Regenerative Innovation: Improving Ethical and Sustainability Decision-Making

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Abstract

Current approaches to innovation tend to be based on rewarding decision making based on speculative investment strategies that do not take into account the negative externalities of the innovation. This has led to overconsumption and resource usage that undermines the planet's ability to support life in the long term, and the ability for societies to flourish. Global income inequality, the gap in women's empowerment, increase of global pollution, reliance on fossil fuel-based energy and food systems that generate water have resulted in the degradation of our planet past life-sustaining and safe-operating zones of the planet.

Much work is underway to improve long term sustainability and ethical decision making in small and medium sized business like the circular economy movement, and the rise of regenerative economics. But how can we embed these longer-term movements into sustainability and ethical decision making today? In this paper I propose a set of principles for Regenerative Innovation to use as guideposts when approaching innovation projects to improve sustainability, and ethical decision-making that can support innovation that considers holistic impacts of the innovation and supports sustainability efforts and long-term human flourishing.

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Dedication

This project is dedicated to individuals who will imagine new futures including human and planetary thriving.

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Introduction

"Sustainability is not a left or right issue: it is a long-term survival issue, an intergenerational justice and equity issue." - Inger Andersen, Executive Director of the United Nations Environment Programme

The UN has declared that the world is in a state of climate emergency and that humanity needs to respond urgently. We are exceeding planetary boundaries, which are a series of environmental thresholds that should not be exceeded otherwise the plant cannot support life. Of the 9 planetary boundaries that regulate the stability and resilience of the earth, assessed by the Stockholm Resilience Centre, 6 have already been crossed and have exceeded the safe operating space of the planet. (Stockholm Resilience Centre, 2023)
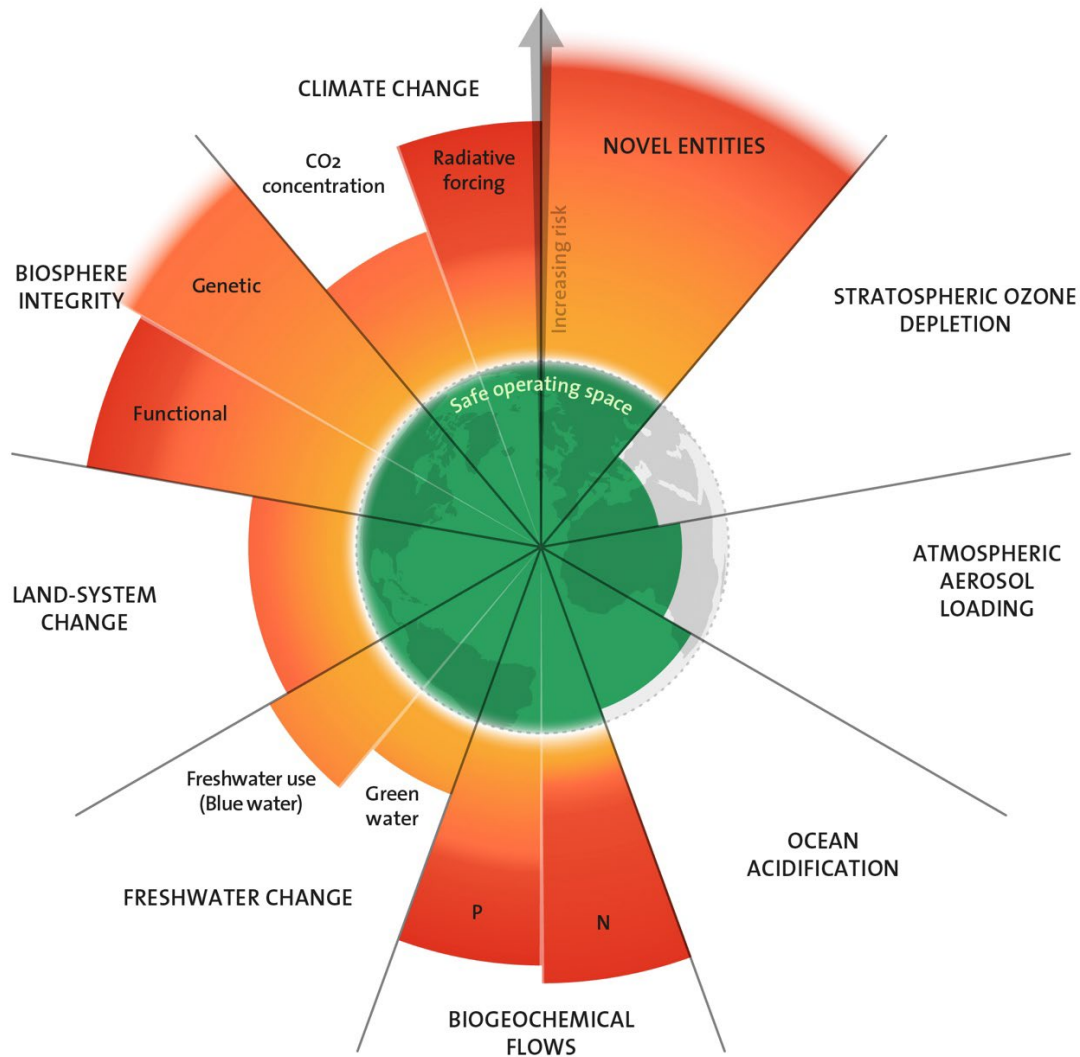
Figure 1 Exceeding Planetary Boundaries, 2023 Report
Source: Link to article

But how did we get here? Our current economic systems rewards of raw efficiency and not systems that support resilience and sustainability, leading us to exceed planetary boundaries that support life and widen the gap of inequality. (Chancel, et al,. 2022) To reach a dynamic balance between resilient systems and efficiency, in the window of vitality, maximizing the health of society and planetary health, a new model of innovation development is needed. (Ulanowicz, et al. 2009) Today, the current

economic systems value financial capital more than other inputs, like relational capital, and extractive business models. However, wealth viewed holistically can include intellectual capital, social capital, natural capital, spiritual capital, cultural capital, etc. (Capital Institute, 2023) These other forms of capital are important since markets will never be adequately incentivised to build these forms of capital, which need a sense of purpose and common values among people, communities, societies to be created. (Carney, 2022) Money is not the only way to create wealth. Wealth often includes other forms of capital like social, environmental, and spiritual capital, but today we have an economy only focused on money and power, and its accumulation. (Fullertion, 2024) Current economic and financial systems incentivize innovation based on assumptions that light regulation of financiers will make better capital allocation decisions, that the economy as whole is will eventually grow and that growth is always natural and positive, and success in the economy maximizing money and power as a reward to a "Darwinian" struggle. (Fullertion, 2024) This leads to the pursuit of innovation for speculation instead of innovation that is adaptive and responsive to the environment and society it which it operates. (Capital Institute, 2023)

This paper looks to examine the intersection of systemic design, approaches to sustainable and ethical decision-making, innovation to uncover how we can mitigate the deepening of the climate and ethical crisis through innovation that borrows principles of ecology and life sciences to create resilient systems, reduce inequality, and improve long-term sustainability progress, and navigating the problems of current economic structures in todays word. In addition, I will highlight how using systemic design is a

fundamental tool to amplify ethical and sustainable decision-making and improve the chances of success in creating new disruptive innovation. From here, I'll introduce a new set of principals for innovation, called Regenerative Innovation, that allows for innovation to thrive in an increasingly destabilizing and uncertain environment, that improves sustainability and ethical decision-making, and offer a proposed reframing of values needed during innovation development that will be necessary to make these changes.

The primary research questions for this paper explore the following:

- How might we enhance organizations' ability to create ethical and sustainable innovation in the small and medium size business.

Additionally, sub-questions to help guide the research include:

- If people understood the principles of how systems work, would they make different choices of what and how to develop new innovative product and services?
- What are the barriers to making sustainability and ethical decisions today when it comes to innovation development?
- Are small and medium size sustainability business using system thinking, and how are they using it to determine the impact of their innovation in the long term and society?

Section 1. Framing the System

"How is it that a company like Amazon can be valued at a trillion dollars, but the value of the Amazon rainforest isn't assigned value until it is removed of its trees, stripped of its wildlife and replaced with a farm or plantation?" - Mark Carney, 2023

Much of our current approach to designing and innovating is based on a mechanical-object view of how systems should work, based on the development of early twentieth-century understanding of physics. (Dubberly, 2008) Rapid industrialization and our understanding of physics led to cultural shifts in how we view ourselves and our place in the world. Current-day neoclassical economics, starting at the same time as the Industrial Revolution and the rise of manufacturing, and the rapid expansion of our understanding of physics, has also been shaped by the mechanical-object ethos. (Capital Institute, 2023)

During the Industrial Revolution, a period where we saw innovation expand to many different industries with the introduction of the scientific method of inquiry, we largely saw ourselves separate from the environment. Looking more at the environment as something that could be exploited for individual growth goals extracting resources without considering the interconnected nature of resources, our impact growth on our attitudes towards extraction and impacts on our society. However, biology is currently undergoing a period of rapid change, in sectors like biochemistry where we are learning how organisms store and encode data, transmit data, and express it, which will cause similar cultural shifts in how we view ourselves and our place in the world and the

ecology of the planet. (Dubberly, 2008) This has allowed us to see ourselves as variables in a larger interconnected system, connected to the physical world around us and the dynamic systems that are impacted when we make changes to our environment.

A Biofuels Ethics Case Study

With fuel for transport making up a third of world energy consumption, Biofuels – renewable transport fuels from plant or animal material, has become an alternative for fossil fuels that can help meet energy needs. (Biofuels,) However, much of the biofuels that are mainly developed from food crops and are controversial due to deforestations, impacts on rising food prices and land use because of their development. (Nuffueld Council on Biofuels, 2011) Today, biofuels make up a small portion of world energy use, but is expected to increase as policies are implemented to encourage their usage. In the USA, bioethanol from corn, driven by economic and energy security concerns, is blamed for the rise in the price of corn and other gains in developing countries. (Nuffueld Council on Biofuels, 2011) Bioethanol from sugar cane in Brazil is hailed as one of the most successful examples of biofuel development programs, but is criticized for contribution to deforestation and habitat loss, informal child labour, and abuses of worker's rights including unhealthy working conditions. (Nuffueld Council on Biofuels, 2011)

The Nuffueld Council on Bioethics looked at the issues caused by biofuels and highlighted the need for moral values in biofuel development that are relevant to today,

developing six ethical principles that policy makers could use to evaluate new biofuel technology and help guide policy development including: "human rights, solidarity, sustainability, stewardship and justice". (Nuffueld Council on Biofuels, 2011) Approaching biofuel development in this way could then be developed into policies, and regulation, of biofuels that, through their development, have otherwise exacerbated ethical problems in the past.

The ethical values included:

Principle 1: Human rights

"Biofuels development should not be at the expense of people's essential rights (including access to sufficient food and water, health rights, work rights and land entitlements)." (Nuffueld Council on Biofuels, 2011)

Principle 2: Environmentally Sustainability

"Biofuels should be environmentally sustainable." (Nuffueld Council on Biofuels, 2011)

Principle 3: Climate change

"Biofuels should contribute to a net reduction of total greenhouse gas emissions and not exacerbate global climate change." (Nuffueld Council on Biofuels, 2011)

Principle 4: Just reward

"Biofuels should be developed in accordance with trade principles that are fair and recognize the rights of people to just reward (including labour rights and intellectual property rights)." (Nuffueld Council on Biofuels, 2011)

Principle 5: Equitable distribution

"Costs and benefits of biofuels should be distributed in an equitable way." (Nuffueld Council on Biofuels, 2011)

Principle 6: An ethical duty?

"If the first five principles are respected and if biofuels can play a crucial role in mitigating dangerous climate change then, depending on certain key considerations, there is a duty to develop such biofuels." (Nuffueld Council on Biofuels, 2011)

It was through the development of a framework for biofuels development that the Nuffueld Council on Bioethics hopes to shape how biofuel technology is developed to improve and avoid problems of the past. Many other industries today face similar challenges with sustainability and ethics during their development process, and improving the problems of the past from innovation efforts is the focus of this paper.

Learning from Living-Systems and Panarchy

There is much we can learn from taking a living systems view towards understanding complexity, and in many cases, what we might typically consider externalities, to unravel how living systems can be in balance, operating with robustness and resilience while being innovative and adaptive. Social-ecological systems consist of adaptive cycles, of which can be described as a panarchy; a healthy system that can invent, experiment and create opportunities while being resilient to destabilizing forces. (Holling, 2001) Panarchys can also operate at their own pace and can be invigorated by

the levels and cycles above and below them. This is the foundation of many descriptions of 'sustainable development'; an ability to retain the capacity to be adaptive, create, test, and expand opportunities. (Holling, 2001) Innovation systems borrow from panarchy, by creating conditions for expanding adaptive capabilities and creating opportunities. Based on the model of living systems borrowed from panarchy, we can imagine ways of approaching sustainability and ethical decision-making with greater adaptability and responsiveness.

Innovation Systems

The literature on innovation systems can be broken down into national innovation systems which are important in high technology and knowledge-based economies. Understanding innovation systems is relevant, since the 1960 onwards, the ideas around differences between development levels between countries is largely assumed to be caused by technological differences and their support. (Fagerber, 2008) This is also consistent with Schumpeter's analysis of on growth and development created 1934. (Fagerber, 2008) (Schumpeter,1939) By understanding the current literature on innovation systems we can identify blinds spots in the current thinking of current innovation systems that has led to the climate crisis and lack of sustainability and ethical decision making in innovation today.

Schumpeter first offers a definition of innovation in the 1930s as "new combinations', where invention is when an innovation is brought to market. (Lundvall, 2007) (Schumpeter,1939) He describes innovation as new products, raw materials, processes,

forms of organization, and new markets. (Schumpeter,1939) Lundvall also provides a refined definition of innovation as " the process encompassing diffusion and use as well as the first market introduction". Systems, in innovation systems, is the interrelationships and interactions between elements, both macro-structures and micro-processes that interact in an interplay that is both co-evolving and self-organizing. (Lundvall, 2007) This allows innovation to happen.

The national innovation systems concept was developed in the 1980s in Europe and USA, and informs policy makers in many large counties such as Japan, Brazil, USA, Canada, China, and India. (Lundvall, 2007), It's also been adopted at the national and international level for economic cooperation such as at the OECS, and World Bank. (Lundvall, 2007). This innovation policy has been added to economic policy in these counties to improve innovation competitiveness. Understanding national innovation systems, which has been around for 20 years and has become widely spread with policy makers and academics (Lundvall, 2007), allows us to look at leverage points that are to enhance innovation performance and competitiveness. (OECD, 1997) National innovation systems is focused on developing improved flow of knowledge and the distribution of information. This is important for knowledge-based economies that are directly based on the production and knowledge of and information development, often as embodied in human beings. This is also referred to as human capital. For this type of innovation system, investments are made in developing research and development functions, education and training, innovative work approaches, and demand for highly skilled employees. (OECD, 1997) Lundvall also suggests that we should include social

capital, welfare systems and labour markets in capital investments in innovation systems as perspectives have moved from a more micro view of innovation to a macro view, including more parts of a system and including the value of interactions between organizations, universities, and government in the development of an innovation. Other inputs and sources of capital also include entrepreneurs, government regulations, ability for firms and organizations to interact, and ability for personnel to move freely between firms. (OECD, 1997) The outcome emphasis tends to be patients, publications and removal bottlenecks of the flow of knowledge at the at the firm and national level to improve competitiveness and performance. However, what is missing from much of the dialogue on innovation systems is sustainability and ethics as important components to innovation, both in how innovations can be developed and are valued mindsets to embed in the innovation development process.

Limits to Growth

We are currently at an important moment in time in terms of sustainability and ethics in many sectors. An exploration of planetary limits to growth modeling was explored in 1972 is coming true and is largely coming true. In Donella Meadows' Limits to Growth (1972) report, her and her team modeled the interaction between five factors resulting in planetary boundaries would be exceeded due to current attitudes towards growth through on a finite planet. In that modelling, current levels of economic and population growth the planet would not be able to support life past 2100, even with advanced technology. The five basic factors that determined the planet's ability to support life analyzed the implications of exponential growth in population, industrialization, pollution,

food production, and resource depletion on a finite planet. Meadows challenged dominate thinking of growth at all costs with the idea that limits of the Earth's carrying capacity will eventually be reached, leading to a collapse of global systems. Some critics argue that technological innovation and human adaptability would allow for continued growth without catastrophic consequences. However, the fundamental message of Limits to Growth remains relevant today, as concerns about sustainability, climate change, and resource management continue to be pressing global issues. This highlights how are current approach to innovation and therefore it's economic impacts have helped create the climate crisis we are experiencing today. Yet little is being done shift the paradigms to approach innovation to improve sustainability and ethical outcomes, thereby impacting how our economies functions, and the different types of capital that can be developed that value by society to create a better world for all.

Emergent Economic Models for a Planet in Crisis

To address some of issues mentioned, we are starting to see a rise in Economic Degrowth as an emergent theory and movement that challenges the conventional wisdom of continuous economic growth as the primary driver of human progress. It advocates for a deliberate reduction in overall economic activity, with a focus on achieving sustainable well-being and ecological balance rather than perpetual expansion of production and consumption. (Hickel et al., 2022) (Wilkinson, et al., 2019)

Key principles associated with economic degrowth include:

Critique of Growth Paradigm: Degrowth advocates argue that the pursuit of endless economic growth is ecologically unsustainable and socially unjust. They point out that the relentless pursuit of GDP growth often leads to environmental degradation, resource depletion, social inequality, and cultural homogenization. In Degrowth, economic activity should focus on human needs and well-being. (Hickel et al., 2022)

Sustainable Well-being: Instead of prioritizing GDP growth, degrowth advocates emphasize the importance of maximizing human needs and well-being within ecological limits. This entails redefining notions of prosperity to focus on factors such as quality of life, equitable distribution of resources, social cohesion, and ecological resilience. (Hickel et al., 2022)

Decoupling Growth from Resource Consumption: Degrowth challenges the assumption that economic growth must inevitably lead to increased resource consumption. Proponents argue for strategies to decouple economic activity from resource use through innovations in technology, changes in consumption patterns, and shifts towards renewable energy sources. (Hickel et al., 2022)

Localization and Self-sufficiency: Degrowth emphasizes the importance of local economies and communities in fostering resilience and reducing dependence on global supply chains. Advocates promote decentralized production, consumption, and governance structures to enhance self-sufficiency and reduce the ecological footprint of

economic activities. (Hickel et al., 2022)

Work, Leisure, and Time Affluence: Degrowth advocates envision a reconfiguration of work and leisure patterns to prioritize leisure time, social activities, and non-material pursuits. They propose measures such as shorter workweeks, guaranteed basic incomes, and policies to promote leisure, creativity, and personal fulfillment. (Hickel et al., 2022)

Equitable Distribution: Degrowth aims to address social inequalities by redistributing wealth and resources more equitably. This involves implementing progressive taxation, social welfare programs, and policies to ensure universal access to essential goods and services, including healthcare, education, and housing. (Hickel et al., 2022)

Cultural Transformation: Degrowth advocates recognize the need for a profound cultural shift away from consumerism and the pursuit of material wealth as markers of success. They promote alternative cultural narratives that value frugality, simplicity, community, and ecological stewardship. (Hickel et al., 2022)

Political and Institutional Change: Achieving degrowth requires fundamental changes in political and institutional frameworks. Proponents call for democratic decision-making processes, participatory governance structures, and reforms to challenge the dominance of corporate interests and prioritize the common good. (Hickel et al., 2022)

Overall, economic degrowth represents a radical reimagining of the goals and mechanisms of economic development, emphasizing sustainability, equity, and well-being over perpetual growth. While it remains a controversial and challenging concept, it has gained increasing attention as societies grapple with the urgent need to address environmental crises and social inequalities.

Regenerative Economics, another emergent theory on addressing economic growth and climate crisis, tends to have the following set of underlying principles that incorporate systems thinking, modelling living systems based on living systems science, working in right relationship, seeks balance, empowering participation, and honoring community and place. (Capital Institute, 2024) It's a framework and approach to economic development that seeks to create systems and practices that are not just sustainable but actively regenerate and restore the health of ecological, social, and economic systems. The following are principles and objectives associated with regenerative economics:

Holistic Perspective: Regenerative economics considers the interconnectedness of ecological, social, and economic systems. It recognizes that the health of the economy is inseparable from the health of ecosystems and communities. (Capital Institute, 2024)

Regeneration over Sustainability: While sustainability aims to maintain the status quo or minimize negative impacts, regenerative economics goes further by actively restoring and enhancing the health and vitality of natural and social systems. It seeks to create

systems that contribute to the renewal of resources, the enhancement of biodiversity, and the resilience of ecosystems. (Capital Institute, 2024)

Circular and Closed-Loop Systems: Regenerative economics promotes the transition from linear, extractive economic models to circular and closed-loop systems. This involves designing products, processes, and systems that minimize waste, reuse materials, and regenerate natural capital. (Capital Institute, 2024)

Restorative Agriculture and Land Use: A significant focus of regenerative economics is on transforming agricultural and land-use practices to regenerate soil health, enhance biodiversity, and sequester carbon. Techniques such as agroforestry, holistic grazing, and regenerative farming aim to restore ecosystems while also increasing agricultural productivity and resilience to climate change. (Capital Institute, 2024)

Community Resilience and Equity: Regenerative economics prioritizes the well-being and resilience of communities, particularly marginalized and vulnerable populations. It emphasizes the importance of local self-reliance, community empowerment, and equitable distribution of resources and opportunities. (Capital Institute, 2024)

Cooperation and Collaboration: Regenerative economics values collaboration and cooperation over competition and individualism. It encourages partnerships between businesses, governments, communities, and civil society organizations to address

shared challenges and promote collective well-being. (Capital Institute, 2024)

Diverse and Adaptive Systems: Regenerative economics recognizes the importance of diversity and adaptability in fostering resilience and innovation. It encourages diverse economic models, enterprises, and livelihoods, as well as flexible governance structures that can respond to changing conditions and feedback from ecosystems and communities. (Capital Institute, 2024)

Long-Term Thinking and Regenerative Governance: Regenerative economics emphasizes the importance of long-term thinking and planning in decision-making processes. It calls for regenerative governance frameworks that prioritize the interests of future generations and the health of ecosystems over short-term profits or political expediency. (Capital Institute, 2024)

Regenerative Finance and Investment: Regenerative economics seeks to redirect financial flows towards investments that support regenerative practices and enterprises. This includes impact investing, community finance initiatives, and the development of new financial instruments that value social and environmental outcomes alongside financial returns. (Capital Institute, 2024)

Overall, regenerative economics offers a holistic and transformative approach to economic development that aims to create regenerative, equitable, and thriving systems for both people and the planet. It represents a fundamental shift in how we

conceptualize and practice economics, moving away from extractive and exploitative models towards regenerative and restorative ones. (Capital Institute, 2024)

We can see that new emergent views of economic growth developing on how to balance human thriving, ethics, and sustainability on a finite resource planet. There is momentum towards developing new ways of improving sustainability and ethical decision making in how small and medium sized business develop new innovations, many small and medium sized businesses that make up a large portion of global economies.

In the next section, we'll look at long term trends that can either amplify current efforts to transform how we approach sustainability and ethical decision making to improve climate change and ethical business practises or undermine this period of transformational change.

Section 2. Understanding Trends and Drivers of Change

Long-Term Trends

By looking at trends, we can get a sense of the direction, size of change, and implications of trends over time that can inform our decision making today and impact the decisions we make tomorrow. (OECD, 2019) This allows us to better identify and prepare for opportunities sooner and address the corresponding challenges, and allows us to stress test our proposed solution against trends and their implications.

Rising income inequality, and gender inequality are considered major drivers of change that have has caused society to exceed the limits of beyond planetary boundaries needed to support life. (Gaffney, et al. 2022) Looking at these through the lens of trends and their corresponding implications, we can get a better understanding of their impact on the future and give us a glimpse of where further investment can help us move towards a more sustainable and ethical world. This can allows us to improve our collective and individual decisions-making for this preferred future of human and ecological thriving.

Rising income inequality

Income inequality has largely been considered an effect of a market economy. The degree of differences between the top and bottom households is at an overall high. In Canada, most wealth is held by relatively few households in Canada. The wealthiest (top 20%) accounted for more than two-thirds (67.8%) of net worth, while the least wealthy (bottom 40%) accounted for 2.7%. (Stats Canada, 2023). High levels of inequality create dysfunctional societies. (Wilkinson, et al., 2024) But, greater equality can help with excess consumption and improve the solidarity and cohesion needed to improve a society's ability to address issues like climate change. (Wilkinson, et al,. 2024) In countries with high income inequality, there tends to be greater disparity in access to health, social, and environmental problem solving at a collective level that benefits the greater society. (Wilkinson, et al., 2024)

UNEQUAL OUTCOMES
Nations with large gaps between rich and poor tend to have worse health statistics, more violence and worse pollution than do more-equal countries.

Figure 2 Nations with large gaps between rich and poor have worst health statistics, more violence and worse pollution than do more equal countries. Source: Nature

Implications

Social Cohesion: High levels of income inequality can strain social cohesion by

creating divisions between the rich and the poor. It may lead to social tensions,

polarization, and a sense of injustice, undermining trust in institutions and harming

societal well-being leading to less collective action towards sustainability and ethical decision making in society. (Wilkinson, et al., 2024) (Wilkinson, et al,. 2010)

Economic Growth: Excessive income inequality can hinder economic growth by reducing social mobility and limiting opportunities for lower-income individuals to invest in education, skills, and entrepreneurship. Unequal access to resources and opportunities may result in wasted human potential and lower overall productivity. (Wilkinson, et al., 2024) This can result in fewer opportunities for individuals to invest in sustainability and ethical small and medium sized business.

Health and Well-being: Income inequality is associated with disparities in health outcomes, with lower-income individuals often facing higher rates of chronic diseases, mental health issues, and mortality. Unequal access to healthcare, nutritious food, and safe housing can exacerbate these health disparities. (Wilkinson, et al., 2024)

Education: Income inequality can impact access to quality education, as children from lower-income families may face barriers to educational attainment due to financial constraints, inadequate resources in schools, and lack of support systems. This perpetuates intergenerational cycles of poverty and inequality, and can also lead individuals feeling less part of a global word and their interconnected place in it. (Wilkinson, et al., 2024)

Political Influence: High levels of income inequality can lead to unequal political influence, with wealthier individuals and corporations having greater access to decision-making processes and policy-making. This may result in policies that favor the interests of the wealthy over those of the broader population, which can often not favor sustainability and ethical businesses or policy. (Wilkinson, et al., 2024)

Empowerment of Women

Gender equity and sustainability goals are mutually reinforcing. (OECD, 2021) However, gender power imbalances continue to require greater investment in education and healthcare for women that can improve sustainability and ethical futures. When women have greater access to healthcare and education they tend to have higher incomes, greater autonomy and decision-making power, and tend to have fewer children. This tends to lead to greater participation in community development, greater social equity and inclusion that tends to support long-term, sustainability focused investment. In addition, having fewer children would lead to a stabilization of the global population to a level that the planet can sustain. (Dixson-Decleve, et al,. 2022) (Phan, Ly,. 2013)

Implications

Entrepreneurship and Innovation: Women's economic empowerment provides women with opportunities to engage in entrepreneurship and innovation. Women entrepreneurs are often more inclined to invest in sustainable business practices, such as renewable energy, waste reduction, and eco-friendly production methods. By supporting women's entrepreneurship, societies can drive innovation towards more sustainable economic models. (Ramya, et al,. 2024)

Education and Health: Providing Access to education, healthcare, and family planning services have positive ripple effects on sustainability. Educated and healthy women tend to have smaller families, leading to reduced pressure on natural resources and lower carbon emissions. Additionally, investments in women's health and education result in improved child nutrition, better maternal and child health outcomes.

Community Development: Women often play key roles in community development initiatives. When empowered, women drive positive change within their communities by advocating for sustainable development projects, promoting environmental conservation efforts, and participating in decision-making processes related to resource management and infrastructure development. (Bonewit, et al,. 2015)

Social Equity: Women's empowerment fosters greater social equity and inclusion, which are essential principles of sustainability. By closing gender gaps in access to resources, employment opportunities, and decision-making power, societies can reduce inequalities and ensure that all members have a stake in sustainable development efforts. (OECD, 2021) (UN WomenWatch, 2009)

Resource Management: When women are economically empowered, they are more likely to adopt sustainable practices for managing resources, such as efficient water usage, soil conservation techniques, and diversified agricultural methods. This leads to

improved environmental stewardship and helps in preserving ecosystems for future generations. (Ben-Amar, et al,. 2017) (OECD, 2021) (UN WomenWatch, 2009)

Using these two long term trends, and their implications we can get a sense of the current driving forces that could be headwinds to possible future interventions and solutions, but they could also be powerful leavers to harness for change. Understanding these topics also helps us challenge our assumptions about the current systemic barriers to improve sustainability and ethical decision-making, such as high levels of inequality driving distrust of larger reporting and government organization and their climate recommendations. These two trends and their directionality had the potential to undermined efforts to improve ethical and sustainability decision making if they are not addressed in innovation frameworks.

From here we'll "listen to the system" and dive into challenges, needs, and perceptions of what innovators in the sustainability and innovation space are experiencing day-to-day to understand what opportunity areas and unmet needs in this highly evolving space are. This will allow us to understand the current state of the business innovation environment, and help us prioritize where an intervention might be the most impactful.

Section 3. Listening to the System

Primary research was conducted with members of the sustainability ecosystem product and services space allowed for gathering rich context on the issues with current innovation systems. Once the research was conducted, data was synthesized into themes, and then into insights to communicate a story of how innovation in the sustainability start-up ecosystem happens today.

Primary Research: In-depth, Semi-Structured Interviews

Method

In-depth, semi-structured interviews were chosen as a way to understand the thoughts, feelings, goals, and context for making ethical and sustainability decisions where participants worked. The semi-structured format of the interviews allows for probing into lines of inquiry on the research topic as they arose during the interview while helping the participant stay on topic with specific questions from the discussion guide.

Recruitment was conducted through Linkedin posts and direct messages with profiles listed on the social media site. Participants were screened for participation in sustainability startup and small business contexts, with people who informed decisions about how the business would operate and which ethical and sustainability strategies they would pursue. Over a period of three weeks, 6 people were interviewed. The interviews lasted between 45 minutes to an hour. Participants answered many of the questions and often shared more information about their context of decision-making,

and the challenges of making decisions that were more ethical and sustainability focused.

Interview questions were the basis of three sections, report building and day-in-the-life, understanding how new ideas were developed and prioritized in the business, and to what extent ethical and sustainability decision-making factored into product decisions. The goal of the interviews was to understand how product and design decisions were made today in sustainability and ethical focused small business environments.

Findings

From speaking with 6 people, all residing in Canada, within the sustainability and ethical small business and consulting space, major themes around apathy to make meaningful change, economic systems that reward growth at all costs, and sustainability as a reputational risk strategy were prominent, greenwashing as a way to hide the ethics and business practices that hurt the community and environment were prominent.

The following three insights were synthesized from the interviews:

A Current Economic Environment that Rewards Growth at All Costs

Many participants talked about how the current funding environment rewarded companies and ventures that showed quick revenue growth only. This made it difficult to embed decision-making based on ethical and sustainability values into the organization in an impactful way. There was very little tolerance to including sustainability into the business models when sustainability and ethical business decision were seen as an

externality to the growth focused system to make the next funding round. One

participant explained this dynamic in the following way: "[in the current economic

system] you have to showcase growth to get the next funding round, and this pushes

the constant innovation to grow and get more revenue to get funding." One participant

talked about how the business was incentivized to develop new innovations that

reduced friction to purchasing consumer goods at all costs to reduce the amount of time

a customer could thoughtfully consider their purchase. They described thoughtful

decision making on the part of a customer as the biggest risk to the business as it could

reduce revenue and slow company growth, even if this meant people bought things they

didn't need and would throw away since impact on the environment and social systems

was considered an externality to conducting business and not valued at the company.

Opportunities in response to this insight
- Changing regulations to incentivize and reward companies with sustainable business models that address social and sustainable business practices, that strengthen the systems they are a part of.
- Rethink the value of growth as the primary value of an organization and reward companies that accumulate and develop other types of capital as part of their development, like social capital, and environmental capital.
- Rethink venture capital funding models and access to capital based on speculation on future profits alone.
- Reward companies that experiment with business models that accumulate other types of capital.

This leads us to the next theme, Greenwashing and consumer fatigue regarding sustainability marketing.

Green and Social Washing and Consumer Fatigue with Regards to Sustainability Marketing

All participants talked about how pervasive Greenwashing was generally, or how companies would market sustainability activity they were undertaking to consumers without having any real impact on the environment. Participants acknowledged that talking about sustainability and ethical business practices generated higher engagement but felt that most of what a typical company a Canadian consumer would encounter today would not truly be doing impactful work through their business with regards to sustainability and ethical business practices. Companies like H&M were cited as a company that didn't "walk the walk" of being a truly sustainable company, and that their marketing around sustainability attempts to respond to customer demand for more sustainable business practices. For one participant, H&M sustainability public relations marketing was viewed as a "thinly veiled distraction from unethical use of labour they use in developing countries to make clothing." For this participant, who had worked in the fashion industry for 15 year, they felt that fast fashion often obscured the ethical and sustainability issues around their products. She described the ethical issues of fast fashion as the following: "If you pay for a piece of clothing under $20 [Canadian], people are usually tied to chairs, you have child labor, and [the women who typically work in factories to make the clothing] have to stay away from their children all year long. It's not a healthy industry and toxic for women. Consumers need to see images of women

[workers protesting] in the streets for the first time, like they are now."

Some participants had experience with larger organizations that would engage with public relations firms and communication companies to craft a sustainability and ethical story to associate with the brands, "...getting away from the storytelling... expensive polish on things", without having any real impact. These participants also talked about how PR companies would often use overly complicated language to confuse their customers about what sustainability and ethical business practices were taking place, hiding the lack of actual environmental and ethical business practices. This behavior also seemed to allow these companies to sidestep meaningful action embedding sustainability and ethical business practices in their business. This was likely due to leadership boards not being incentivized to take action and embed these values in the business and looking at business model innovation or approaching innovation from a sustainable and ethical way.

Opportunities in response to this insight
- Set regulations around sustainability and ethics reporting to demystify and reduce confusion around sustainability and ethics when it comes marketing materials to consumers.
- Encourage organizations to develop business and innovation models that embed ethical and sustainability decision making into their business processes to reduce instances of 'inauthentic' reporting of sustainability and social marketing to consumers, and drive development that will have positive impacts on the system it is a part of.

- This leads us to our next insight, lack of understanding our place in nature and society.

Lack of Understanding of Our Place in Nature and Society

Some participants talked about a lack of awareness by the public about our role in the global connected ecosystem of the planet, limits of natural resources, and how interconnected we were as a global economy. This lack of awareness on these topics meant that individuals didn't understand their place in nature and the global society, making it easier to turn a blind eye or ignore the challenges our modern economy enables, like inequality, and overextraction of resources, and pollution. In more recent years, there seemed to be a growing connection between adverse and extreme weather events, fossil fuel usage, and climate change, however the attitude was that this change in public option on climate change to influence companies and governments to do more to make sustainability and ethical decision making wasn't going to enough to make meaningful change happen fast enough. There was, as one participant described, "...a lot of climate change denial" that was making it difficult to incentivize companies and governments to make change. One participant felt that the lack of natural science education was a contributing factor to resistance to understanding and taking action on sustainability initiatives, and not view sustainability as a competitive advantage. There was little mention of ethical decision making happening within the organizations I spoke with. All but one founder talked about ethics as a important component to developing their business, and saw this as a larger problem in their industry, largely because

government had not created incentives or regulations for business to work in ethical ways since incentives and benefits were harder to quantify.

Opportunities in response to this insight

- Improve ecology and natural science education in schools to improve citizens understand of their place in nature.

- Develop systemic design literacy to improve citizen understanding of the powerful forces that reinforce existing system and improve inclusive participation in diagnosing and recommending interventions to change system dynamics.

- Introduce organizational systemic design literacy to improve complex problem solving and intervention innovation opportunities that could spur new business ventures.

- These themes mean that addressing sustainability and ethical decision-making not only needs to happen within organizations, but also within the boarder society so to improve the functioning of current democracies, like the one in Canada.

However, the focus of this paper is to improve sustainability and ethical decision-making to drive innovation within organizations, of which the following opportunities support way to improve this type of decision making to drive improved sustainability and ethical innovation that has long lasting and impactful change on the environment and society:

- Rethink the value of growth as the primary value of an organization and reward companies that accumulate and develop other types of capital as part of their development, like social capital, and environmental capital.

- Encourage organizations to develop business and innovation models that embed ethical and sustainability decision making into their business processes to reduce instances of 'inauthentic' reporting of sustainability and social marketing to consumers, and drive development that will have positive impacts on the system it is a part of.

- Introduce organizational systemic design literacy to improve complex problem solving and intervention innovation opportunities that could spur new business ventures.

These are significant for my project because it points to opportunities that can be easily included in current innovation practices, like innovation principles to guide how to provide new mindsets and approaches innovation development that may result in more sustainable and ethical products and services that acknowledges the impact they have on society and environment. These are hopeful findings, as we'll see in the next section, because they point to the potential inclusion of smaller changes, like workshop and training, to the current innovation development process that can potentially have large impacts on what and how new innovations are created and the impact they have on society.

The overall theme here evokes a mindset shift, and skill building to see the bigger picture, our world and our place in it to improve how we make decisions that can

address climate change, inequality, and power imbalances. These have powerful

implications for current innovation development organizations like innovation, research

and development labs, and new venture development; how they train their employees

and founders to shift their perspective to build a better, more equitable and sustainable

world.

In the next section I will use the information I have learned from the interviews and

diagnose system archetypes that are reinforcing the current systems that have led us to

climate change and unethical businesses.

Section 4. Understanding the System

Using the Systematic Design Toolkit, we're able to explore the interaction between variables in systems that influence emergent behavior and dynamics. Taking a systemic design approach to understand the problem space, we can see that several reinforcing loops regarding the problem exist, that can be defined using system archetypes. System archetypes are highly regular patterns that exist within systems and can indicate problems in the system. Through casual loops to visualize the system dynamics, we can see these patterns more clearly. (Systemic Design Toolkit, 2020) This approach also allows us to understand complex systems from a new vantage point. Typically, we are trained to think of problems in linear ways, observing sequences of events from cause-and-effect, and first-order chains. This leads us to approach solving complex problems with a linear, step-by-step process and focuses on one variable in the system with limited success. This limits the success of solutions because we do not have a view of how variables in the system exert influence on the other variables in the system. (Systemic Design Toolkit, 2020) However, viewing problems from a systems perspective, we can acknowledge that there is a dynamic that exists between variables in the system, and that systems are sensitive to rebalancing due to forces exerted across a web of connections between variables within the system.

For this project, I used the insights and data gathered from Section 1 and 2 to map and understand the system dynamics. For this, I used systems mapping, causal loops, and casual layer analysis to understand the barriers and influences of the system.

Causal Layer Analysis

Influences maps allow us to develop an understanding of the dynamics of sustainability business space system. By understanding the and surfacing all components in the system we can understand where we can make changes. Causal loops allow us to examine the interplay between variables in a system to spot where activities that are influencing the system, what accelerates or decelerates the interactions between system components. The interaction between components can be described as feedback loops, where positive feedback loops result in an increase of a variable, and negative feedback loops where one where a positive change in one lead to a negative change in another. This allows us to identify system archetypes, or common patterns between variables that reinforce the existing system dynamics.

System Archetypes

A system can be described by the various archetypal or patterns, and interactions between variables in the system. By understanding the current state system archetypes, we can better spot the inefficacies and potential points of intervention to drive preferred outcomes.

Common patterns of interactions can be explained as archetypes. Archetypes capture anticipated problems in a system and can describe the pattern of interactions happening in a system. The archetypes that reflect the current problems in the sustainability and innovation system are Fixes That Fail, and Tragedy of the Commons.

Tragedy of the Commons (Macro Systems View)

In the Tragedy of the Commons archetypes, actors maximize their individual benefit from a shared resource at the expense of all other actors and to the detriment of the long-term value of the resource. In this archetype, actors try to realize short-term gains over long-term gains that could be realized through sustainable resource management. The resource is deleted quickly until it is no longer able to be sustained and is fully depleted.

From the interviews we can see that current models of innovation certation and economic policy tend to favor rewarding innovation based on speculative investment rather than on the other types of capital that are created from an innovation. Because of this, companies are rewarded for maximizing their own value and exploiting the communities and environments they are in as they maximize their own value and taking from the system without worrying about the impact on community or environment. This is because the current models of innovation and growth do not value the impacts of society and planet, often just considered externalities of the innovation process.

Opportunity

From the interview data mapped to this system archetype, we can see current innovation efforts focus on only speculative investment and fail to capture the true impact of how they operate and the outcomes of their innovation on society and the environment. As more participants use up resources and public goods, they deplete the resources and public goods available to all in a way the depletes the resource for all. By developing a way to view innovation, and small and medium sized business development in a way that supports better resource management and accounts for the

impact of externalities of operating their business, we can work towards better resource

management and a strengthening of public goods and resources.

Shifting the Burden (Micro Systems View)

In Shifting the Burden archetype, unproductive actions that are used to resolve a

tension of a symptom, leaving the underlying problem unresolved and ignoring the

problem while the problem gets worse.

We can see this from many of the interviews conducted where board members feel the

need to respond to create more ethical and sustainable companies by their end

customers by trying to "spot fix" the perception of their brand through sustainability

marketing. This has resulted in an abundance of greenwashing and hiding the true

impact of the business on society and the planet. End consumers become apathetic to

the marketing campaigns of these organizations without real evidence that the

companies are minimizing their negative impact on society and planet. This results in

consumers and citizens feeling apathetic towards sustainability claims made by all

companies and choosing to spend money where they can get the greatest value, rather

than having to do individual calculations on how "green" or "ethical" a company's

offerings and impacts are. All of this happens while the worsening inequality and

sustainability becomes more dire.

Opportunity

From mapping the interview data into a system archetypes we can see the following

opportunity: Current attempts to fix the perception of companies as ethical and

sustainable fail to address the true causes of these issues as they attempt to quickly try to improve the perception of how they operate. Rather than addressing the root causes of the problems they create while developing and releasing new innovation, they assume that conditions to operate will continue to offer unbound access inputs like raw materials and labour, which is still confined on a resource bound planet where the ability to sustain life is under threat due to climate change and worsening inequality.

Having used the interview data to map the archetypes that reinforce and support the current state system dynamics, we develop a new perspective on how the current system works today and identify opportunities for intervention. This also gives us better visibility into how to address the current reinforcing mechanisms and system dynamics.

I the next section we'll take the information collected from trends analysis, the interviews, and outputs of the system archetypes sections and input this data into the Three Horizon Framework to understand what is happening today, Horizon 1, pockets of the future that can carry us into a desired, Horizon 3, and what would need to happen in a transition state, Horizon 2, to carry us into Horizon 3.

Section 5. Envisioning the Desired Future

Three Horizons Mapping

Three Horizons Mapping is a methodology from the Systemic Design Toolbox that uses strategic foresight to examine trends over time. It gives us a tool take inventory of the trends that are embedded in our current system, pockets of the future in the present, elements of the current system we can reuse, and elements of the currently system we need to sustain. (Systems Design Toolkit, 2020) By looking at the relationship between trends and events over a temporal period, we can discover the relationship between trends and events over time and spot opportunities for innovation. It also allows us to understand the transition state to get to a desired future state some point into the future. It can also be used as a planning method used to examine what needs to change today or amplified today, what needs to be maintained in the intermediate and transitionary phase, and what can be reused in the long term as we work towards a desired future vision.

Horizon Mapping allows us to see multiple futures existing simultaneously and in the present moment, (Systems Design Toolkit, 2020) and can allow us to test out multiple ideas for strategic fit in different futures. Horizon Mapping lets us draw on multiple future trajectories to help imagine a future desired state over time. This tool uses three event horizons to understand the current, intermediate, and desired future state.

First, we examine Horizon 1, or the current state. This tool was ideal to examine the current-state neoclassical economics economy as ask what the current state system

concerns are, pockets of the future in the present state. We take inventory of the current regime, nice in, and transition interventions. We then map horizon 3, representing our desired future state with the current trends, and primary research collected so far. Finally we map Horizon 2, the "turbulent transition" (System Design Toolkit, 2020). In horizon 2 we include intermediate interventions that may be temporary, and elements of the current system we can reuse on our way to the ideal future vision future.

Horizon 1

In Horizon 1 we examine the current state under neoliberal economic drivers of innovation. Where investment and speculative funding is based on revenue growth over a short period of time, at the expense of impacts on society and environment. Where little value is place on creating businesses that allow for human and environmental thriving, and income inequality continues to be a major factor driving lack of community cohesion and suffering of many for the benefit of a smaller group of wealthy business owners and shareholders. (Capital Institute, 2023)

In Horizon 1 innovation and venture building is based on improving shareholder returns and speculative investment returns. Resources are considered unlimited on a resource limited planet and little attention is paid to the impacts of innovation on the environment and social structures the innovation could impact. Little attention is paid to what is currently view as externalities and knock on impacts of conducting business, such as sustainability and social impacts. These are considered issues to be dealt with by governments with short time horizons for planning, and incentives to not disrupt the

current systems that elevate key metrics like Gross Domestic Product (GDP) like powerful lobby groups, and lack of foresight. Citizens are largely apathetic towards climate change and social issues due to power imbalances between the haves and have-nots in society.

But we can see glimpses of the future in the current state. More and more organizations are realizing that there is more to sustainability than recycling, and there is a desire to move away from cleaning up mess to creating better cities through small and medium sized business, since they account for a large amount of waste and business types in society. (Ellen Macarthur Foundation,. 2022) There is a greater awareness that making economics work means changing behavior to create incentives to change how waste is taxed, and that it's also important to nudge behavior in sustainability and ethical directions in terms of regulations. An example of this is the recent changes of the US Security Exchange Commission that requires registrants to provide climate-related disclosures in their annual reports and registration statements, including those for IPOs, beginning with annual reports for the year ending December 31, 2025. (SEC.gov, 2024) There are more companies that are internalizing the concept of reuse when going into businesses as the default.

The work of the Ellen Macarthur Foundation on Circular Economy is being shared, and more and more sustainable innovation accelerators than ever before, and the market is maturing in options to offer products based in reuse resulting in building economic resilience in the market and options for consumers. (Ellen Macarthur Foundation,. 2022)

However, convenience continues to be a big pain point for consumers, so solutions to improve traceability and impact continue to be important motivators for business to move to a more circular economy-based business model. We can see glimpses of the future of a regenerative economy through the adoption of regenerative economy and finance principles with new budding innovation industries like the cryptocurrency sector, where the newest version of Ethereum is being built with regenerative finance principles, (Ethereum, 2024) and the Nuffield Council on Bioethics also develops an ethical framework for biofuel development to avoid the human rights and sustainability problems of the past.

Horizon 3

In Horizon 3, the desired future vision state, we imagine a world based on regenerative principles that take a systems view to innovation balancing sustainability and social thriving on a resource bound planet. We see a balance between thriving and efficiency that allows for equity and sustainability to drivers of innovation and values other types of capital in the creation of innovation and businesses; where business look to create disruptive innovation that creates systemic change that benefits all as well as the planet. In Horizon 3 the focus is on degrowth or moving away from a high consumerism driven economy and more towards circularity and renewal of ecosystems and the planet to support human thriving. Organizations measure value in terms of different types of capital that can be created to support human and planetary thriving. A new approach to innovation allows us to embed sustainability and ethics into innovation development that in turns helps to transform economies away from extractive and exploitive to

regenerative ecosystems of human empowerment, sustainable development, and upholds human rights for all in a climate changed world.

This this future, investment is based on a constellation of outputs including social, environmental capital, spiritual capital, and creative capital, since current unchecked market fundamentalism destroys other forms of capital, like social capital, that is needed for long-term vitality of capitalism itself. (Carney, 2022) Principles of living systems and systemic design are used to determine opportunities for disruptive innovation that can create systemic change. Inequality is reduced as the distribution of wealth benefits more diverse people of society and isn't aggregated to many ultra-rich stakeholders. Sustainability education and regulation becomes the norm to ignite innovation in many sectors, that can create long term change. Governments take the responsibility of helping ensure business and the economy operates as social and sustainability custodians of a thriving economy, that allows for greater human thriving. Sustainable and ethical innovation is the norm and address many long-standing issues that were once a problem of 10 years ago. While governments come and go, the principles of regenerative innovation and social thriving serve as a north start for decision making.

Horizon 2

In Horizon 2 we look at signals of pointing to circular economy as the intermediate state. In this world, more and more people are trained on circular economy and the market for circular economy solutions improve, making options for consumers more convenient and accessible. Organizational leadership starts to embed values of circularity,

regeneration, and balance into how decisions are made across the organization so that these values transcend the charismatic leadership and become embedded in the DNA of how organization approach innovation and adopt more sustainability and ethical decision making into their day-to-day decisions. This allows organizations to align their business models with purpose outside of speculative investment of Horizon 1, and towards strengthening humanity and sustainability centered outcomes. Leadership teams start to embed sustainability and ethics as core values in operating business, how they interact with other organizations, and how they develop innovation. In horizon 2, more and more business sectors adopt principles of circularity economy and regeneration to meet consumer demand for more humane, ethical, and sustainable products. New business show promise of a new transformative future through adopting circular principles from the beginning and offer new products and services that meet customer demands in a convenient way, promising to be a reliable alternative to current products and services still being created in the old unsustainable and unethical way.

Building Towards the Proposed Intervention

Using the Three Horizon Framework to interrogate our present, and image our transition to a desired future state we can see that there are opportunities to pull through the elements of our desired future state into today with the inclusion of regenerative innovation principals that will aid in sustainability and ethical decision-making.

At this point, we've covered the current context and challenges, the long-term trends that their implications on driving change, capturing the current challenges of innovators

in the sustainability and innovation space to understand their barriers to success, understood the current system dynamic through system archetypes and their reinforcing impact on current system dynamics, and charted a path from today to a desired future state with the Three Horizon framework. We are now able to consider an intervention to the problem of ethical and sustainability decision-making that happens in the innovation spaces of small and medium sized companies in the following section Proposed Intervention: Regenerative Innovation Principals.

Section 6. Proposed Intervention: Regenerative Innovation Principals

Given all the information collected through secondary research, interviews, long-term trends, system archetypes, and three horizons framework, we can spot areas of introduce ways to improve the system, address the unmet needs and opportunities. Based on the evidence collected to this point, to prepare small and medium sized business to thrive in the preferred horizon three, and address the systemic challenges, we can imagine a new way to approach innovation that includes regenerative economics elements, degrown, and panarchy that address problems synthesized from the research interviews.

Referencing the opportunity areas identified from the research, I'll focus on addressing following opportunity areas:

- Rethink the value of growth as the primary value of an organization and reward companies that accumulate and develop other types of capital as part of their development, like social capital, and environmental capital.
- Encourage organizations to develop business and innovation models that embed ethical and sustainability decision making into their business processes to reduce instances of 'inauthentic' reporting of sustainability and social marketing to consumers, and drive development that will have positive impacts on the system it is a part of.

To address these opportunity areas, developing a set of innovation principles would allow greater access to more sustainability focused and ethical innovation that could transition us from Horizon 1 to thriving in Horizon 2 and 3. It would also help address the challenges associated with inauthentic reporting on sustainability and ethical impacts by allowing for innovation and business sporting opportunities at the start of idea development, rather than trying to elevate minor attempts at reporting ethical and sustainability efforts. This would also allow more companies and small business to innovate with long-term, and systemic impact in mind, which is a marker for truly disruptive innovation (Manu, A,. 2022) while improving the ability to offer sustainable and ethical products and services in an impactful way.

Pulling in elements of Degrowth, Regenerative Economics, panarchy, and living systems from section 1, we can craft principles of regenerative innovation that can be used in our current state Horizon 1, grow in Horizon 2, and be primed to allow for greater innovation in Horizon 3.

Principles of Regenerative Innovation

The following set of five principles allow us to approach gaps in sustainability and ethical decision-making when developing innovation interventions:

1. Develop Values Based Leadership Around Sustainability and Ethics

By aligning purpose and values outside of just growth for speculative investment, and the pursuit of other types of capital, allows us to unlock the creativity needed to reward

innovation that solves complex problems. This means that leadership is not just visionary and charismatic, but operates with integrity and clear purpose towards sustainability and ethics that inspires trust in the multiple people needed to orchestrate the certation of a new innovation. This can allow us to unlock sustainability and ethical decision-making in the pursuit and development of innovation.

2. Take a Systems View to Understand Impacts and Opportunities

Understanding how the current system works, and the archetypes that exists that reinforce the current structures allow us to create new disruptive innovation at moments that can have the most impact, while understanding the ecological and ethical impacts of our interventions or innovations. We would also be able to spot novel opportunities for innovation by having holistic view of the problem space and the factors that could impede success of an innovation or amplify the effect of the innovation on the system.

This principal also allows us to get a better view of the complex network of interactions that happen in the current state, insert our innovation, and model potential alternative futures that could arise from our innovation. We would then be able to capture a more holistic view of all the potential impacts of introducing the innovation intervention to the system as to capture the different types of capital we could develop because of our innovation, besides speculative investment; this leads us to our third principal.

3. Honor and Value Different forms of Capital Generation as part of the Innovation Development Process

By accounting for and valuing different types of capital that can be developed from an innovation, we can value the innovation for the benefits it provides outside of just a speculative investment and take accountability for what would otherwise be considered externalities of the innovation and process. Valuing other types of capital allows us to add humanity back into the market and align creativity into innovation that is in service to society, people, and the planet. (Carney, 2022) Honoring and cultivating different types of capital is made easier through empowered participation of the community and society the innovation is intended for and will occupy, which leads us to need for the fourth principal, empowered participation that supports human thriving.

4. Empowered Participation that Supports Human Thriving and Upholds Human Rights

By engaging with the communities that will be impacted and use the innovation, we are better able to capture their needs and hopes to translate that in an innovation that supports human and ecological thriving. That also means that people that will be impacted by the innovation directly and indirectly are empowered to participate in the innovation process, who can then spot potential challenges and help strengthen to connection of different types of capital that could be developed from the innovation, like social capital and impact on communities. By including people that could be impacted by the innovation, not just the intended customers, we are able to understand our blind spots and unintended impacts on the people who would be affected by the development of the innovation, including human rights impacts of the innovation development.

This also means that innovation should not come at the expense of people's human rights, or contribute to human rights violations. Understanding the human rights conflicts through the development of the innovation is also important to ensure we are developing new innovations in an interconnected system that uphold human thriving for all.

5. Develop with a Sustainability Goal of Renewal, Circulation, and Balance

Approaching problem spaces from a mindset of renewal, circulation, and balance can offer new perspectives on how to build ideas, and what innovation opportunities are possible in a dynamic, and changing word that balances sustainability and ethical decision making on a resource limited planet. Innovations should not exacerbate global climate change, but instead create opportunities for renewal and regeneration on the planet.

Using these principals for Regenerative Innovation, we can transition how we approach innovation from one that is extractive to one that supports a more sustainable, ethical, and empowered, and equitable world that will allow for sustainability decision making and meaningful change to happen.

Section 7. Reflections / Conclusion

Climate change, limits to growth, and inequality are major challenges on a resource limited planet. For more than a century we have relied on systems of innovation and economics that have been largely extractive, that have large systems impacts that aren't accounted for, and have resulted our planet exceeding many thresholds that would allow for life to be sustained. This polycrisis, or a series of economic, political, environmental, and geopolitical crises that are interconnected and exacerbate each other (Tooze, 2024) cannot be solved with a climate only approach but a multi-faceted approach that will ultimately allow us to address climate change. This includes addressing inequality, empowering women, valuing other types of capital, innovating in ways that acknowledge and design for what would be considered externalities of doing business, innovating in a regenerative, sustainable and ethical way to support planetary and human thriving.

From the interviews conducted, there is a demand for change in how we innovate and approach problem solving that is impactful. We are long past short-term solutions to long term and systemic problems including the urgent problem of climate change, and sustainability and ethical decision-making. However, from the three-horizon framework used in this paper, there are many reasons to be hopeful, including the growth of circular economy innovations and marketplaces, and pockets of regenerative economics being applied in new industries like cryptocurrency development.

By adopting regenerative innovation principles, we can improve our ability to innovate in a way that supports sustainability and ethical decision making, and can make improvements in how we develop new solutions in a complex world. This has wide-ranging applications such as in artificial intelligence development, sustainable energy development, new approaches to agriculture.

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