X-ECONOMIES: CONTEMPORARY ECONOMIC VISIONS AND PRACTICES

a Scientometric Approach with Glossary

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1 Introduction

The 21st century is marked by several existential global challenges, the most severe one being climate change. Furthermore, the 2007 financial crisis portrayed the downside of our current economic systems, and the prevalence of extreme poverty reinforces this capitalist critique. To find solutions for the above-mentioned challenges, the United Nations formulated the Sustainable Development Goals in 2015. While the formulation of common global aims and strategies is a necessary step in the right direction, it remains abstract in many instances. While the SDGs guide many policymakers and entrepreneurs, they are not the final solution to our pressing global problems. Instead, they exemplify the need to find alternative ways of organizing our society and eventually realize the SDGs.

For the field of economics, several solutions for pressing economic issues, like climate change or rising inequalities, have emerged recently. These solutions mostly imply an alternative perspective on economics and differ from mainstream economic activity through their "processes of production, exchange, labour/compensation, finance, and consumption "[i]. Alternative Economies exceed neoclassical thinking by framing the economy as a heterogenous and social space. Famous alternative economic concepts are the circular economy or the digital economy. However, many more alternative economies exist or are likely on the rise, making it a challenge to estimate their exact number. To nonetheless describe them, scholars use X describing their unknown number, thus calling them X-Economies. "X Economies, as a meta-level concept (…) denotes an unknown number of realigned or newly proposed economy visions and practices, present or will emerge, yet all claiming a transition towards a more sustainable, responsible and resilient economy compared to the current instance." (p.2)[ii].

Our report aims to clarify existing X-economies and to investigate potential research gaps, which academics or entrepreneurs must fill to promote X-Economies' vision of an alternative economic reality. Therefore, it aims to answer the following research question:

Through which combined actions could researchers and entrepreneurs most likely overcome innovation burdens, replacing the current economic regime with X-Economies?

To answer this Question, Section two of the report introduces Geel's Multilevel Perspective, and the role X-Economies play within it, as well as how this report distinguishes itself from previous research on X-economies. Section 3 elaborated first on the qualitative and afterwards on the quantitative approach of this research. Section 4 presents the analyses' results – a glossary of 25 X-Economies and an overview of research gaps between the Circular, the Social, and the Digital Economy. Section 5 discusses these results, including limitations, as well as potential future research. Finally, the report concludes in Section 6.

2. Theoretical Framework

2.1 Introduction to Innovation System Changes from a Multi-level Perspective

The report's overarching research fields are innovation systems, and more concretely how they change. Geels defines innovation systems as socio-technical (ST) systems[iii]. These ST systems are interlinked with other ST systems, with each of it having its specific individual actors, institutions, and rules[iv]. Together, these different ST systems define and control the functioning of a society, therefore, building its current regime (see figure 1). These regimes do not occur in isolation, but within the context of exogenous factors. These exogenous factors, are hard factors, meaning that humans cannot directly control or influence them, which is why the innovation literature refers to them as a wider 'landscape (see figure 1). Regimes cannot influence these factors either. Consequently, over time it is likely that a current regime (such as the current economic system) fails to adequately respond to changes or arising problems within the landscape (such as climate change or Covid-19). These tensions give rise to so-called novelties (e.g., alternative economies). These novelties, which develop in protected niches where the regimes' rules do not apply, claim to have

better responses to landscape problems than does the current regime and actively aim to replace aspects or the whole patchwork of regimes [iv].

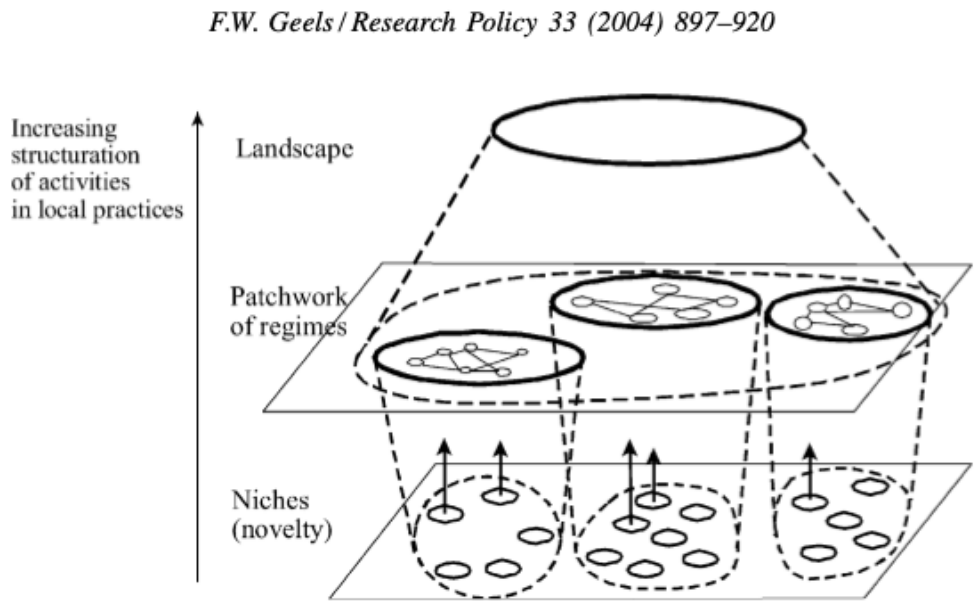

Figure 1 multiple levels as a nested hierarchy (Geels 2002a[v])

However, due to several structural powers in place, this change is very hard and slow to achieve, as regimes consciously and unconsciously reinforce themselves. If niches successfully manage to challenge the current regimes, system innovation occurs, as described in figure 2.

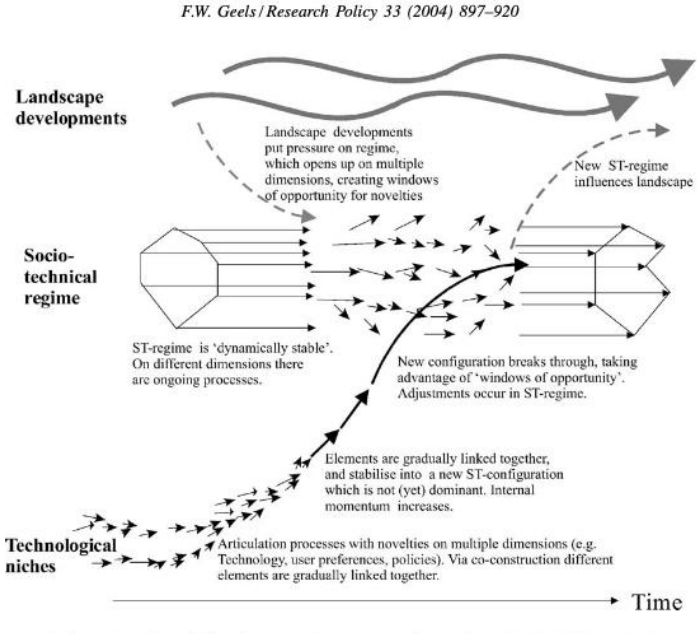

Figure 2 a dynamic multi-level perspective on system innovations (Geels 2002b)[vi]

2.2 Link to Previous Research

Two important research contributions on X-Economies and their potential interactions exist. Türkeli et al.[ii] conducted a quantitative analysis of the keywords in different X-Economies. They analyzed the interaction between different X-Economies by calculating what percentage of keywords were common between them. Similarly, Schlömann (2020)[vii] previously worked on the geographical and citation analysis of the articles written in Digital Economy and Circular Economy. Schlömann further analyzed the interaction of keywords between these two X-Economies. However, very little work has been done providing a reusable framework to analyze the keywords of different X-Economies. This is where our research is influential, as we developed a reusable piece of code to analyze any of the defined X-Economies articles. Moreover, we also cover more metadata for our analysis as we discuss in our methodology next. Furthermore, our analysis does not only cover potential research field's overlaps, but also likelihoods regarding which research areas will be most efficient in the innovation process. Regarding previous qualitative research, no previous study aimed to list more than six different X-Economies, whereas our report mentions 25 in total.

2.3 Objectives and Practical Contributions

We want to provide a practical guide for academics and entrepreneurs on how to best cooperate to achieve regime change. This guide for change specifically focuses on the question of how to overcome path dependencies and lock-in in current regimes and thus enable innovation in the first place. Practical contributions to overcome this burden tackle four main points.

Firstly, our report aims to provide an overview of existing X-Economies and their different definitions. This overview is crucial when aiming for connecting a potentially unknown number of X-Economies to overcome the current socioeconomic regime.

Secondly, this report focuses on overcoming the problems of cognitive rules that hinder change from the side of the current regimes, as well as within the niches (Geels, 2004). Current change is mostly slow, as scientists within the current regime, but also within niches (alternative economies) tend to research in only one direction due to cognitive routines. Consequently, they might not have the wider perspective on

what kind of research and what cooperation might be beneficial for scientific and social progress. Our research aims to overcome this problem by pointing to research gaps across disciplines.

The third one focuses on the reinforcing role established networks play in sustaining a regime. Established regimes, having existed for a longer time already, work within a stable large network. These networks allow regimes to remain powerful and influential. Therefore, if niches aim to become more powerful compared to regimes, they need not only a network within one niche (e.g., circular economies), but further across several niches (e.g., a connection between circular economy and digital economy). Since our research investigates potential beneficial linkages across disciplines and economies, it will certainly support the creation of a network among alternative economies.

Lastly, our research ultimately pushes for more research on alternative economies by highlighting the profitability of this research in terms of its citations and usefulness. This increase in research will give alternative economies more credibility, while pointing to the fallacies of current regimes, therefore channeling future innovation changes.

3. Methodology

3.1 Literature Review

The aim of the report's qualitative part was to create a glossary of different X-Economies. Each Glossary entry contains a detailed literature review regarding the Definition of the respective X-Economy. Some further explicitly mention the X-Economy's relevance and provide an example of active entrepreneurs in the field. The process of creating the Glossary was threefold, consisting of a messy research phase, more organized research based on internet platforms or institutional reports for the different X-Economies (e.g., https://www.theblueeconomy.org,), and a systematic literature review using peer-reviewed articles. In this systematic literature review, we used three databases: EconPaper, Jstor and Scopus. Econpapers is the biggest database for economic research articles, and thus provided a good source for

definitions such as about the digital or circular economy. However, as some X-Economies distance themselves very much from mainstream economics, finding inputs about them required a more holistic database, like Jstor or Scopus. After reading the abstracts of all relevant findings, we filtered all differing definitions and reflected on them in the definition section.

3.2 Metadata Analysis

This part of the project aimed to extract metadata information about the 1000 most cited articles written about the different X-Economies (digital, circular and social) in the Web of Science (WoS) database. Any article in the WoS has different types of metadata such as author names, editors, digital identifiers, ISBN etc. associated with them. These forms of metadata are stored in two-character unique field tags that make it easy to identify them, export and run analysis on them. For the relevance of the project, the metadata we chose to focus on were author-defined keywords (DE), research areas that encompass the article (SC), reference count (Z9), year of publication (PY) and the country of publication (C1). These metadata were present in the original article in an erroneous fashion. The next step was to clean the dataset and store the aforementioned metadata in a presentable manner. To achieve the results in the most reproducible form, we used the Python programming language and its libraries Pandas, Numpy and Matplotlib. We wrote scripts in python which can be reused for analysis of all X-Economies other than the ones we analyzed. This however requires the data to be presented in an Excel (.xlsx) format.

3.2.1 Keyword Separation

The first step of cleaning the dataset was to separately store all the author-defined keywords in an article. For example, in an article about the digital economy, “COVID-19; Economic policy uncertainty; Geopolitical risk; Stock market; Oil prices; Wavelet; Causality” were the keywords. The idea was to store COVID-19, Economic policy uncertainty and all the other keywords in separate rows so that they can be used in further analysis. To achieve so, a function was written in the python programming language that takes as input a given list of keywords and outputs all the individual

keywords separately. Since all the individual keywords have been stored separately, it became easy to analyze how the same author-defined keyword can be used in a different context in different articles about X-Economies.

3.2.2 Research Areas Separation

Every WoS article has a list of interdisciplinary research area/s associated with it. This helps to identify how the content of the article might encompass different relevant fields of academic research. So, the next step in the analysis was to also store these research areas separately for each keyword. This helped analyze what interdisciplinary research areas a particular keyword is associated with. For example, an article in the digital economy has “Public, Environmental & Occupational Health; Mathematics; Mathematical Methods In Social Sciences” different research areas associated with it. The idea here was to store these research areas for each keyword separately so that we can combine them and find out how many times a particular research area has been associated with the same keyword. The same function was used as in the keyword separation to achieve the desired output.

3.2.3 Average Citation Count

For any given article, the citation count helps understand how influential it has been in the academic community for advancing research. So, the next step of the analysis was to keep track of how many citations an article has received from its date of publication. This information was contained in Z9 (reference count). To achieve an average citation count, we used the metadata PY (the year of publication) and set the current year to 2022 (This was done to avoid dividing by zero for articles written in 2021). Then, we subtracted the current year from the year of publication and divided the reference count by that number. This gives us the average reference count, which provides an idea about how influential an article has been over the years in the field that it has been written for.

3.2.3 Country

For any given article in X-Economies, the country of publication (C1) is vital information. This is because it helps us understand the trends that the academic researchers and entrepreneurs in the country are following in the different fields of X-Economies. For example, if a lot of digital economy articles are written and published in the Netherlands, it can mean that academic researchers and entrepreneurs in this country are pushing forward the vision of the digital economy as an alternative to the traditional economy. So, for this reason, we chose to include the country information of an article in our analysis. In the C1 metadata, the information about a country is stored differently compared to our other analyses. The country of publication of the article was not explicitly mentioned, rather it was mentioned along with the author's name and their full address as can be seen in Fig1 below.

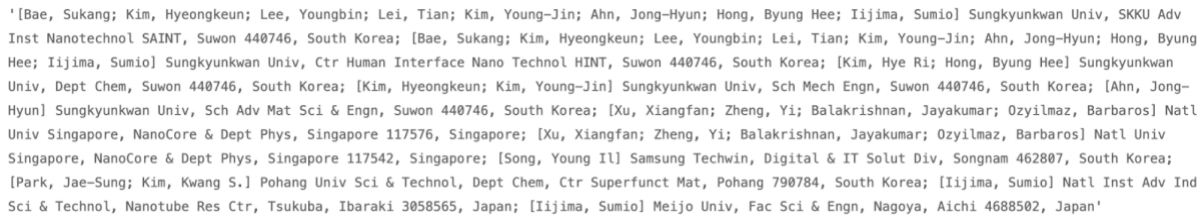

Fig1: Country information in an article about X-Economies

So, to obtain the country information from this string, we had to parse through the full address and only keep the country information that is mentioned at the end for each author. We used a python library that contained a list of all of the countries in the world and compared it to this string. If there was a match, the function would keep that country and continue this loop until it reaches the end of the string. So, in the above example, the function would return South Korea, Singapore and Japan as the countries for this article.

3.2.4 Preprocessing

The final part of our quantitative methodology was to apply to preprocess. This was done by removing rows of data that contained duplicate information or the rows that caused our designed function to run into an error. This gave us the information for our

analysis section in their atomic form. It means that data stored in this form cannot be reduced further without losing vital information. As can be seen in Fig2 below, a keyword is presented with an average citation count, the number of times it has been mentioned in different research areas and the number of times it has been mentioned in articles written in different countries about X-Economies.

Sharing economy	389.838095	{'Computer Science': 3, 'Engineering': 3, 'Social Sciences - Other Topics': 2, 'Business & Economics': 2, 'Environmental Sciences & Ecology': 2, 'Psychology': 1, 'Sociology': 1, 'Science & Technology - Other Topics': 1, 'Telecommunications': 1, 'Operations Research & Management Science': 1, 'Information Science & Library Science': 1, 'Geography': 1}	{'Spain': 4, 'Australia': 3, 'Germany': 2, 'Netherlands': 2, 'Austria': 2, 'Italy': 2, 'France': 1, 'Saudi Arabia': 1, 'Hong Kong': 1, 'Canada': 1, 'South Korea': 1}

Fig2: Keyword in its atomic form

Finally, we applied our quantitative methodology for each of three X-Economies (digital, circular, and social) and prepared our data for the analysis section.

4. Results

4.1 GLOSSARY

X-Economies

ACCESS ECONOMY **16**

BIOECONOMY **18**

BLUE ECONOMY **20**

BLOCKCHAIN ECONOMY **22**

CARE ECONOMY **24**

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DIGITAL ECONOMY **34**

DOUGHNUT ECONOMY **36**

E-ECONOMY **38**

FEMINIST ECONOMY **40**

FUNCTIONAL SERVICE ECONOMY **42**

GREEN ECONOMY **44**

HYDROGEN ECONOMY **46**

SHARING ECONOMY **48**

SOCIAL ECONOMY **50**

SOLIDARITY ECONOMY **52**

PARTICIPATORY ECONOMY **54**

PERFORMANCE ECONOMY **56**

PLATFORM ECONOMY **58**

WELL-BEING ECONOMY **60**

YOUTH ECONOMY **62**

ZERO-WASTE ECONOMY **64**

ACCESS ECONOMY

The term Access Economy also refers to concepts of the Sharing or Collaborative Economy (see page 28)[viii]. Nonetheless, it is distinct, as it exclusively focuses on that part of the Sharing Economy, which gives access to goods or services, while not sharing their ownership in the strict sense. Access Economy might be a better expression to define the sharing economy as making "use of online platforms to connect individuals interested in providing private goods or services to other individuals looking for a convenient way to access these goods or services "(viii, p. 3-4). Using the concept of Access Economy instead of Sharing Economy takes away the illusion that platforms organize sharing of goods and services when they in fact only provide temporary access to them.

Why Sharing Access and not Ownership?

Sharing Access with people might not require as strong interactions as sharing ownership. Therefore, it allows people from very different geographical areas to interact and provide access to each other goods and services. Considering the Access Economy when speaking about X-alternatives is furthermore vital due to its increasing prevalence in most countries.

Access Providing Businesses

Many companies said to be part of a sharing economy are in fact also access economies, such as Uber or Airbnb.

BIOECONOMY

The Bioeconomy focuses on the sustainable production of renewable resources from land fisheries and aquaculture and their use in the production of food, feed, fiber, bio-based products, bioenergy, and other related goods[ix]. Its Primarily aim is to first complement and eventually replace fossil fuels with renewable raw materials (and energy)[x]. A future bioeconomy will differ from pre-industrial societies, by being very knowledge-based and relying on biotechnology. The Bioeconomy's motor is biomass, which becomes important as food, but technology can further process it into fuels and chemicals.

"Basically, bioeconomy is nothing new. For thousands of years, mankind covered its needs for food, materials, consumer goods and energy through renewable raw material and reenable services."

(Pietzsch & Schurr, 2017, p.2)[x]

Very different motivations exist for countries to implement a bioeconomy. First and foremost, replacing a fossil fuel-based economy becomes necessary for the survival of humankind in the face of climate change [x]. Fossil fuels release carbon dioxide emissions, therefore, their use increases global carbon dioxide emissions. These increased emissions are responsible for the greenhouse effect, and thus, global warming. In sum, a bioeconomy is indispensable to minimize the average global surface warming. Its importance becomes further visible when considering rapid population growth and increasing risks of famines. Moving towards a bioeconomy would allow greater food security, but also overall greater economic stability

BLUE ECONOMY

The Blue Economy aims to restore, protect, and maintain the costal and maritime system's diversity, productivity, functionality, and its inherent value [xi]. Therefore, the Blue Economy advocates zero emissions, waste-free, circular as well as local production and consumption. The concept of the Blue Economy is wide, ranging from sustainable fishery to waste reduction[xii]. This variety highlights the need for improved global corporation among states, companies, and other actors to sustain this maritime and costal global common good. In fact, the Blue Economy takes these natural systems as source of inspirations, since Ecosystems are waste-free.

"Currently, there are 200 projects being executed worldwide, based on the principles of The Blue Economy. All these projects together have generated approximately 3 million jobs. We have proven that our model works in creating value for the people, the businesses, and the environment."

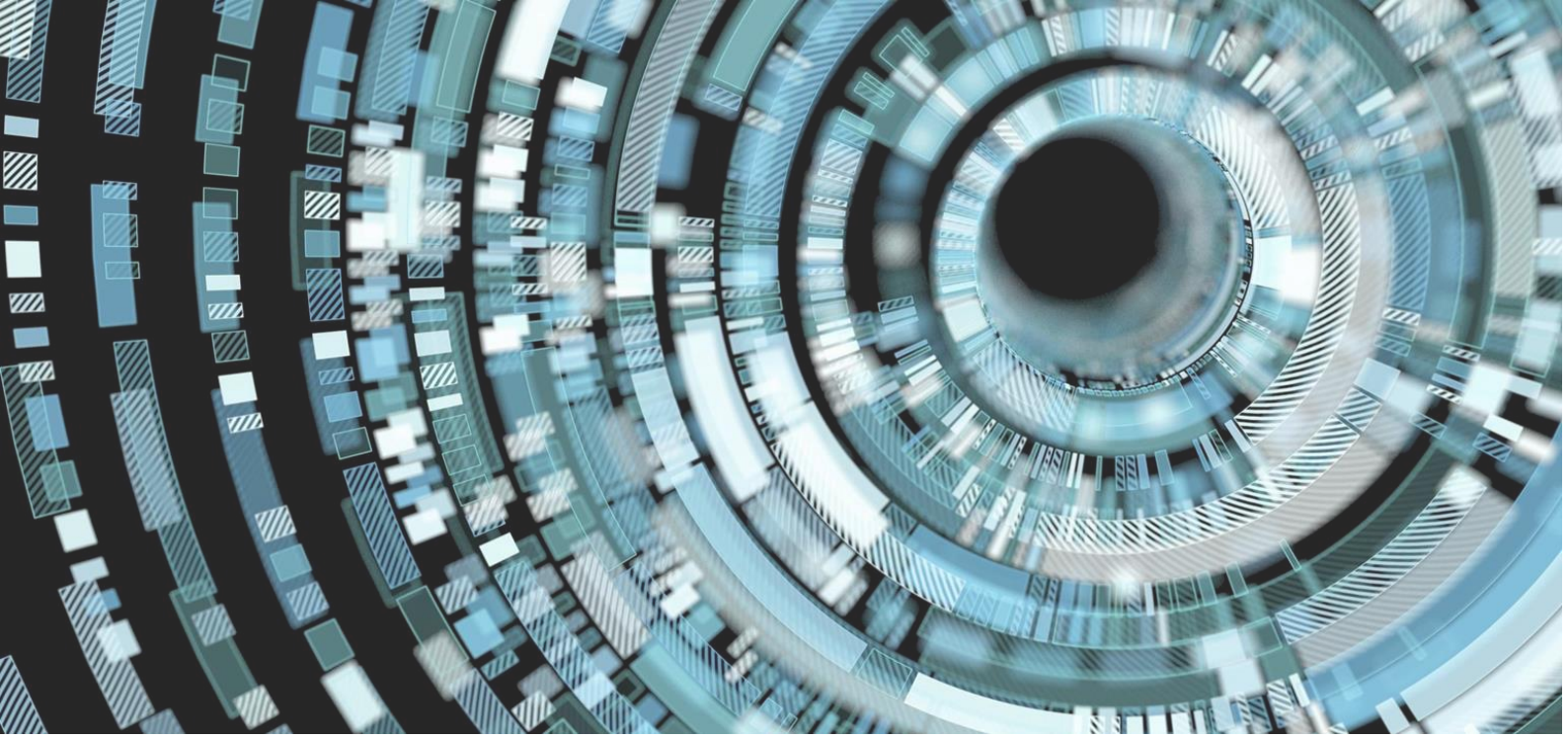
(Gunter Pauli – Founder of the Blue Economy)[xiii]

Why Do We Need the Blue Economy?

Oceans and seas play a crucial role in our ecosystem. They are livelihoods, food and mineral sources, oxygen generators and absorbers of greenhouse gases [xi]. In short, they are indispensable for our planet and their maintenance highly relevant for our future.

The Blue Economy in Action

Patagonia operates according to the Blue Economy Principles.



BLOCKCHAIN ECONOMY

In the blockchain economy, agreed-upon transactions would be enforced autonomously, following rules defined by smart contracts[xiv]. The blockchain economy would manifest itself in a new form of organizational design—decentralized autonomous organizations (DAO)—which are organizations with governance rules specified in the blockchain.

CARE ECONOMY

The Care Economy describes the economic sector which provides formal or informal care work and services to society[xv]. Care activity occurs within the formal and informal economy, involving childcare, elderly care, education, healthcare, and individual social and domestic services. Within all these sectors, most of the workforce is female[xvi]. For this reason, the Care-Economy is closely related to Feminist or Gender Economics. Given the fundamental societal importance of these activities, care-economists suggests building our economic system around them[xvii]. Such a readjustment could entail higher wages in the care sector, wages for household work, care and gender sensitive economic decision making as well as greater public provision of care places, such as kindergartens.

Why Should We Care?

The Care economy remains a gendered domain with mostly female employees [xvi]. Therefore, easing its burdens is crucial for gender equality and equal working opportunities.

Caring Cooperatives

Beyond Care Childcare Cooperative (https://beyondcare.coop/about-our-coop/)

CIRCULAR ECONOMY

The Circular Economy (CE) concept attracts academic and private actors[xviii].This interest might stem from the CE's operationalization of the Sustainable Development concept for business activities. Despite its popularity, CE definitions might vary considerably. After quantitatively analyzing the broad range of possible rationales for the CE, Kirchherr et al. define the CE according to the following main principles [xviii]. Firstly, the CE often refers to a four R-framework – reduce, reuse, recycle (and restore), as adopted by the European Union in their Waste Framework Directive[xix]. Importantly, these Rs follow a hierarchy [xviii]. Actors should first try to reduce the use of inputs, before potentially reusing them. In case reducing or reusing are impossible, actors should recycle or restore resources or products, rather than throwing them away. Unfortunately, misleading definitions of the CE tend to exclusively focus on recycling, while neglecting its other aspects. The CE describes a transformation of our linear economic system; therefore, the above-described concepts apply at three different levels: the macro-level (the entire economy), the miso level (regional systems), and the micro-level (individual companies, products, and consumers). Most definitions consider business models to be the main driver of the CE, but also consumers might play a crucial role in its achievement. Figure 1 illustrates the CE's aim to keep material goods (blue circle) in circulation, if possible, while ensuring that biological energy

flows regenerate (green circle) while their byproducts find usage (e.g., in farming).

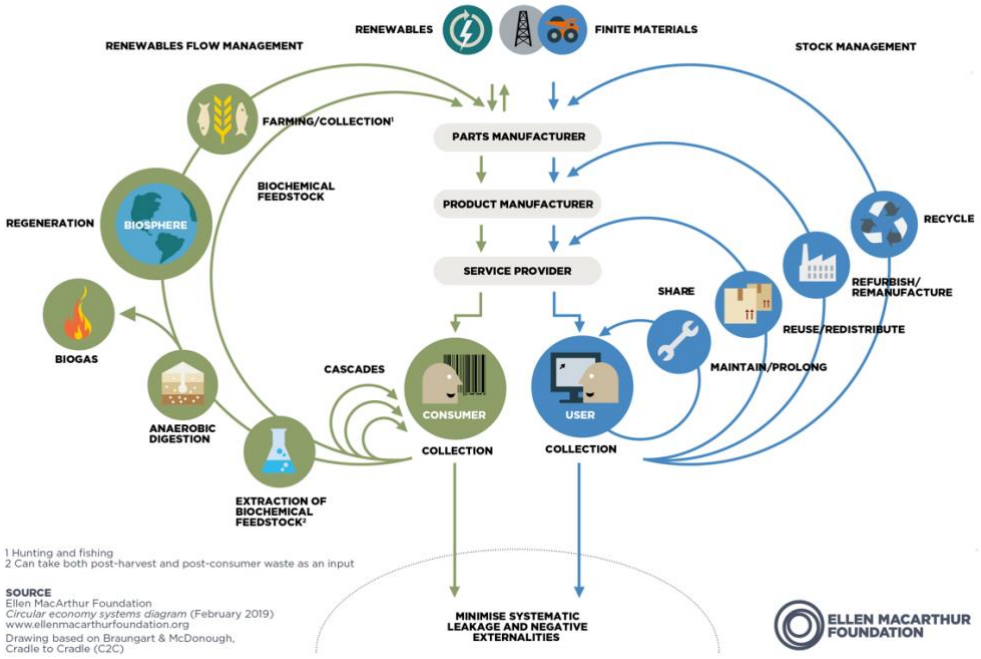


Figure 1 Value flows in the Circular Economy[xx].

Why Circulate?

Climate change forces us to rethink how we use our resources and nature, calling for less waste and production to achieve Sustainability (increased environmental quality, economic prosperity, and social equity)[xviii]. The CE aims to promote sustainable development to the benefit of present and future generations.

The Circular Economy in Practice

Notpla developed biodegradable packaging out of seaweed and plants.

COLLABORATIVE ECONOMY

The collaborative economy, often named the sharing, peer-to-peer economy, or collaborative consumption, loosely describes horizontally governed economic networks in which the participants share services or under-used assets[xxi]. Over the last decades, online platforms like Airbnb became popular and allowed for an increase in global sharing transactions[xxii]. While some scholars define only online sharing transactions through these platforms as CE, others claim that the concept includes both online and offline activities[xxiii]. Further disagreement about the CE's definition exists. Some academics describe CEs as a not-for profit sharing activity, while others include profit-driven sharing, like Airbnb, in their definition [xxii]. Moreover, scholars dispute whether both companies and individuals can participate in the CE, and whether sharing networks need intermediaries, like Airbnb, to be realized. Lastly, the most ambiguous question is whether the CE provides shared access temporarily or collaborative ownership to overs goods or services (see the entry on Access Economy on page 16)viii.

Why Collaborate?

In times of natural resource scarcity and limited room in urban area, this sharing concept is efficient to introduce more sustainable consumption patterns.

Figure 2: Participants in the Sharing Economy [viii]

DATA ECONOMY

Definitions of the data economy vary. According to the United Nations (UN), the data economy constitutes of the production, distribution, and consumption of digital dataxxiv. Rantanen and Koskinen, define it as:

> *"(A) Network, that is formed by different actors of ecosystem, that are using data as a main source or instance for business. Different actors and stakeholders are connected directly or indirectly within network and its value chains. Data economy ecosystem also incorporates the rules (official or unofficial), that direct action allowed in network."* *(Koskinen et al., in xxv, p. 4.)*

Why Is the Data Economy Relevant?

The data economy allows companies to make more informed decisions by using customer data (UN, 2019). The drastic increase of the data economy, for instance social media, makes it socially relevant.

DEGROWTH ECONOMY

As its roots, Degrowth criticizes the capitalist system which hunts growth at all costs[xxvi]. However, unlimited growth on a finite planet is impossible. Ignoring this fact and further the human exploitations on which growth often builds, makes our economic system unstable and degrowth more important[xxvii]. The term 'degrowth' might have a negative connotation for some, but its French ("la décroissance") and Italian ("la descrescita") origin has a very positive, relieving meaning. Degrowth from this original perspective describes, for instance, a river who calms down after a storm, going back to its normal flow. Like this river, our economy must calm down and realign with social and planetary boundaries, according to the Degrowth movement. Therefore, Degrowth's overall aim is indeed social and natural well-being[xxviii]. Degrowth can take many different forms, but the movement has some overreaching missions. Self-determination and dignity for all people, for instance. Establishing this aim, requires decelerating the economy to eliminate time pressure and time poverty by degrowing worktime, while allowing people more time for crucial social interactions and care work. Degrowth further describes the shrinking of the material economy through the reduction of production and consumption[xxix]. Besides, it stands for greater (economic) democracy, reducing the prevailing power of big economic actors, like international companies[xxx]. In sum, degrowth calls for a future where societies live

within their ecological means, with open, localized economies and resources more equally distributed through new forms of democratic institutions.

Size doesn’t Matter – Degrowing Might

The predominant economic system is caught in a double bind: its expansion disrupts the natural world, obstructs well-being, and fails to curb global inequities, while slowdown destabilizes the inner workings of the economic system itself. Persistence in denying these contradictions will end in a process of uncontrolled economic decline, with serious social and ecological harm.

DIGITAL ECONOMY

The Digital Economy is hard to define, as it constantly evolves[xxxi]. Therefore, its scale, benefits, risks, and goal are to a larger extent unknown. Nevertheless, broad definitions exist, describing the Digital Economy as economic activity "based on the exchange of real-time data using digital technologies, institutions, legal acts, and competencies" ([xxxii], p.380). The IMF becomes more specific stating that,

> *"the digitalization of the economic activity can be broadly defined as the incorporation of data and the Internet into production processes and products, new forms of household and government consumption, fixed-capital formation, cross-border flows, and finance.(…)The Digital Economy is sometimes defined narrowly as online platforms, and activities that owe their existence to such platforms, yet, in a broad sense, all activities that use digitized data are part of the Digital Economy: in modern economies, the entire economy." ([xxxiii], p.6).*

In all its shapes, the digital economy builds upon the rapid spread of information and telecommunication technologies (ICT)[xxxiv]. These technologies considerably

transformed business transactions, mostly increasing their speed, and overcoming geographical restrictions xxxii. In a 2015 published report, the OECD assign six key features to the Digital Economy: mobility of intangibles, costumers as well as business functions, the use of “big data”, network effects due to increased participation and integration, the use of multi-sided business models, a tendency for monopolies and oligopolies to emerge due to the required network effects, and a high volatility because of low entry barrier and rapid technological change [xxxiv]. New business forms in the Digital Economy entail digital payment services (see PayPal), online advertising often consumer targeted, social media platforms or commerce done via the internet. Furthermore, the digital economy enabled the rise of virtual currencies.

Why Going Digital?

The Digital Economy allows for faster, more efficient, and more targeted economic, cultural, and social exchange.

DOUGHNUT ECONOMY

The Doughnut Economy builds on the doughnut economics concept, first introduced by Kate Raworth in an Oxfam report in 2012, and later elaborated on in her 2017 published book[xxxv]. Her idea for a better economy relies on a critique of current economic methods[xxxvi]. Solely focusing on very isolated theories, economists tend to forget the Economy's embeddedness in Society and Nature. The main goal of Raworth's alternative doughnut economics is to center any economic activity around this embeddedness by drawing clear planetary as well as social boundaries for well-being. When visualizing her aspirations, two different sized circles come about, together making the shape of a Doughnut (see figure 1). Doughnut Economics means to put these visualized planetary boundaries and social foundations at the heart of economic thinking, to then come up with the theories, instead of starting analysis with outdated tools in the first place, as currently done [xxxvi]. Economists should aim for providing a social well-being and accept all nine planetary boundaries to get and stay within the doughnut. They must replace GDP by more meaningful goals instead. Furthermore, they must exchange the homo economicus with a more social and adaptable conception of human nature. While Raworth's focuses on the required changes in the economic discipline, she also developed ways in which organizations

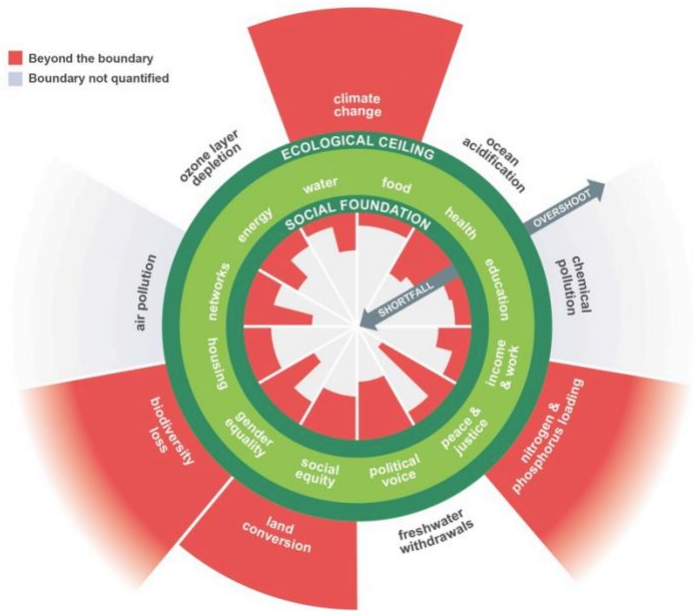


Figure 3

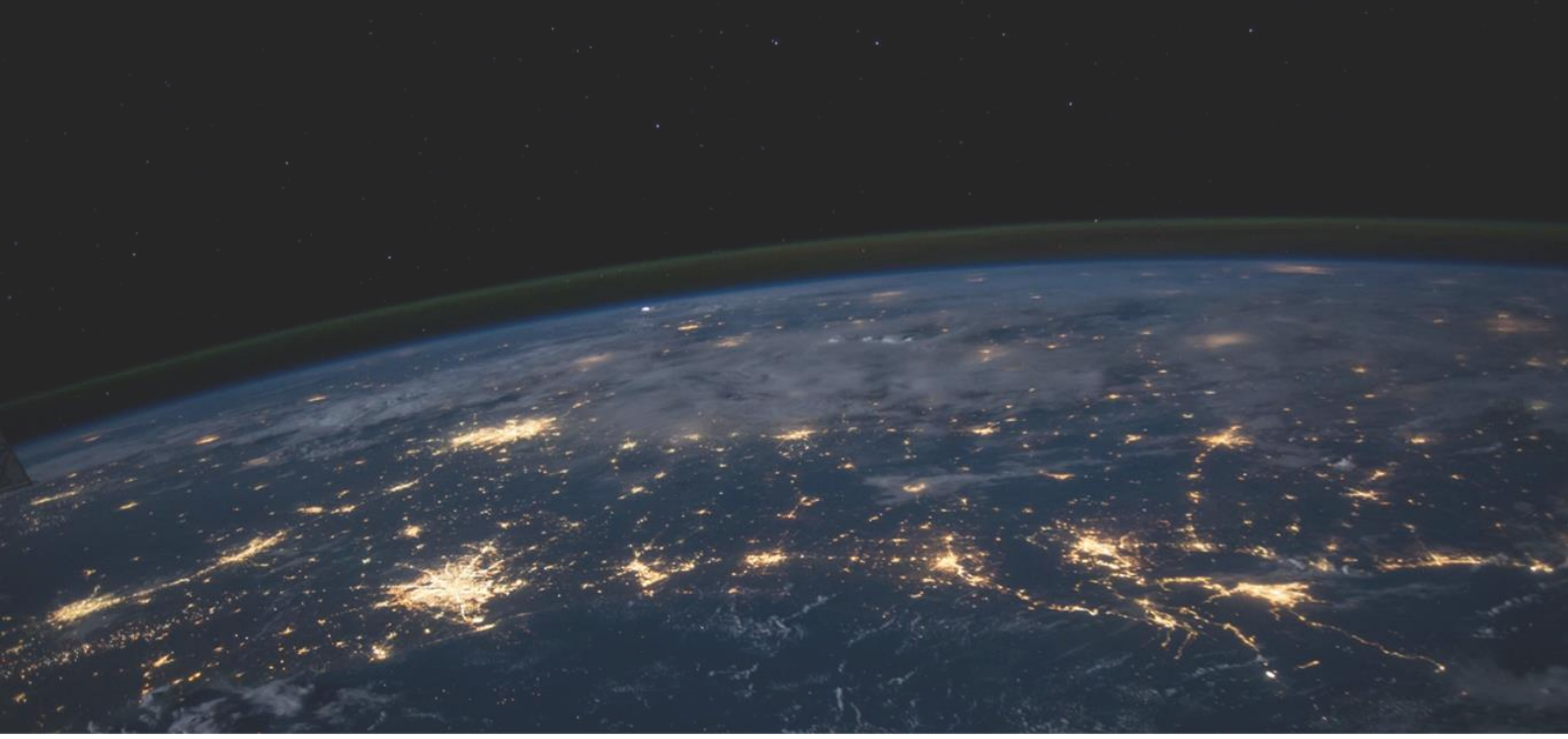
could get into the doughnut [xxxv]. Organizations must be regenerative and distributive by design, not linear and exploitive [xxxvii]. Being Regenerative entails a Circular Economy. Redistributive by design means sharing profits with all people along the supply chain, for instance. Most importantly, it's guiding question must not be profit, but: "How many benefits can we generate in the way we design this enterprise?"

Why You Should Want the Doughnut

The Doughnut economy replaces outdated economic visions of GDP growth and selfishness with a more holistic approach, providing a tool to tackle the ecological as well as the social crisis.

Tasting the Doughnut

Several Entrepreneurs sat around a table and discussed how to get into the doughnut, such as Patagonia or Interface Carpets [xxxvii]. Interface Carpets, for instance, reduced their company waste by 91% since 1996 by using circular methods. Furthermore, to take their mission of being regenerative serious, they aim to restructure their buildings in New South Wales to provide regenerative services like their surrounding forest. While Interface Carpet exemplifies moves towards the doughnut, finding one company that managed to live up to all its aspects is hard, but hopefully soon a reality.



E-ECONOMY

According to the Bloomsbury Business & Management Dictionary (p. 2657)[xxxviii], the e-economy “is characterized by extensive use of the internet and information technology”. Isaev and Vasilyeva define it more specifically as a „set of economic relations covering all parts of commodity production, distribution and the realization of tangible and intangible benefits that occur through electronic data exchange, using telecommunication networks” (p. 35)[xxxix]. The e-economy closely relates to the phenomenon of techno-capitalism, which occurred first in the 1990s and is characterized by rapid technological innovation focusing on increased value as well as speed. These fast technological changes, combined with the focus on the internet and information technology, transform economic processes, organizations, and evaluations in many aspects. First and foremost, geographical distance does not limit market activity and value anymore. The resulting territorial limitlessness shifts most companies’ focus away from internal structures towards building relationships with other firms or customers. In the e-economy, the customers' role changes, as they become suppliers of resources, such as information, and co-creators through online review processes[xl]. Not only does the relationship with the customer change, but further do old market hierarchies dissolve[xli]. Firms, which were previously powerful due to their location or size, but cannot build a network, might lose influence [xl]. Lastly,

markets tend to become more decentralized within the e-economy, as electronic networks enable several market participants to shape it [xli]. Decentralization is crucial for the e-economy since it allows more interactions and collaborations. This increased collaboration favors innovation processes, which are the main priority of most firms within the e-economy and its underlying motor.

The E-Economy's Importance

The e-economy enables more global connectiveness, allowing people to exchange information and technology, as well as to jointly respond to pressing challenges.

FEMINIST ECONOMY

Feminist economics point to economics' inherent bias, "created by the centrality of distinctively masculine concerns" (p. 8)[xlii]. In other words, feminist economists claim that economic analysis is double-blind to its gender effects, first by remaining a male-dominated discipline with only a few female researchers, and secondly by ignoring feminized topics, such as household or care work. While feminist economics take different forms and uses varying paradigms (such as Marxism, Structuralism or Liberalism), they tend to have five methodological starting points in common [xliii]. First, contrary to mainstream economic analysis, feminist economics highlights both paid and unpaid care and household work as central aspects of our economies. Consequently, they take human interdependence and interconnectedness as the departure for their analysis. Second, feminist economics defines economic success in terms of well-being rather than in aggregated metrics such as the Gross Domestic Product (GDP). Third, power relations and inequalities are central to feminist economic analysis. Fourth, while mainstream economics tend to avoid ethical judgements, feminist economics encourages moral considerations, claiming that economics is not an objective, value-free discipline. Lastly, but very importantly, many feminist economists take an intersectional approach in their analysis, not solely focusing on inequalities between men and women, but further between classes,

ethnicities, and other social groups. In sum, a Feminist Economy builds upon different methodological approaches than mainstream economics, enlarging its analytical scope to include, for instance, care work and power relations, while challenging its underlying assumptions, such as the homo economicus. For Power (p.6)[xliii], feminist economics focuses on the importance of social provisioning, emphasizing that:

"As its root economic activity involves the ways people organize themselves collectively to get a living".

Why We Should All Be Feminists

A Feminist Economy is relevant for several reasons. Firstly, it highlights and aims to overcome prevailing injustices based on people's gender, class, or ethnicity [xlii]. Furthermore, being concerned with economists' blindness towards central aspects of our economy and society, namely care and household work, a feminist economy might improve overall living quality by improving economic analysis to account for the most vital aspects of our societies [xliii].

FUNCTIONAL SERVICE ECONOMY

One sentence summarizes the meaning of the Functional Service Economy (also called Performance Economy) quite well. “The essence of the performance economy lies in producing, selling and managing performance over time” (p. 148)[xliv]. Importantly, it does not only aim to maintain resources but further to increase their efficiency. Resource efficiency translates into slower, longer, and more intensive resource use, maximizing its lifetime[xlv]. Thus, one main goal of the Performance economy is to use as well as to re-use goods the longest time possible, which is one aspect of the Circular Economy to which the Performance Economy relates. To achieve its goal, the Inventor of the Functional Service Economy, Walter Stahel, advocates two strategies: prioritizing sufficiency over efficiency and selling performance instead of products. Sufficiency over Efficiency means minimizing overall material resource input [xlvi]. One example could be zero-emission houses which require only very little energy, due to optimal isolation and design [xlv]. Selling Performance instead of products shifts the objective of economic activity from selling products to selling its “benefits offered to the user”. In this business model, customers only pay when receiving a service and not when purchasing a product. Furthermore, the good’s ownership remains with the producer, who has a strong incentive in producing durable products, consequently. According to proponents of the

performance economy, focusing on services instead of manufacturing makes the economy more labor-intensive and less manufacturing dependent. Due to this shift, it could both protect natural resources and decrease unemployment [xliv].

Why Performance Matters

The Performance Economy responds to the ecological crisis by putting waste reduction over waste management and disincentivizing mass consumption [xliv].

GREEN ECONOMY

The concept of the Green Economy (GE), first introduced in the late 1980s and early 1990s, gained political as well as scientific popularity only around after the financial crisis in 2008, when international organizations, such as the United Nations started featuring it [xlvii]. It remains a very ambiguous concept for two reasons. First, many critics consider the GE to be a too broad, vague, and context-dependent concept. This disagreement surrounding the GE might be one reason why many differing definitions of it exist. In a network analysis of 140 organizational and scientific definitions, Merino-Saum et al. distinguish between four different kinds of definitions [xlvii]. Definitions tend to differ according to how critical they are towards the economic system, with some perceiving GE as a pro-growth discourse merely focusing on technological innovations and resource use efficiency, some as a discourse wanting to decouple economic growth from environmental damage, and some as a critical discourse which aims to overcome the pro-growth paradigm [xlviii]. One of the definitions builds upon the UNEP's Green Economy concept, stating that the GE is a concept "that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities" (p. 5)[xlix]. A more commonly used GE definition builds upon the UN's 2011 definition, which describes the GE as a concept improving resource efficiency to ensure economic growth, while limiting its negative

environmental and climate impact[l]. Contrary to the UNEP's definition, this definition ignores "environmental limits" all together, while focusing much more on green growth (GG) [xlvii]. Another commonly used definition links GE to the concept of Sustainable Development [li], describing the GE as a precondition or part of it. Lastly, some definitions fall out of these three categories altogether, and tend to be broader, by for example, defining the GE as the commodification of nature [xlvii]. In sum, GE is a concept which might link to improving social conditions and eliminating environmental risks, to the potential compatibility of economic growth or development with limited resources or climate risks, as well as to the sustainable development discourse more generally.

Why Going Green?

Depending on its understanding, the Green Economy might be a valuable tool to achieve the UN's Sustainable Development Goals [li].

HYDROGEN ECONOMY

The Hydrogen Economy loosely describes an economy that relies on hydrogen to meet most or some of its energy demands. It builds on varying techniques using hydrogen to produce, store, or transport energy[lii]. Proponents consider hydrogen a vital driver in the transition to a sustainable energy system for several reasons[liii]. First off, because of its potential to reduce carbon emissions, especially in the transportation sector, but further in the chemical sector or the iron and steel production. Secondly, lower carbon emissions improve local air quality. Thirdly, hydrogen's ability to store energy in liquid or gasoline is a promising solution for storing as well as transporting solar and wind energy, making green energy production more realistic and lucrative. Moreover, hydrogen energy might be produced locally, potentially avoiding long-distance transportation altogether. This local production would make energy supply less dependent on insecure energy sources, such as oil or gas, improving overall energy security. Despite the foundation of the international journal of hydrogen energy in 1976, differing and contesting visions on the hydrogen economy exist. These visions lie between two extremes. One of the visions pictures the hydrogen economy as a highly decentralized energy system with local hydrogen production from domestic renewables. According to this vision, a hydrogen economy will empower citizens and reshape their understanding of energy consumption by creating a direct link between

local energy production and the environment. On the other extreme, stakeholders perceive hydrogen mainly as a transport fuel, produced in a centralized system from nuclear power or fossil fuels to be transported throughout an accompanying infrastructure. These two extremes highlight the disagreement about hydrogen's production process and whether either renewable energies or nuclear energy and fossil fuels should form its base. Furthermore, within this range of production possibilities, controversy exists regarding the question of whether hydrogen should function mainly as a transport fuel (e.g., hydrogen cars) or whether it should replace heating or even electricity.

Hydrogen's Power

People consider the Hydrogen Economy relevant for different reasons. An often cited one is climate change. Being organic its production builds on renewable energies, a hydrogen economy provides a solution to reduce carbon emissions [lii]. Others consider it relevant for economic reasons stating that hydrogen energy will unavoidably replace older energy forms, making investments in it (monetary or education-wise) unavoidable as well if nations wish to remain competitive.

Hydrogen – A Driving Force for Businesses?

Hydrogen cars are an alternative to gasoline cars (For more information: https://h2.live/en/wasserstoffautos/).

SHARING ECONOMY

The sharing economy is also referred to as collaborative economy. For a detailed definition please have a look at the entry about the Collaborative Economy on page 28.

SOCIAL ECONOMY

The Social Economy depends on its geographical and temporal context. Broadly, Moualert and Nussbaum define it as "that part of the economy that organizes economic functions primarily according to principles of democratic co-operation and reciprocity, guaranteeing a high level of equality and distribution, and organizing redistribution when needed, in order to satisfy human basic needs in a sustainable way" (p. 2079)[liv]. However, the authors stress that this definition is too general to appropriately describe all organizations referring to the Social Economy since they likely differ among countries and periods. Despite its generality, Moualert's and Nussbaum's definition allows us to distinguish between two different, but interdependent aspects of the Social Economy. The first aspect refers to its institutional side, including social security provisions, governance, and more generally the public sector's involvement. The second perspective points to the interaction between private, public and the so-called third sector. The third or civic sector consists of voluntary non-profit organizations and co-operatives [lv]. Kay defines the Social Economy following this second perspective, describing it as the interactions of voluntary organizations (civil sector) and social enterprises (private and/or civil sector)[lvi]. Social enterprises do not aim for profit-maximization, but social-welfare (Evans in [lvi]). Furthermore, they tend to hold their wealth not individually, but

collectively to benefit the people for whose welfare they operate. Lastly, social enterprises might build on participatory principles. In addition to social enterprises and non-governmental organizations, other crucial non-for-profit organizations in the Social Economy are community organizations, such as cultural or sports clubs [lv]. Private, public and third sector actors involved in the Social Economy share the following values: "primacy of people and the social objective over capital, democratic governance, solidarity and the reinvestment of most profits to carry out sustainable development objective"[lvii]. In sum, the Social Economy can mean many different things in specific contexts. Generally, however, it aims for social justice and solidarity, often through civic involvement, bridging the gap between public and private actions.

Why We Should Embrace the Social Economy

Society depends on social capital, such as social networks or trust, but also on cohesion which is more likely to occur in a socially just, inclusive and solitaire societies. Private and public sector tend to not appropriately fulfill human basic needs, which makes a social economy crucial. Furthermore, the Social Economy has the potential to enhance the Sustainable Development Goals[lviii].

SOLIDARITY ECONOMY

The concept of the Solidarity Economy or Popular Economy emerged in Latin America throughout the late 20th century[lix]. Due to the authoritarian regimes prevailing in many Latin American countries and the debt crisis, an increasing number of citizens could not find employment in the formal economy[lx]. To survive, people organized themselves in community-based economies, driven by solidarity. The term Solidarity Economy origins from the Chilean philosopher and sociologist Luis Razeto Migliaro, describing these alternative forms of economic organization, based on solidarity [lix]. The Solidarity Economy is very similar to the Social Economy. Some authors consider them to be the same, while others highlight their differences [lx]. A common characteristic of the Solidarity and Social Economy is their refusal of the strict separation between the state and the market. Utting (2018, p1) uses the term Social and Solidarity Economy to describe “forms of economic activities undertaken by non-state organizations and enterprises that prioritize social objectives and are guided by principles and practices of cooperation, self-help, solidarity, and democratic self-management” (p.1)[lxi]. This definition adds three specific features compared to the pure Social Economy. The Solidarity Economy might be formal or informal, or even describe a mix of both. It entails, for instance, worker cooperatives, community land trusts, credit unions lending circles, social currencies, and community gardens or

parent-run kindergartens [lx]. Furthermore, in the solidarity economy, local communities are often the protagonists, creating, for instance, bottom-up supply chains where consumers and producers collaboratively negotiate prices, while sharing part of the production's risk [lx]. If not geographically close, proximity in the sense of empathy and relativeness is crucial, as this emotional proximity enables the solidarity economy in the first place. Lastly, and perhaps most importantly, the Solidarity economy went further than the social economy "and raised the question of the aim of activities, something that had been sidestepped in the social economy, which centered on the relations between activity and actors" (p.36) [lx]. Key objectives underlying any solitaire economic activity are collectivity and horizontal power-sharing. Given its emphasis on solidarity, the Solidarity Economy also entails non-monetary economic exchanges, based on gifts or volunteering [lix]. To sum up, while the Solidarity Economy also always falls into the category of Social Economy, not every Social Economic activity refers to the Solidarity Economy.

Solidarity Economy – When Market and States Fail

The Solidarity Economy emerged as a response to state and market failure to meet citizens' needs [lxi]. Moreover, the Solidarity Economy responds to our economies' environmental and social ills. It, therefore, has the potential to foster the realization of Sustainable Development Goals [lix].

Solitaire Cooperatives

Patto della Farina del Friuli Orientale is a short food supply chain agreement aiming to change social and market relationships by bringing consumers and producers closer together [lix].

PARTICIPATORY ECONOMY

The Participatory Economy aims to establish economic institutions ensuring economic democracy and economic justice[lxii]. Economic Democracy means to distribute economic decision-making power proportional to how much a decision is likely to affect people. More affected People should have a greater say. Economic justice entails that people receive compensation for their work according to their efforts and not their material or human capital. People working equally hard should get the same wage, no matter their intellectual differences. The idea of a Participatory Economy follows the intuition that all members of society own productive resources, "everything we need to produce our way of life" (p.12)[lxii] collectively and should further all benefit from their usages. Therefore, citizens should democratically organize them. Three pillars of the Participatory Economy allow for this organization: a self-managing workplace, a self-managing neighborhood and a participatory economic planning where both working councils and neighborhood councils have a say[lxiii]. To ensure that every worker has not only a formal right to shape decisions, but receive some empowerment, proponents of the participatory economy suggest so-called balanced jobs [lxii]. No matter what your job in cooperation is, it should entail both empowering and pleasant parts, but further unpleasant ones, such as swiping the floor occasionally and not leaving such latter tasks to cleaning stuff alone, thus excluding them from any decision-making power. Furthermore, participatory planning plays a vital role in

distributing resources for production and consumption. Throughout this process, worker councils, neighborhood councils and federations collectively and unanimously distribute resources according to efficiency.

Taking Democracy Seriously

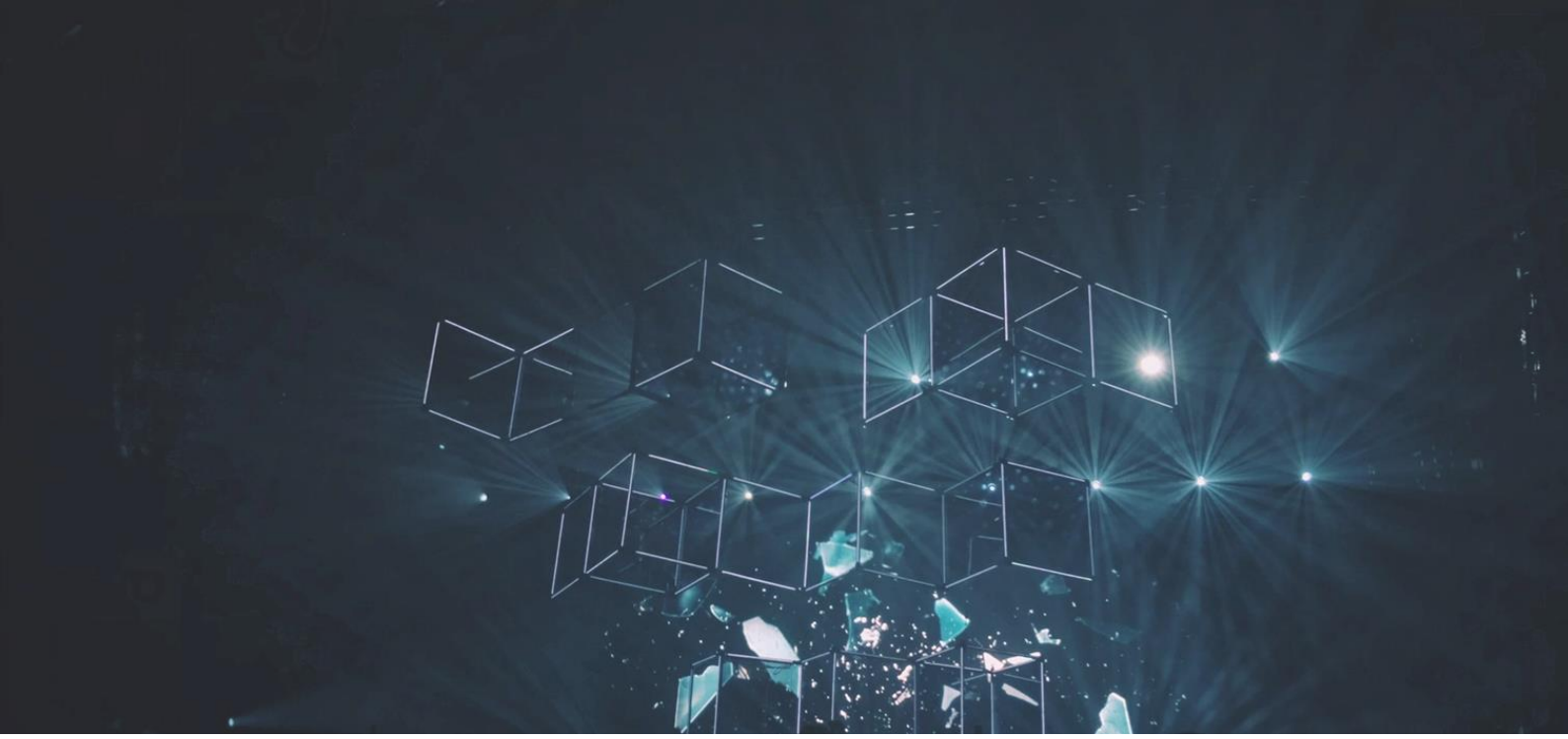
Social inequality constantly increased throughout the last decades (development economics book), raising the question how responsible our market economies are for this trend. According to proponents of the participatory economy, market-based systems structurally reinforce inequalities, thus requiring a readjustment. Collective and democratic ownership of productive resource might be a solution. Furthermore, climate change highlights the importance of collective ownership of productive commons or rights, such as the right to pollute carbon emissions. As a democratic society, we should collectively own and preserve nature, and thus decide how much people can pollute to stay within the planetary boundaries necessary for our all well-being.

„Wanting participatory economics means we want classlessness and we want some very specific defining institutions. Our own organizations should therefore reflect these desires, move us toward them and be consistent with arriving at them.“

(Michael Albert)[lxiv]

PERFORMANCE ECONOMY

The Performance Economy is also referred to as the Functional Service Economy. For a detailed definition please have a look at the entry about the functional service economy on page 42.



PLATFORM ECONOMY

With the invention of the microprocessor, in 1971, the information technology revolution (ITR) of the 70s started, changing economic activities' nature dramatically[lxv]. From an economic perspective, the most significant consequence of this revolution was the reduction in information costs. This reduction gave rise to the so-called digital platform economy (DPE), which loosely describes a "growing number of digitally enabled activities in business, politics and social interaction" (p.62)[lxvi]. Platform businesses act as intermediaries between market participants, creating matches and increasing trade [lxv]. Consequently, platforms can satisfy billions of customers' needs simultaneously and effectively. Given its reliance on digital technology, the DPE lowers bureaucratic effort, and small network organizations tend to replace traditional bureaucratic firms. The information technology further allows for a two-sided platform economy: "special kinds of firms that facilitate exchange by allowing direct transitions between different types of consumers who could not otherwise transact" (p. 1635)[lxvi]. This active consumer engagement is another specific feature of the platform economy.

WELL-BEING ECONOMY

The Well-Being Economy criticizes how our "economy is designed in a way that does not account for nature, in a way that is blind to the distribution of resources, and in a way that puts measures of progress such as short-term profit and GDP to the fore" (p.4)[lxvii]. Instead, the wellbeing movement advocates an economy that serves the planet and people instead of induvial interests[lxvii]. Its values evolve around dignity for all living beings and nature, a sense of belonging, fairness, and participation. The movement has four overreaching goals. First, an economy must aim to meet people's diverse needs, including material ones like food or shelter, but further education, health, security, leisure, as well as self-determination and social relations. Secondly, it wants to distribute resources fairly across citizens, regions, countries, and generations. Thirdly, it highlights the planetary boundaries within which our economic system must function. And lastly, all these goals should be designed and aimed for in an inclusive and holistic approach to human wellbeing and development. To achieve these goals several strategies, exist. Contrary to other alternative economies, the well-being economy takes a (fair) market-based approach with a strong focus on social entrepreneurship. However, it highlights the market's limits by demanding greater global commons, the public and preferably local provision of renewable energies, as well as an agroecology approach. Other favored approaches are the Circular and the Blue Economy. The Wellbeing economy takes participative democracy seriously,

enlarging it to the economic and the cooperate sphere. For example, under the steward ownership concept, workers and not external shareholders should collectively own their cooperation. Besides addressing class inequalities, the focus further lies in solving the global north-south divide. Lastly, and perhaps most famously, the wellbeing economy wants to overcome the predominant GDP paradigm and replace this one-sided metric with more holistic ones. These metrics should reflect real value creation, including ecological and social costs, as well as informal and formal care work. Related to the abundance of GDP, wellbeing economists want to overcome the inherent need for economic growth and replace it with a more selective approach to create an economy that allows "humanity to determine economics, rather than the other way around", as illustrated in Figure 4.

Figure 4: "The Business of Wellbeing Guide" resource by Wellbeing Economy Alliance.

Illustrated by Mariana Rosa from Sense Tribe[lxviii].

Why Well-Being Is Worth Focusing on

Our “Current economy is unsustainable, unfair, unstable, and unhappy” (p.4)[lxvii]. The Well-being economy aims to change this situation by feeding our imagination with possibilities for alternatives.

YOUTH ECONOMY

The Youth Economy is a very vague concept on which not much literature exists. According to Buheji and Ahmed (p. 2405)[lxix], a "youth-based economy would focus on (the) development of techniques which could ensure proper engagement of the young decision-makers of tomorrow in the development decisions of today". The definition shows that a Youth Economy is mainly about the empowerment of young people. While certainly, not all proponents of a Youth Economy would agree, some scholars, such as Côté base this required empowerment on existing discriminatory and marginalizing tendencies against young people, claiming that youth could be considered an economic class in some countries[lxx].

Giving Young People a Voice

In the financial and housing crisis or the resulting high unemployment, young people seem to have been disproportionately affected by these adverse economic conditions. After the Financial Crisis, up to 50% of young people in Greece or Spain were unemployed, for instance [lxx]. Therefore, questions about how to empower young people are crucial.

ZERO-WASTE ECONOMY

The Zero Waste International Alliance defines the Zero Waste Economy as “the conversation of all resources by means of responsible production, consumption, reuse, and recovery of products, packaging, and materials without burning and with no discharge to land, water, or air that threaten the environment or human health”[lxxi]. This definition exemplifies the close relation of the Zero-Waste and Circular Economy. However, according to some scholars, the Zero Waste concept is slightly broader than the Circular Concept, which has at its core a solid-waste hierarchy [lxxii]. This waste hierarchy prioritizes some waste management strategies over others. For instance, it advocates reducing waste before thinking about the recycling mechanism. In contrast, the Zero-Waste concept does not necessarily build on a solid-waste hierarchy, as it considers "trash" itself a useful resource. Thus, Zero Waste does not only focus on waste prevention but aims to re-shift our conception of waste as something useless[lxxiii]. Therefore, it focuses on communication and education strategies to accelerate these behavioral changes. Furthermore, policy incentives for people to create sustainable, long-lasting, and waste reusing products, are crucial [lxxii]. Entrepreneurs can meet such product requirements by imitating natural processes. Given the required technological and social developments, the Zero Waste concept itself constantly evolves, as does its definition. Nevertheless, one main contribution of the Zero Waste Economy is already visible, namely, its waste philosophy, stating that “wastes are values to be realized and not problems to be solved” (p. 327)[lxxii].

Rethinking our System Requires Rethinking Waste First

Our linear economic model yearly produces more than 1.47 billion tons of solid waste [lxxii]. This waste is responsible for increased greenhouse gas emissions, bad to deadly water and soil quality, a reduction in biodiversity, and thus overall harmful for public health. Therefore, we must shift to a circular economy empowered through a Zero Waste concept.

4.2 Results of the Metadata Analysis

4.2.1 Unique Keywords

After preprocessing data and storing them in atomic form, we ran analyses on the individual X-Economies as well as the interactions between them. First of all, from the 1000 most cited articles on different Economies, we could extract roughly 3000 unique keywords for most of the results. This excludes the digital and circular economy as well as the combination of all the three X-Economies, where we could roughly extract 200-300 keywords each. The figure below provides an exact count of the unique keywords for each of the results.

WoS Search	Unique Keywords
"Digital Economy"	3364
"Circular Economy"	2954
"Social Economy"	2499

WoS Search	Unique Keywords
"Digital Economy" AND "Circular Economy"	217
"Circular Economy" AND "Social Economy"	3407
"Digital Economy" AND "Social Economy"	3919

WoS Search	Unique Keywords
"Digital Economy" AND "Circular Economy" AND "Social Economy"	370

Fig3: Unique keywords for each search in the WoS database

4.2.2 Interaction Keywords

As can be seen in Fig3, our search in the WoS database also included interaction searches between the different X-Economies (digital, circular and social). This gave us the actual common keywords between these different economies. However, our python program was also built in a way that it can give the interaction keywords by analyzing the individual searches. This is what we call hypothesized common keywords. It is called so because it comes from manually combining the individual searches and finding out the common keywords. In our case, it was not manual as we wrote a python script and executed it to give our desired results. As can be seen in Fig4 below, by combining the individual searches between digital economy and circular economy, we could extract 287 hypothesized common keywords. This is different from the 217 actual unique keywords mentioned in Fig3, which we obtained from searching ("Digital Economy" AND "Circular Economy") in the WoS. Similarly, the

number of unique hypothesized common keywords for digital and social economy was 327 and for circular and social economy it was 310.

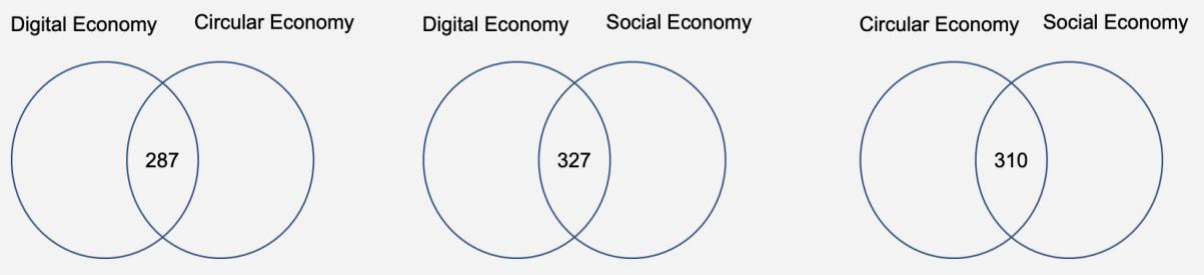


Fig4: Hypothesized interaction keywords for different X-Economies

4.2.3 Non-Realized Keywords

The next step in our analysis was to compare the actual interaction keywords and the hypothesized interaction keywords obtained from combining the individual searches. What this means is that we find the common keywords between the actual and hypothesized searches. The results were a list of keywords that are common between both the actual and hypothesized searches. A more interesting result was the keywords that were presented in the hypothesized searches but not in the actual keywords. These were the keywords that we obtained from combining the articles manually, however they have not been researched upon yet. This would be a highlight to our research as it would help identify potential keywords between the different X-Economies that the next articles can be written on or about. It can also help identify the potential points of discussion between entrepreneurs working in these different X-Economies. Fig5 below shows a graphical depiction of such an analysis for digital economy and circular economy. Moreover, running a similar analysis for digital economy and social economy, we got 327 hypothesized interaction keywords, 262 of which were realized and the rest 65 were non-realized. For the circular and social economy, out of the 310 hypothesized interaction keywords 44 were realized whereas 266 of them were still to be researched upon.

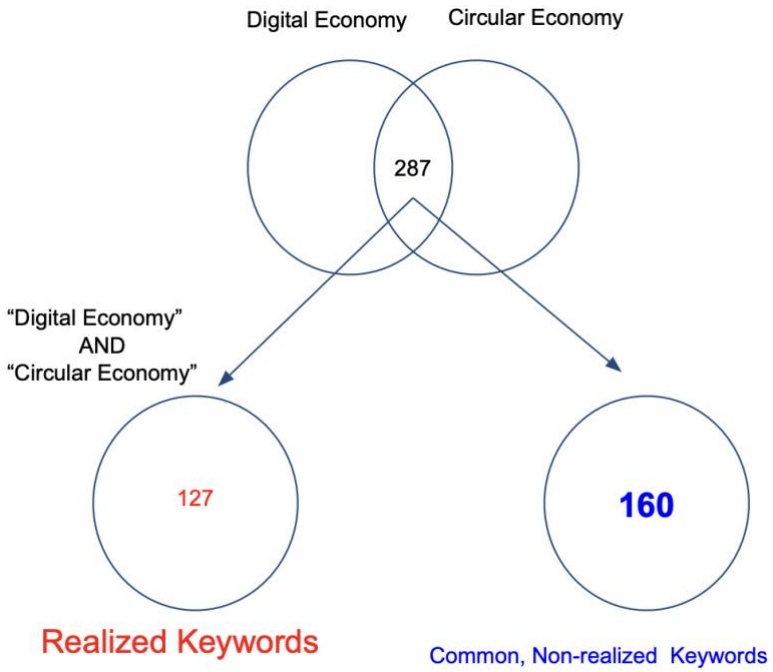


Fig5: Realized and Non-realized Common Keywords

4.2.4 Potential Keywords for Future Research

The final step of our metadata analysis was to be able to present a word cloud which shows these common non-realized keywords. This has been shown in the appendix section for all the three X-Economies. Moreover, from our metadata analysis, we can also point out potential keywords that are most likely to be mentioned in the future articles written about the different X-Economies we discussed. Fig6 depicts such a list of three keywords for the digital economy and circular economy articles. As can be seen, the keywords China, Sharing economy and COVID-19 might be mentioned in future research done on the interaction between digital and circular economy. This is because they are keywords having the highest strength in terms of their average citation count over the years. Similarly, Fig7 and Fig8 depict such a list of keywords for "Digital and Social" and "Circular and Social" economy respectively.

0	China	{'Environmental Sciences & Ecology': 6, 'Engineering': 5, 'Business & Economics': 4, 'Science & Technology - Other Topics': 2, 'Operations Research & Management Science': 1, 'Transportation': 1, 'Automation & Control Systems': 1, 'Mathematics': 1, 'Computer Science': 1, 'Demography': 1}	{'Japan': 6, 'Netherlands': 4, 'Denmark': 3, 'Hong Kong': 3, 'Canada': 2, 'Singapore': 1, 'South Korea': 1, 'Germany': 1, 'Philippines': 1, 'Macau': 1, 'Norway': 1, 'Austria': 1}	306.312798
1	Sharing economy	{'Environmental Sciences & Ecology': 2, 'Business & Economics': 1, 'Public Administration': 1, 'Science & Technology - Other Topics': 1, 'Engineering': 1}	{'Netherlands': 1, 'Chile': 1, 'Spain': 1}	226.960714
2	COVID-19	{'Environmental Sciences & Ecology': 3, 'Social Sciences - Other Topics': 1, 'Engineering': 1, 'Science & Technology - Other Topics': 1}	{'India': 1, 'Australia': 1, 'Japan': 1, 'Malaysia': 1, 'Nigeria': 1, 'Finland': 1}	212.250000

Fig6: Potential keywords for research in "Digital Economy and Circular Economy"

0	Energy	{'Energy & Fuels': 2, 'Science & Technology - Other Topics': 2, 'Environmental Sciences & Ecology': 2, 'Business & Economics': 1, 'Electrochemistry': 1, 'Chemistry': 1, 'Marine & Freshwater Biology': 1, 'Engineering': 1}	{'Canada': 2, 'Saudi Arabia': 1, 'Germany': 1, 'Turkey': 1, 'Australia': 1, 'France': 1, 'India': 1}	201.254167
1	Environmental management	{'Environmental Sciences & Ecology': 2, 'Biodiversity & Conservation': 1}	{'Australia': 1}	110.720238
2	Ecosystem services	{'Environmental Sciences & Ecology': 2, 'Agriculture': 1, 'Science & Technology - Other Topics': 1, 'Business & Economics': 1}	{'Spain': 3, 'Germany': 2, 'Netherlands': 2, 'Australia': 1, 'Canada': 1, 'Norway': 1, 'Austria': 1, 'Italy': 1}	108.168831
3	Circular Economy	{'Business & Economics': 1, 'Social Sciences - Other Topics': 1, 'Environmental Sciences & Ecology': 1, 'Engineering': 1}	{'Netherlands': 1}	102.400000
4	knowledge management	{'Business & Economics': 3, 'Social Sciences - Other Topics': 2, 'Information Science & Library Science': 2, 'Sociology': 1, 'Environmental Sciences & Ecology': 1, 'Biodiversity & Conservation': 1, 'Computer Science': 1}	{'Spain': 1, 'Australia': 1}	97.994902

Fig7: Potential keywords for research in "Digital Economy and Social Economy"

0	China	{'Environmental Sciences & Ecology': 4, 'Engineering': 3, 'Business & Economics': 2, 'Social Sciences - Other Topics': 2, 'Geography': 2, 'Development Studies': 1, 'Public Administration': 1, 'Urban Studies': 1, 'Area Studies': 1, 'Construction & Building Technology': 1, 'Science & Technology - Other Topics': 1, 'Public': 1, 'Environmental & Occupational Health': 1, 'Biomedical Social Sciences': 1}	{'Hong Kong': 2, 'Netherlands': 1, 'Singapore': 1, 'South Korea': 1}	562.356509
1	industrial ecology	{'Environmental Sciences & Ecology': 1, 'Science & Technology - Other Topics': 1, 'Engineering': 1}	{'Austria': 3, 'Germany': 2, 'Netherlands': 2, 'Denmark': 1, 'Norway': 1, 'Australia': 1, 'Japan': 1}	428.341517
2	Resource efficiency	{'Environmental Sciences & Ecology': 1, 'Science & Technology - Other Topics': 1, 'Engineering': 1}	{'Italy': 1, 'Sweden': 1}	385.072619
3	Waste management	{'Energy & Fuels': 1, 'Science & Technology - Other Topics': 1}	{}	370.294336
4	pandemic	{'Social Sciences - Other Topics': 1, 'Science & Technology - Other Topics': 1}	{'Canada': 1, 'New Zealand': 1, 'Norway': 1, 'Sweden': 1}	340.500000
5	Economic impact	{'Business & Economics': 1, 'Surgery': 1}	{'Ireland': 1, 'Spain': 1}	338.800000

Fig8: Potential keywords for research in "Circular Economy and Social Economy"

5. Discussion

Our quantitative and qualitative analysis contributed to advancing research in the field of X-Economies. Our work can be helpful to both academic researchers as well as entrepreneurs. The non-realized hypothesized common keywords can give researchers potential areas of research that have not yet been explored in the interaction between different X-Economies. Moreover, these keywords can give entrepreneurs ideas about what next big trends are set to arise when they are working in these X-Economies. This might help them set their plan of action accordingly. Moreover, our qualitative analysis i.e., the glossary of different X-Economies we have built might be useful for both academics and entrepreneurs. The glossary provides a clear guide to defining these economies and what it entails.

Next, these keywords can also be used as a foundation for building an interactive collaborative platform where individuals working in different X-Economies can find resources, interact, and collaborate. For example, a researcher might specialize in the field of Engineering and artificial intelligence, while there is another researcher who is working in the field of sustainability and is looking to research

potential technologies that can help build better sustainable homes. So, our platform (like LinkedIn but for X-Economies) can help bring together these two researchers and provide them with potential keywords they can generate points of discussion on. The way it will be achieved is that the results we generated in our research will be fed to the algorithm and then the algorithm will provide potential matches. This will help advance research and literature in the field of X-Economies which in turn will help bring meaningful regime level change as we have discussed in the Multilevel Perspective.

5. 1 Limitations and Further Research

While working on X-Economies for the past 6 months, some of our quantitative and qualitative analyses have been affected because of the limitations we encountered.

The first limitation was the lack of academic articles written about different X-Economies. This impacted both our quantitative and qualitative analysis. Because of the lack of research, we had a limited number of articles (and therefore keywords) to analyze for the quantitative part. This means that some of the results we obtained might not be robust to provide generalizable results. For the qualitative part, this means that we could not use peer-reviewed articles to define and elaborate on all different X-Economies.

A second limitation was the lack of consensus about the definition of different X-Economies. While one researcher defined a particular X-Economy in one way, the other did in a very different way. This might disturb potential collaboration among researchers, especially from different industries. It might be good, to use quantitative methods to investigate differing definitions (see Kirchherr et al., 2017 for an example[xviii]).

A third limitation was the lack of computing power to analyze all the articles of different X-Economies and not just 1000 most cited. This is because running analysis on excel files is computationally expensive and it takes time for the program to run and provide results on a large excel file. Finally, we were also constrained by the time duration of this project. While six months is a considerable period, most of our time was spent building a foundation of research that future iterations of this project can adopt and take it forward. So, we could not analyze all the X-Economies (only three) and we could not find a concrete glossary that encompassed all the X-Economies.

Thus, future iterations can build up on the building blocks that we have created throughout this project. Researchers working on it can expand on the glossary to encompass more X-Economies than the one we have mentioned. They can also research on finding more information-rich articles on the ones we have already defined. For the quantitative analysis, researchers can run the analysis on all the X-Economies defined in the glossary and the potential network of interactions that exist between them. Finally, researchers working on this project in the future can also develop a website where one can access the work we have done so far and what will be done in the future. This will be insightful in advancing research in the field of X-Economies and contribute towards adopting the picture of an alternative socio-technical system envisioned in these economies.

6. Conclusion

Our research analyzed the field of X-Economies with a Scientometric approach alongside a qualitative analysis that includes a glossary. Our paper tried to outline the current crises that we face and how these crises call for a change in the current economic system. It requires the current system to be more interactive, collaborative as well as adoptive to deal with these crises. So, we present the concept of X-Economies, alternative socio-technical systems that take the Sustainable Development Goals (SDGs) into account and aim to bring about technological, social, and ecological changes as well as new policies and forms of governance. Next, we provided a glossary of different X-Economies, creating an overview of existing ones. Our quantitative analysis heighted the need for greater collaboration among X-economies and gave instructions on how to best do so among the social, the circular and the digital economy. Finally, Section 5 discussed potential limitations and pointed to promising future research.

Ultimately, this research contributes to the strengthening of new economic visions and practices. It remains us, that for change to happen, academics, entrepreneurs and politicians must think out of the box and be open-minded for other approaches and collaborations. After all, 21st-century problems are far too complex for single-sided research approaches. Instead, they show us how valuable teamwork and collective actions can be.

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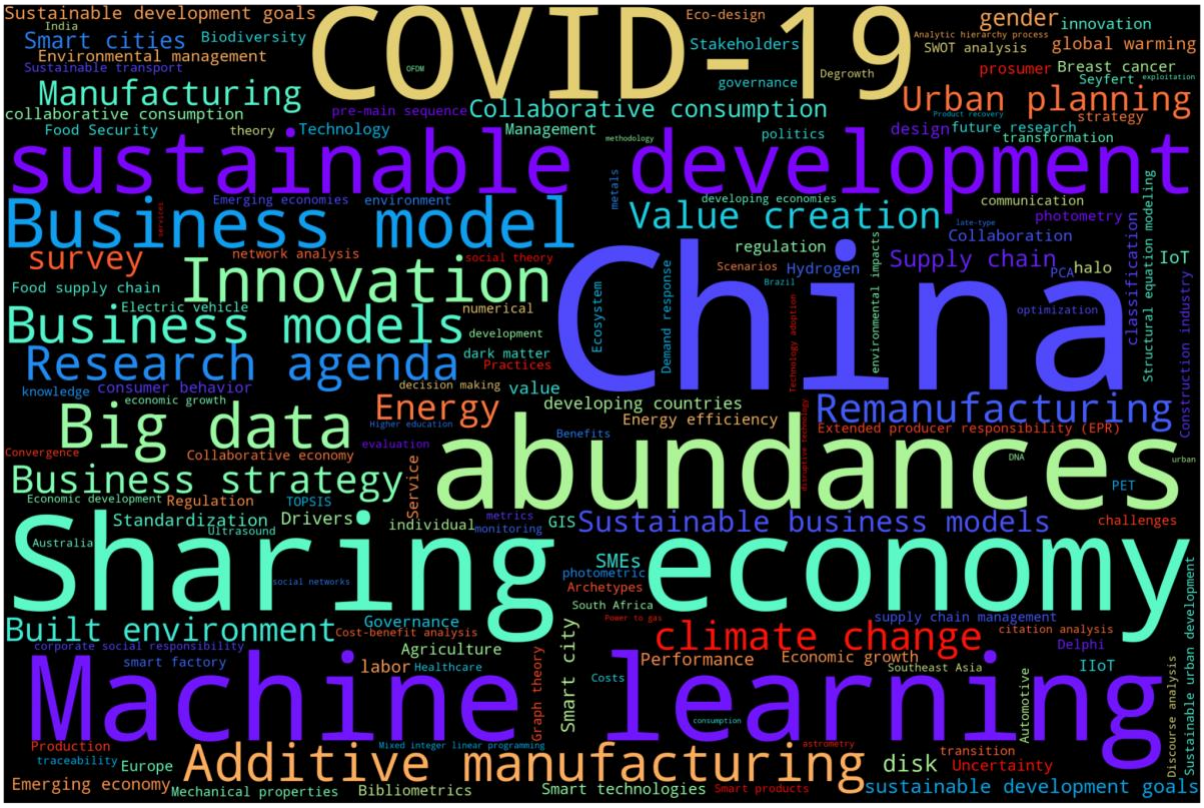
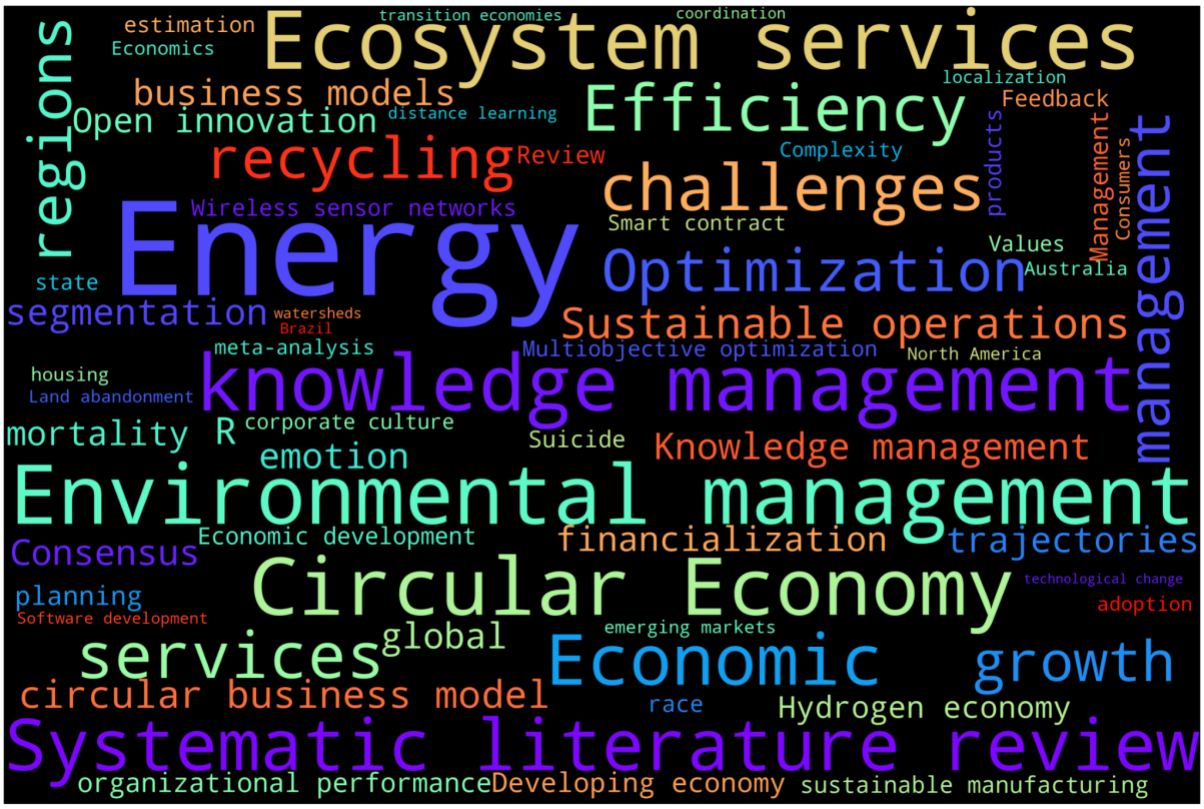
8. Appendix: Word Clouds of Non-Realized Potential Keywords

8.1 Digital Economy and Circular Economy



8.2 Digital Economy and Social Economy



8.3 Circular Economy and Social Economy