ, TERI, Adelphi and the Confederation of Indian Industry (CII) in September 2018 (EU-REI, 2018a, b, c, d). Besides, the National Institution for Transforming India (NITI) Aayog has also released sectoral-level assessment for different sectors such as aluminium, steel, electrical and electronic equipment, construction and demolition during January 2019, in association with the concerned ministries such as the Ministry of Mines, Ministry of Steel, Ministry of Electronics and Information Technology, and Ministry of Housing and Urban Affairs, respectively (NITI Aayog, 2019a, b, c, d).

In this backdrop, TERI submitted a "Reference Report for National Resource Efficiency Policy for India" to the MoEFCC on 12 April 2019 wherein the sectoral studies as conducted under the EU-REI project and by the NITI Aayog formed the basis of drawing strategies for mainstreaming RE in the seven sectors, namely automobile, plastic packaging, construction and demolition, e-waste, steel, solar photovoltaic and aluminium. It adopted an integrated RE approach and followed the principle of 6Rs—reduce, reuse, recycle, redesign, remanufacture and refurbish in making recommendations towards the development of a policy framework for the promotion of RE. The report underscored the need for adoption of the life cycle approach in public policymaking for ensuring sustainable production and consumption in the country. Further, it is emphasised that the scope of the recommendations remained limited to the non-energy abiotic material resources at this juncture (TERI, 2019).

3.2 National Resource Efficiency Policy and the Overarching Framework for RE/CE in India

In India, the Draft National Resource Efficiency Policy 2019 (hereafter, NREP 2019) was released on 23 July 2019 by the MoEFCC in the public domain inviting comments and suggestions. This policy has been prepared by the MoEFCC after incorporating

inputs from the RESC in consultation with multi-stakeholders both within and outside the government (MoEFCC, 2019).

The guiding principles of this policy are sustainability considerations and optimum resource use, attaining material security, innovations in business models and creating employment opportunities during the envisaged transition of the economy to the one practising RE and adopting the CE framework. To develop an enabling institutional and regulatory framework towards facilitating the process of transition, it proposes (a) the setting up of National Resource Efficiency Authority (NREA), under the aegis of the MoEFCC, to mainstream resource-efficient strategies and the promotion of crucial dimensions of the CE, and (b) constituting an inter-ministerial advisory board—National Resource Efficiency Advisory Board (NREAB) to ensure collaborative efforts among the several stakeholders. It remains noteworthy that the scope of NREP 2019 covers both biotic and abiotic resources "across all the life cycle stages of any sector". However, the action plan laid down in the policy document initially for the three years from 2019 to 2022 relates to the abiotic resources across the seven hotspot sectors, namely aluminium, automobiles including electric vehicles, buildings, construction, chemicals (plastics), solar photovoltaics and steel. It also provides for a comprehensive review of the policy after ten years to examine the need for any changes in the rules as well as the institutional structure (MoEFCC, 2019).

Further, the NITI Aayog in collaboration with the EU Delegation to India published a status paper entitled "Resource Efficiency and Circular Economy: Current Status and Way Forward" in January 2019. It outlined an overarching framework for the Indian economy identifying six broad pillars: (i) policies, (ii) programmes and mainstreaming, (iii) regulations, (iv) dynamic recycling industry, (v) research and development (R&D) and technology development, and (vi) capacity development, outreach and monitoring (see Appendix I for further details). Initiatives under these heads are deemed necessary for the adoption of CE as it goes beyond just managing wastes and aims at promoting the sustainability of resource use throughout their life cycles (NITI Aayog, 2019e).

4 An Economic Perspective on Circular Economy

Broadly speaking, a successful transition from a linear to a circular economy would entail making concerted efforts towards a range of enabling technical, economic and social factors (see Box 1). Also, there arises an urgent need for collaborative efforts among all stakeholders such as governments, businesses, researchers, civil society and citizens towards realising a fundamental shift in the socio-economic system (Ghisellini et al., 2016).

Box 1 Enabling Factors of a circular economy

1.	Eco-design	• Products designed for a longer life, enabling upgrading, reuse, refurbishment and remanufacture • Product design based on the sustainable and minimal use of resources and enabling high-quality recycling of materials at the end of a product's life • Substitution of hazardous substances in products and processes, enabling cleaner material cycles
2.	Repair, refurbishment and remanufacture	• Repair, refurbishment and remanufacture given priority, enabling reuse of products and components
3.	Recycling	• High-quality recycling of as much waste as possible, avoiding down-cycling (converting waste materials or products into new materials or products of lesser quality) • Use of recycled materials as secondary raw materials • Well-functioning markets for secondary raw materials • Avoidance of mixing and contaminating materials • Cascading use of materials where high-quality recycling is not possible
4.	Economic incentives and finance	• Shifting taxes from labour to natural resources and pollution • Phasing out environmentally harmful subsidies • The internalisation of environmental costs • Deposit systems • Extended producer responsibility • Finance mechanisms supporting circular economy approaches
5.	Business models	• Focus on offering product-service systems rather than product ownership • Collaborative consumption • Collaboration and transparency along the value chain • Industrial symbiosis (collaboration between companies whereby the wastes or by-products of one become a resource for another)

(continued)

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6.	Eco-innovation	• Technological innovation • Social innovation • Organisational innovation
7.	Governance, skills and knowledge	• Awareness-raising about changing lifestyles and priorities in consumption patterns • Participation, stakeholder interaction and exchange of experience • Education • Data, monitoring and indicators

Source Adopted from EEA 2016

In this context, it is worth emphasising that the key considerations from an economist's point of view are—*efficiency* and *equity*. The neoclassical school of thought which emphasises the market mechanism in the realisation of these two objectives relies primarily on the functioning of the invisible hand in achieving equilibrium. This equilibrium is perceived to be influenced by the changing market conditions as reflected by any adjustment in the market forces of demand and supply and is expected to result in a new equilibrium after the due adjustment process which accounts for the shortage/surplus conditions as the case may be. The equilibrium achieved is considered desirable as it is in itself a manifestation of a *social order* which under the market mechanism gets realised despite the free spirit of economic agents.

However, the absence of the crucial prerequisites such as atomistic economic agents, perfect information and zero transaction costs in real-world situations tends to limit the significance of market mechanism in ensuring allocative efficiency. The public intervention is sought after not only for overcoming such imperfections of markets on a case-to-case basis for the efficient provision of private goods but also for dealing with the situation of externalities and efficient provision of public goods, wherein the market fails in achieving the desired optimal outcomes. Further, despite the claims regarding the distribution neutrality of the markets, the world has witnessed ever-increasing concentration of wealth and income in the hands of a few, raising serious doubts regarding the gains from higher economic growth to trickle down in the absence of public intervention. Despite the widespread recognition of such limitations of the market mechanism, there have been arguments in favour of designing suitable policy interventions to correct for the market's inadequacies, thereby achieving the much-desired objective of social order while permitting the freedom of choice to the economic agents (Nayak, 2020). In other words, it is claimed that the social order can still be reinforced through appropriate public interventions.

It is noteworthy here that there is increasing evidence that the optimality achieved through market mechanism could still be a cause of concern in itself. For instance, it could well be the case that the optimal level of pollution/wastes achieved far

exceeds the assimilative capacity of nature, thus leading to unabated environmental degradation. Further, the optimal scale of economic activities could still be beyond the carrying capacity of the ecosystem and can thereby threaten the earth's life-support system (Hussen, 2013). This can potentially unfold into a *higher degree of disorder* (owing to the climate crisis, nature crisis, pollution and waste crisis) which would not only fundamentally disturb the social order effected through the market mechanism in the first place but would also, in turn, undermine its significance as an institution ensuring the social order itself (i.e. the key role it is envisioned to perform). The reason being that the market mechanism as an institution fundamentally deals with the situations in and around the set of scarcity issues (i.e. achieving allocative efficiency) and at best can be manoeuvred for realising equity considerations through designing suitable public interventions which may or may not interfere with the decision-making of economic agents. However, there arises a need for assessing the adequacy of market mechanism for (a) addressing emergencies arising from such crises that threaten the very survival of life on planet earth (for instance, the prevailing unprecedented crises due to the COVID-19 pandemic), (b) coping with concerns for sustainability arising from the increasing intensity and frequency of extreme weather events (such as cyclones and droughts), (c) facilitating decision-making in situations of uncertainty and (d) dealing with the irreversibility of environmental changes in the wake of an alarming growth in human footprints on nature in the recent times. Such events do expose the vulnerability of the human systems and end up introducing a higher degree of disorder in the socio-economic systems to be managed.

Thus, it may not be incorrect to argue that any attempt to re-establish order in the socio-economic systems under such challenging situations would entail revisiting the social relations as effected through the market mechanism. For instance, the disorder that emerges, on account of the inconsistencies of the market outcomes vis-à-vis ecological considerations driven by the law of thermodynamics, would necessitate reorienting the social relations suitable for ensuring coordination/cooperation of actions towards the promotion of social good. Therefore, if the objective is to ensure sustainability as a social good, it is felt necessary that there should be responsible and "sustainable consumption and production patterns" in the society (i.e. SDG-12). However, the challenge in realising this is aptly put forward by Joseph E. Stiglitz (hereafter, Stiglitz) in the following words.

> In recent decades, economists have focussed on the need for collective action. Society is better off if or when its acts collectively – through the provision of public goods, proscribing activities that give rise to negative externalities, and encouraging those that give rise to positive externalities. There can be Pareto improvements. But the most important arena for collective action is *the establishment of the rules of the game*, enabling a market economy to function, enforcing contracts, and preventing the abuse of power, whether within an institution or within society. (Pg. 20–21, Stiglitz, 2017)

In the above backdrop, it is important to focus on the recent initiatives in the domain of business model innovations under the purview of implementing CE. This is considered to be one of the key enabling factors in the transition to the CE framework in the long term while having the potential to contribute towards sustainable

consumption and production (i.e. SDG-12) in the near or medium term through facilitating RE. Such innovative business models have been broadly categorised into (a) service-*and function-based models* such as product-oriented services, user-oriented services and result-oriented devices, (b) *collaborative consumption*-based models involving sharing, swapping, trading or leasing of products and other assets (such as land or time) and (c) *waste-as-a-resource* business models emphasising exploitation of cross-sectoral and cross-cycle links in the flow of resources such as industrial symbiosis. It is emphasised that these innovative models are characterised by disruptive changes in the socio-economic system that can have positive effects for the society as a whole. However, this process of transition would involve trade-offs as there are potential negative effects for the traditional business models as well as stakeholders in the associated value chains, adverse implications for financial institutions, fiscal policy and regulatory framework from an economic point of view. In this backdrop, it is argued that there arises a need for concerted efforts towards providing adaptive financial mechanisms and innovative policy frameworks to strengthen the positive vis-à-vis negative outcomes during such a transition (EEA, 2016). In other words, this calls for *rewriting the rules* in the broadest sense.

In a democratic set-up, *the establishment of the rules of the game* is to be administered by the government, i.e. the elected representatives, who *in principle* are expected to conform to the mandate of the electorates.[4] Thus, it is the *prevailing* social preferences that tend to inform the determination of such rules which, in turn, implies that society ultimately serves as the governing institution towards their formulation. The adequacy of both these institutions in executing their responsibilities in contemporary times is best put forth by Stiglitz in the following words:

> Thus, the system of checks and balances has (so far) prevented one branch of the government dominating over another; but it has not prevented powerful groups from capturing the entire government, or to put it more mildly, from exercising disproportionate influence, of a kind inconsistent with democratic values. This failure can be traced to the failure of a broader set of checks and balances – within our society. (Pg. 24, Stiglitz, 2017)

> But in a deeper sense, in terms of the functioning of society and the political system as a whole, there is an absence of checks and balances—no way, short of a wholesale recommitment to an agenda of greater equality, of preventing those at the top from continuing their aggrandizement of power; no way to prevent the concentration of economic and political power; no way to ensure a democracy even in the market place of ideas. (Pg. 27, Stiglitz, 2017)

Hence, any move towards mainstreaming the CE would then have to necessarily overcome the following potential hindrances[5]:

[4] How widely such mandates reflect (or capture) the social preferences remains subject to the choice of the voting rule and the pursuit of democratic values and culture in the society as a whole. Such a discussion remains beyond the scope of this study.

[5] This is not to imply them as being an exhaustive list of such hindrances (or barriers). For instance, Kirchherr et al. (2018) identify a different set of barriers in the implementation of CE for the European Union and classify them as being cultural, market-related, regulatory and technological in nature.

(a) The inadequacy of the notion of Pareto efficiency in guiding such a transition, given the wide disparities in the socio-economic indicators of human well-being and the skewed distribution of resources across different sections of society. More importantly, any move which would necessarily end up making someone better off at the expense of someone else during the process of transition would be considered untenable following the notion of Pareto efficiency and as Charles D. Kolstad puts it

> If the Pareto criterion is used to make societal decision, then decisions may tend to be biased towards the status quo. If society is only willing to take steps that improve on the status quo for everyone, then implicitly, there is the assumption that the status quo is acceptable. (Pg. 49, Kolstad, 2012)

(b) At the more fundamental level, this would necessitate modelling the behaviour of individual economic agents embedded in the realm of social conduct, i.e. behaving in a socially responsible manner, as against just being reduced to "self-interested, own regarding pursuers of utility maximisation—'Max-U'—defined only over their own private outcomes". According to Smith and Wilson, this amounts to revisiting the

> …neoclassical tradition that swung too far in displacing, rather than more modestly supplementing, Smith's classical systems-oriented thinking. The new equilibrium concepts were defined too narrowly over outcomes, a substitution that seemed superior in the context of institution-free general equilibrium market analysis and the partial-partial equilibrium analysis of game theory. At some point even the human being was dropped as the subject of our general inquiry as a social science. (Pg. xvi, Smith & Wilson, 2019)

Further, they argue that one of the fundamental weaknesses of the neoclassical tradition of utility is its inappropriateness of the understanding of the contextualisation of "one's own interest" in Adam Smith's body of work (especially concerning The Theory of Moral Sentiments and An Inquiry into the Nature and Causes of the Wealth of Nations) and is certainly not at par with the modern interpretation of "self-interest" which runs counter to its original interpretation in principle. Hence, the decision-making of individual economic agents being reduced to their self-interest behaviour under the neoclassical tradition has introduced an anomaly in the understanding of Adam Smith's perspective.

> Thus, if the modern economist espouses naked self-interest as the foundation for economic decision-making, she does so incompatibly with the founder of the discipline and more generally with the genius of the Scottish Enlightenment. There are moral rules, just rules, that govern our conduct in impersonal markets (Pg. 5, Smith & Wilson 2019).

> For Smith there is no unresolved observed contradiction between people pursuing their own interest, say in money, and choosing actions that are other-regarding. One's own interest includes living harmoniously and ethically with others, and choosing socially fit actions. (Pg. 11, Smith & Wilson, 2019)

Consequently, according to them, there has been misplaced emphasis on just the *outcomes* of actions and lack of appreciation of their *origin*, a crucial aspect about their social context, as understood and emphasised by Adam Smith.

> Max-U had served well-enough the observational demands of decision in market supply and demand experiments under perfect enforcement of property, but not in the interactive world of personal social exchange. That world required a plethora of new experiments designed to understand why the postulated mapping from action to outcome to utility was so sensitive to the particular context. However, none of the new efforts to improve understanding were guided by *a comprehensive theory of human sociability as had been provided in Sentiments wherein individual actions are signals of rule-governed relational conduct, where context matters because it gives meaning to outcomes.* (Pg. 159, Smith & Wilson, 2019)

(c) The need for emphasising long-term perspective versus short-term gains towards mainstreaming systemic-level changes for addressing the sustainability concerns while adopting the framework of CE. As Nitin Desai aptly puts it in the following words

> Is environmental protection a hindrance for profit-seeking businesses? Not if these businesses have a long-term vision of their viability…The real pressure for diluting environmental scrutiny comes from hit-and-run businesses that are looking for quick profits rather than long-term sustainability (Desai, 2020).

Besides addressing the above forces resisting the change towards the CE, another crucial aspect relates to the need for its standardisation, given the variety of approaches followed towards its implementation—top-down, bottom-up, etc. It is expected that concerted efforts in this regard would be crucial in eliminating the vagueness in its implementation strategies and to facilitate comparison in terms of achievements by developing a threshold in terms of "frameworks, guidance, supporting tools and requirements for the implementation of activities of all involved organisations". Recognising such a need, the International Standard Organisation (ISO) has constituted a technical committee (ISO/TC 323) under the chairmanship of Mrs. Catharine Chevauche in 2019. This committee is administering the development of four standards focussing on the crucial areas related to the CE—(a) framework and principles for implementation (ISO/WD 59004), (b) guidelines on business models and value chains (ISO/WD 59010), (c) measuring circularity framework (ISO/WD 59020) and (d) performance-based approach—analysis of case studies (ISO/CD TR 59031) (Naden, 2019).

5 Concluding Remarks

Going forward, there is an urgent need to move beyond the techno-centric and business-oriented understanding of CE to a framework that attempts to integrate with the socio-economic realities and development priorities of the developing economies. The implementation of CE envisages profound shifts in the production structures and

consumption patterns during the process of transition from the linear economy to the circular one. However, the elected governments in these economies, despite their attempts to implement strategies focussing on CE, are most likely to uphold the developmental priorities towards promising inclusive development and improving well-being crucial for social cohesion. This is not to imply that the adoption of the CE framework is contrary to the process of economic growth and development. The trade-offs involved in the intervening transition phase won't present a win-win situation in the near-or medium-term. Thus, it is expected that in the times to come the mainstreaming of the CE in the development discourse for realising long-term sustainability would remain contingent upon social acceptance towards traversing the path of transition through suitable public policy interventions and an enabling business environment. Has the increased frequency of extreme weather events in recent years and above all the unprecedented prevailing situation owing to the COVID-19 pandemic brought the society to such a *juncture* remains to be validated in the times ahead. But certainly, the resilience of human systems that has been tested by the prevailing circumstances has undoubtedly brought us as a society to the *crossroads* wherein the time to act is *now*.

Appendix I: RE Framework in India

The key thrust areas and the set of initiatives that are considered crucial for promoting RE in India are as follows:

I. *Policies*
• Formulate a national policy on RE for all types of resources (biotic and abiotic) addressing various life cycle stages and key stakeholders • Formulate a national policy on Sustainable Public Procurement (SPP) to minimise consumption of resources, reduce waste generation and GHG emissions, as well as contribute to innovation in materials and technology in the space of RE • Strengthen existing sectoral policies and programmes of Ministry of Mines by incorporating RE principles • Formulate a national policy for end-of-life-vehicles (ELVs) • Formulate a Waste to Resource Management Directive based on existing waste and hazardous substance management rules/regulations following a life cycle approach targeting relevant stakeholders and focussing on RE

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II. *Programmes and Mainstreaming*
• Mainstream RE initiatives by leveraging existing flagship programmes and schemes like Swachh Bharat Abhiyan, Smart Cities, Make in India, Startup India, Digital India and others • Industry may leverage Corporate Social Responsibility (CSR), Corporate Environmental Responsibility (CER) and Extended Producer Responsibility (EPR) for RE initiatives • Build on the National Chemical Management Plan being drafted by Ministry of Environment, Forest and Climate Change (MoEF&CC) to develop a strategy, framework and guidelines for the safe and circular management of chemicals • Leverage the national clean energy and environment fund to finance infrastructure, clean technologies and related RE initiatives
III. *Regulations*
• Establish a national coordinating body—Bureau of Resource Efficiency (BRE) between various ministries to identify, implement and achieve national RE goals • Establish state-level coordinating bodies to identify, implement and achieve state-level RE goals • Large and resource-intensive industries and bulk waste generation may be mandated to file the Resource Use and Efficiency Statement • Establish and mandate a "Consent to Close" requirement for medium and large industries in the "RED" category to ensure that waste streams are responsibly managed and recycled before closure • Rationalise tax regime on critical virgin raw materials to make secondary raw material price competitive
IV. *Setting up a Dynamic Recycling Industr*y
• Promote the establishment of Material Recovery Facilities (MRFs) with the allocation of land in urban areas and industrial estates • Facilitate urban local bodies (ULBs) to undertake urban mining and create secure landfills. • Facilitate the establishment of Producer Responsibility Organisation (PRO) for waste recycling and for engagement with the informal sector • Facilitate innovation to enhance resource recovery and improve working conditions by integrating the informal sector into the waste value chain • Establish a remanufacturing council or association to catalyse the growth of the remanufacturing industry • Establish and manage platforms for waste exchange by expanding the SBM portal
V. *R&D and Technology Development*
• Support R&D to develop scalable technologies for RE • Create and manage knowledge platforms that facilitate open innovation, provide access to experts and engage academia to support the transition towards RE • Leverage technologies like artificial intelligence (AI), robotics, block chain, etc., for the recycling industry

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VI. *Capacity Development, Outreach and Monitoring*
• Facilitate creation of accredited laboratories that could conduct testing (especially for recycled products) as well as provide advisory services • Provide capacity development support on RE for ministries/departments at the national and state levels • Develop and promote programmes and certifications for informal sector skill development in RE • Develop and launch citizen awareness programmes on RE • Foster intergovernmental collaboration and knowledge exchange with the G20, RE dialogue and other bodies like International Resource Panel and other national and international forums • Develop monitoring and outcome indicators for tracking progress on RE • Establish and mandate the certification for operators managing waste-to-resource recycling centres to ensure safe, efficient and net positive operations

Source GOI, 2019

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