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The important role of strong sustainability and the potential of the circular economy in generating a socially and ecologically just future

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Abstract: The human-nature relationship is in a state of deep imbalance, where no country in the world currently meets the needs of its citizens at a scale that remains within planetary boundaries. Covid-19 revealed cracks in the way our societies are run and the vast vulnerabilities that exist, with economic inequality at an historic high as 0.5% of the population own the same as the bottom 90% according to a recent Oxfam study. Here, the difference between strong and weak sustainability is explained and used to argue in favor of critically examining our social provisioning systems and to develop technologies that lower the environmental impact and simultaneously increase the social gain. The circular economy is briefly introduced and put forward as a way of thinking that can drive future-proof innovation with potential for multi-solving both social and ecological problems. To conclude, technology is recognized as a paradigm defined through the current economic thinking. Going forward it is important to take power over this thinking and ask ourselves how we may use technology to provide a good life for all within planetary boundaries rather than to produce profits for the few.

Key words: circular economy, strong sustainability, overconsumption, ecological economics, technology

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Introduction

Covid-19 turned the world as we know it upside down. As countries across the planet were on lockdown, the pandemic revealed cracks in the current way our societies are run and the vast vulnerabilities that exist, exposing existing inequalities in health, education, justice, economic and other social systems (Allen and West, 2020; Basnyat, 2020; Renato, 2020). As the race to develop a vaccine has been accomplished in record-breaking time (Kim et al., 2020), the end to the pandemic may be in sight – at least for developed countries (Grant, 2021). Though, a vaccine is not enough to solve the systemic imbalance of the human-nature relationship.

The origin of the Covid-19 pandemic has strong links with human exploitation of nature. The natural barrier to zoonotic infectious disease lies in healthy ecosystems, which are diminishing at an alarming rate (Johnson et al., 2020), with scientists having highlighted the risk of zoonotic diseases for years (Smith et al., 2014). 2020 was a record-breaking year in many aspects: it was the joint hottest year ever recorded as identified by C3S (2021), shared only with 2016, a year in which El Niño increased temperatures. Last year can further boast record wildfires and temperatures in the Arctic, a record number of tropical storms in the Atlantic, record wildfires in the US and Australia, record force of the tropical storms in the Pacific, and a large number of locusts-pests hitting Sub-Saharan Africa (C3S, 2021; Kramer and Ware, 2020). In their yearly Global Risk Report, the World Economic Forum have identified climate action failure, extreme weather and biodiversity loss as the main threats facing human societies (WEF, 2020). In recent history, humans have caused the loss of 83% of wild mammals, 50% of plants, cut down half the planet´s trees and exploited 90% of global fish-stocks, termed the Anthropocene extinction (WEF, 2020).

The cause of this worsening environmental crisis is the unavoidable conflict between material economic growth, the prevailing global development paradigm, and ecological health (Rees, 2003). Economic growth has been framed as the main tool to bring development and diminish poverty world-wide, under the umbrella of sustainable development, defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987, p.16). Though, economic development has not caused a parallel growth in happiness, with increasing inequality across the world accompanying much of this growth (Victor, 2010).

National and indeed global level economic development in the past 30 years has yet to meet the needs of citizens at a scale that remains within planetary boundaries (O'Neill et al., 2018).

Covid-19, along with climate change, are symptoms of a larger disease. The world´s current economic system has been pinpointed as the problem, as the human-nature relationship that dominates here is not fit for life (Shiva, 2013). In what follows, the next chapter introduces some issues related to a consumption-driven economy. The difference between strong and weak sustainability is explained to serve as an inspiration for how these problems may be solved. Next, the circular economy is proposed as a tool that has potential to implement strong sustainability, wherein critical thinking about future-proof technologies can be central to ensure the creation of balance in the human relationship with nature. This article attempts to draw a simple picture on how the social, environmental and economic paradigms interrelate and inspire a new way of problem-solving that can combine solutions to multiple problems and draw the line on how socially and ecologically just futures may materialize.

A CONSUMPTION-DRIVEN ECONOMY IN CONFLICT WITH NATURE

Economies are increasingly dependent on consumer activity, relying on private consumption to keep the economy going rather than to fulfill needs (Pirgmaier, 2020). Critical new value theory research identified the current, dominating economic paradigm as "not an economy that serves people by delivering wellbeing, but one in which people serve the economy" (Pirgmaier, 2020, p. 9). As economic growth has been the key development paradigm promoted by sustainable development since at least the 1980s, it is problematic that the benefits of this growth has accrued with the top 20% instead of benefitting society as a whole, leading to the gap between rich and poor being at its highest level in decades (Dabla-Norris et al., 2015). Currently, the world´s richest 0.5% own as much as 90% of the global population (Oxfam, 2020). This is an increasingly large issue not only for the social consequences of inequality, but also as climate change threatens to exacerbate further economic inequality as well as high incomes being important drivers of CO_2 emissions (Oxfam, 2020; Jackson and Papathanasopoulou, 2008, Chancel and Piketty, 2015). As stated by Wiedmann et al., "consumption is by far the strongest determinant of global [environmental] impacts" (p.3, 2020). Internationally, it is the richest 10% that account for 70% of vehicle-purchases, 76% of packaged holidays, and consume around 40% of final energy – equivalent to the bottom *80%* (Oswald et al., 2020). Built on exploitation of the human and natural world and with society serving the economy, it is perhaps not surprising that for example the British people, for one, have never been outright asked what they want the economy to do, nor how it should be achieved or measured (Earle et al., 2017).

Contrary to the dominant manner of exploitation, ecological economics has emerged as a relatively new economic field focusing on re-establishing balance in the human-nature relationship. The core of this discipline is seeing the economy as embedded in society: the economy is a social construct, and society is embedded in nature - contrary to the neoclassical vision of society embedded in the economy and nature as an externality from which to draw resources (Røpke, 2004). Viewing the economy as embedded in society is a paradigm shift as this places control of the economy back into the hands of society, contrary to a society in which political goals are defined in terms of their effect on the economy (Earle et al., 2017).

Going forward, to recover from the Covid-19 pandemic and to offer socially just and environmentally sound climate change mitigation and adaptation policies it is important to implement an alternative to the current dominant development agenda that has mainly managed to make the rich richer and exploit nature almost to the point of no return. Now, we should focus on the safe and just operating space for humanity (Raworth, 2017). Thinking back to the definition of sustainable development as defined in the Brundtland report, this brings us to an important distinction from ecological economics that should be the key to the recovery from Covid-19 and for all future development: weak versus strong sustainability.

WEAK SUSTAINABILITY

Weak sustainability, in short, is the idea that natural capital can be substituted by human technology and is hence not important to conserve (Gowdy, 2000). Under weak sustainability, ecosystem services can be replaced by humans and our technologies, and the human use of the environment is perceived as a purely economic problem. As long as the value of economic output is not declining over time, the activities are seen as sustainable even if the natural environment is degraded (Gowdy, 2000).

Carbon capture and storage technology, CCS for short, is an excellent example of the weak sustainability concept in practice. Increasing CO_2 emissions from ever-growing consumption and production activities, which have a long lifetime in the atmosphere, are one of the main drivers of climate change (Hsiang and Kopp, 2018). To keep global warming below 1.5°C, recognized as a goal under the Paris Agreement, around 18 billion tons of CO_2 emissions must be reduced by 2030 (IPCC, 2018). Natural, healthy ecosystems absorb CO_2 from the atmosphere and store them for example in our oceans, peatlands, forests and grasslands (Jones and Donnely, 2004; Smith, 2006). This is exactly the kind of natural service that would be beneficial to copy, especially as these ecosystems and their ability to absorb CO_2 are diminishing due to temperature increases (Tagesson et al., 2020). As the shift in economic production has been deemed too costly or too difficult to roll out in time, CCS technology has been put forward as a way to remove large amounts of CO_2 from the atmosphere and/or from production processes (Herzog, 2017). This feeds the argument that there is no need for structural change as current levels of production would become "net zero" or "carbon neutral" by means of CCS technology, allowing us to continue with the dominating material economic growth paradigm. However, CCS-technologies, should they become large-scale successful – which is doubtful (Herzon, 2017), does not solve the problem of the ecosystem degradation and inequality that stems from the current system.

STRONG SUSTAINABILITY

Strong sustainability, on the other hand, recognizes that while (human) economic and technological, and environmental, capital can be complementary, they are not interchangeable (Gowdy, 2000). It maintains the importance of keeping ecosystems intact and does not prioritize economic profits over human and environmental well-being. Gowdy (2000, p.28) states this clearly: "*Sustainability is not only an economic problem but also one of maintaining essential, non-replaceable and non-substitutable environmental features*", in essence inviting a different way of thinking about the values and drivers of the economic system.

Examples of strong sustainability are policies, incentives and technologies that focus on reducing environmental impacts through for example reducing material and/or energy needs, whilst simultaneously increasing, or at least not diminishing, the well-being of people. A systemic example is 'Doughnut Economics', focusing on creating inclusive and sustainable economic development within planetary boundaries (Raworth, 2017). More concrete examples include for example the indigenous South American philosophy of 'Sumak Kawsay', where wellbeing is viewed from the perspective of a whole community, with nature considered a member of this community (Villalba, 2013), passive solar architecture, and 'Transition Towns' where citizens collaborate locally to rebuild energy resilience and reduce CO_2 emissions (Transition Network, nd). But while these are many and growing, they are yet to be implemented on a systems-scale that shifts the priorities of national, regional or indeed the global economy. Life on earth depends on ecosystem resilience, but as weak sustainability has more commonly been the mainstream answer to problems, this resilience is diminishing – as demonstrated by the Covid-19 pandemic (Johnson et al., 2020).

STRONG VS WEAK POLICYMARKING

Our reliance on healthy ecosystems is furthermore reaching a crossroad, as 2020 was marked not only by the record events as mentioned above, but also by the crossover of man-made materials (plastics, asphalt, steel, cement and so on) outweighing Earth´s entire natural biomass (Elhacham et al., 2020). At the same time, a shift in the way we think about climate change is under way. In the latest UNDP's study, surveying 1.2 million people across 50 countries, two-thirds of respondents stated that climate change is a global emergency (UNDP, 2021). To reach net zero carbon emissions and the 1.5°C temperature goal, many countries are relying on electrification of vehicles and renewable energy (Vakulchuk et al., 2020). Renewable energy has made huge cost-improvements in recent years (Hodge et al., 2018). The price of solar energy and lithium batteries has fallen ninefold in the last decade and wind power is 40% cheaper than in 2010 (NREL, 2020; IRENA, 2020). Overall, the cost of renewable energy has fallen to such a degree that it is cheaper to build new renewable energy infrastructures than running the old, fossil-fuel ones (IRENA, 2020). This has a huge impact on air pollution, which kills an estimated 9 million people globally every (Landrigan et al., 2017). The public health benefits of renewable energy over fossil-fuels actually outweigh the costs of building the new infrastructure alone (Epstein et al., 2011; Union of Concerned Scientists, 2017). This turns the argument that decarbonization is too expensive, as we explored above as the main driver of for example CCS technology, on its head.

But are these practices strong or weak sustainability? If electrification of vehicle-fleets in the EU, for example, relies on the mass-production of lithium batteries and new cars to be fitted with these batteries, while the old, fossil fuel powered cars are sometimes "retired" to the Global South (UNEP, 2020), have we really achieved any emissions-reductions? Renewable energy has a similar issue. While the energy-sources from wind and solar are indeed renewable, the infrastructure to harvest them are not. Wind-parks for one have a large environmental footprint in their demand for virgin steel and constant maintenance as well as their impact on the local ecosystem (Tota-Maharaj and McMahon, 2020), and while technological innovations have dramatically improved their production processes, solar panels still rely on non-renewable earth minerals, sometimes obtained from questionable practices including child labor (Tsoutsos et al., 2005; Santoyo-Castelazo and Azapagic, 2014). Furthermore, how much of the remaining natural ecosystems will need to be sacrificed to make room for them to meet projected increases in global energy demand?

THE POTENTIAL OF THE CIRCULAR ECONOMY

There are ways one can be creative to turn the previously mentioned actions of renewable energy, electrification and others into strong sustainability measures that do not need to compromise the remaining natural world to the same extent, and which can lead to fulfilled lives within planetary boundaries. The circular economy is a concept with great potential if utilized in the right way, which already benefits from promotions by the EU and national governments as well as the private sector (Korhonen et al., 2018). It is not within the scope of this piece to discuss all its aspects or dive into its debates. The focus here lies on opening the door to thinking in closed systems where social and environmental impacts are measured and optimized in the spirit of strong sustainability.

The circular economy is a regenerative system wherein resource inputs and wastes as well as emission and energy leakages are minimized, and material and energy loops are, ideally, closed (Geissdoerfer et al., 2017). The promises of the circular economy to offer cyclical use of materials are especially relevant since human-made materials now outweigh natural ones (Elhacham et al., 2020). The key to keeping the circular economy within the realm of strong sustainability is three-fold: i) harvesting of renewable resources should not exceed their regeneration rate, ii) the rate of extraction of non-renewable resources should not exceed the rate of creation of renewable substitutes, and iii) wastes, whether emissions or materials, should not exceed the environment´s capacity to digest them (Daly, 1992). The main promise of this concept is to minimize systematic leakages and negative externalities caused by products and services by sharing, maintaining, prolonging their lifetimes, reusing or redistributing from one user to the next, refurbishing or remanufacturing them when exhausted, to avoid to as large extent as possible to recycle them, though this is the last step that closes the wider circle (Ellen MacArthur Foundation, 2015). While this is the essence of a circular economy, a vast array of facets of it can be found with different foci, such as value retention of the manufactured object versus value retention of the material (Blomsma and Tennant, 2020). What if, for example, electric cars were not produced from scratch but rather the fossil-powered components of existing cars were exchanged for renewably powered ones? This would forego the need for an entirely new car and lead to a large reduction in virgin material-use.

The circular economy makes common sense and has the advantage of already having attracted the business community to sustainable development (Korhonen et al., 2018).

The good news is, there are many ways one can improve and extend the lifetime of materials. For example, using fewer and simpler materials that are not glued together so they can be taken apart and used separately the next time round, and making the product repairable and abandoning planned obsolesce, is another way. The Cradle2Cradle approach keeps registry of both private and public sector examples, which can be of relevance to policy formulation as both examples of good practices as well as inspiration for what is possible (Cradle2Cradle Institute, 2021). Some strong sustainability innovations within the realm of the circular economy are starting to happen, with one excellent example being modular kitchens. Modularity allows a component-by-component retrofit which minimizes waste and can be scaled up to create a circular and modular housing stock (van Stijn and Gruis, 2020). Yet, housing is not the only sector which can benefit from modular and circular thinking. What about healthcare solutions, agriculture, aviation and shipping? Material passports is one type of technology able to facilitate a strongly sustainable circular economy. By keeping track of the materials that go into a product, say a building or a car or a laptop, one is able to rapidly make use of those materials once the product has reached the end of its life in its current state. As the world is currently wasting enormous resources every year, this is a step which can lead to great improvements down the line (van Stijn and Gruis, 2020). Though far from easy as it goes against current economic rationale, it is being incentivized by pioneers such as the French government that now require a 'Repairability Index' to be printed on products (Stone, 2021).

To visualize the potential for achieving wellbeing within strong sustainability, a recent study has observed that collective provisioning systems, such as access to healthcare, public transport, garbage disposal/recycling and sanitation are more important to achieve high levels of wellbeing than changes in income or increased energy consumption (Baltruszewicz et al., 2020). Alternative provisioning systems, systems that do not rely de-facto on economic growth to provide fundamental services but rather sideline the profit-motive and focus on providing services, can dramatically reduce the demand for final energy (Baltruszewicz et al., 2020), which would reduce the need to build more and more (renewable) energy infrastructure. Though, to operationalize strong sustainability, it is important to first begin with a clear objective of what it is that we wish to sustain (Gowdy, 2000), and recognizing that this does not need to rely on the for-profit paradox. The circular economy and strong sustainability leave room for governance and management in the beyond-profit sector through e.g. social enterprises and workers collectives driven by meeting societal and environmental needs rather than a profit-motive, as well as the potential to generate more inclusive provisioning-systems where anything from printers, tools, cars, care, practices, programs and knowledge can be developed and shared (Cradle2Cradle Institute, 2021).

Strong sustainability invites a paradigm-shift in an economy driven by well-being, inclusivity and social justice within the realm of planetary boundaries and with the goal to meet social needs - rather than an economy driven by profits and consumption-growth that exploits nature without actually fulfilling those needs. The technology we need in the 21st century and beyond is thus technology that makes alternative provisioning systems in the realm of low natural impact and high social gain the new normal.

CONCLUSION

Climate change has been identified as the largest and most pervasive threat to human societies the world has ever experienced (UNEP, 2015), materializing in many forms such as extreme weather-events (C3S, 2021) and zoonotic diseases (Johnson et al., 2020). The issue of inequality and natural exploitation in the name of economic development and shareholder profit maximization goes to the heart of the economic system (Pirgmaier, 2020). Though, the man-made cause of these issues is also the key to remedy the problem. We could actively design a world in which prosperity, not profits, is the desired outcome.

This research has explained the difference between strong and weak sustainability; the idea that humans may or may not replace natural ecosystem services with technology (Gowdy, 2000) - and highlighted our dependence on these ecosystem services for the wellbeing of our societies (Johnson et al., 2020). A strong sustainability circular economy has been brought forward as a potential way to mitigate climate change by reducing energy and material needs, whilst simultaneously meeting social needs. The strong sustainability of electric cars could for example be improved if the petrol-powered engine could be exchanged for a battery and thus remove the need to produce an entirely new car, and modularity as a means for circular design has potential to drastically reduce the environmental impact of many industries. We need to critically examine our social provisioning systems and develop technologies that dramatically lower their environmental impact and simultaneously increase the social gain (Baltruszewicz et al., 2020). Technology is a paradigm defined through the current economic thinking, and going forward we may take back power over this thinking and ask ourselves how we may use technology to support each other to thrive within the biophysical limits imposed by the natural world, rather than to profit monetarily.

We are standing at a crossroad in history not comparable to any other moment as the consequences of our actions – such as climate impacts and pandemics - were not only predictable, but *are* predicted (Oreskes and Conway, 2014). By plotting our brilliant human minds together, we can create a circular society wherein technologies and processes that produce social and natural rather than economic value is given priority, meet the needs of our society and remain within planetary boundaries (Raworth, 2017). There is room for everyone to participate - we certainly need both symptoms-treating technologies to help reduce worldwide environmental footprints, clean up our oceans and restore ecosystems, as well as strong sustainability technologies and measures like passive and modular housing, low-impact agriculture and a total overhaul of the care and transportation sectors. What is needed now is for the next generation, for example the readers of this student journal, to step in with critical eyes, look for the best way to multi-solve social and environmental problems, and implement these solutions.

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