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Sustainable Economics

How Can a Combination of Design and Systems Thinking Contribute to the Transformation to a Sustainable Economic System?

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Author: Pascal Meyer (96534517)

Course Leader: Paul Sternberg

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Introduction

The major problems humanity faces in the next decades are in its complexity, urgency, and dangerousness exceptional in history. Today's approaches are failing to decrease global warming and global inequality sufficiently because our economic system leads systematically to unsustainable consumption and rising inequality within and between nations. Since the end of the colonial era in the 1960s, global inequality has tripled (Hickel, 2017). These developments are existential threats to all societies on this planet and to our democratic foundations. The simultaneous occurrence indicates that our economic system is in a disequilibrium with the planet and its societies, which is why the demand for a sustainable economic system is increasing evermore. Nearly all current climate policies aim for technological fixes such as eco-efficiency, while global poverty policies rely on economic growth. But in most cases, these policies cannot do more than slowing down the process of environmental degradation and increasing global social inequality. Albert Einstein is credited with the statement that 'the significant problems we face cannot be solved at the same level of thinking we were at when we created them' (Ehrenfeld, 2008). Still, the literature about alternative approaches for our economic system is predominately taken by economists and policymakers. Some of them fail to focus on the root cause of our problems and some fail to come up with innovative ideas.

Outgoing from there, I want to discuss how this necessary process can be improved by employing a design and systems thinking perspective. During my social innovation studies, I have learned to use these methods to tackle social problems. Although designers and systems thinkers already suggest extending design thinking with systems thinking, there are no studies on a systematic level such as the whole economic system. For that reason, the goal of this thesis is to investigate and discuss how a combination of design and systems thinking can contribute to the transformation to a sustainable economic system.

I want to contribute with this master's thesis to the discourse about some of the most urgent question of our time: What in our current economic system do we need to change to design a system that serves humanity? And maybe even more importantly: How can this social change be accomplished? The answers to these questions can never be absolute and will always change, therefore, everything in this thesis is only representing a temporary fragment of our complex social and economic system seen from my perspective.

I am a social innovation student with a background in communication design, which is why I want to view this question more from a designer's perspective and less from an economic or policy perspective. After explaining my motivation and background, I will explain the

characteristics of a design perspective and how it differs from conventional policy-making and problem-solving approaches. At the same time, I will explain why a design perspective alone might not be sufficient and why the combination with systems thinking can complement the weaknesses of both approaches.

We cannot design the future when we do not know how the present system developed and how it is functioning. Thus, the first and second part of my dissertation will be about the history of our economic system and the idea of sustainability. Based upon this, I will not only focus on the two major endemic and immediate problems of global warming and global inequality in a problem analysis, but I will also look at problems that are reinforced by these issues. The last part of the thesis is finally about the question of how the application of design and systems thinking can contribute to solve these problems, thereby, help to redesign the economic system towards sustainability.

Motivation

Personal Background

My professional background and motivation for writing this thesis are of relevance because they unquestionably influence my thinking even though I strived towards having a neutral and unbiased perspective on the issues that I have explained and discussed in this thesis.

I have a passion for designing and solving problems in unconventional ways throughout my whole life. Before studying social innovation, I studied communication design with a focus on advertising and marketing. Designer Papanek (1973) wrote in his book *Design for The Real World* that advertising design 'is probably the phoniest field in existence today'. And although the superlative is maybe questionable, I totally agree with his general point. Commercial advertisement thus became a contradiction of my need for using my time and skills for doing good. Consequently, I have decided to study social innovation afterwards, because it combines my passion for designing and problem solving with the aim of improving the society. But social innovation also added a third dimension that was in my interest: the political and economic perspective.

Geopolitics and macroeconomics have been a field that interested me since I was 15 years old because I wanted to understand the underlying structures of the system we live in. The idea of combining social innovation with this holistic perspective on the whole system and the empathic perspective of a designer builds the fundamental idea of this thesis.

Social Innovation and its Limits

The increasing importance of social innovation should be highlighted in this context. Manzini (2015), a leading researcher on sustainable design and design's role in changing systems, argues that social innovation will play an important role in the 21st century just like how technological innovation did in the last century. The need for new solutions in an increasingly more complex society made social innovation already a popular part of social policy reforms (Baglioni and Sinclair, 2018).

But, ultimately, social innovation also has its limitations. Sociologist Ferragina and anthropologist Grisolia (2015) infer that social innovations, which are not embedded in a structural reform, just 'forward the neoliberal ideology'. In fact, many social innovations just emerge, according to sociologist Sinclair (2017), in response to social problems that are systematically caused. The general critique is thereby that today's social innovations have to act within the logic of our economic system. Political scientist Guérot (2017) criticises that

‘social entrepreneurship is usually just a fig leaf to conceal the worst negative outgrowths of neoliberalism’.

But all this critique is not new: Over a hundred years ago, Oscar Wilde had already argued that this kind of approach defocuses people from tackling the root causes of social problems and ultimately allows the responsible capitalistic economic system to subsist longer:

> “Just as the worst slave-owners were those who were kind to their slaves, and so prevented the horror of the system being realised by those who suffered from it, and understood by those who contemplated it, so the people who do most harm are the people who try to do most good” (Hickel, 2017).

Therefore, as a social innovator, I actually want to prioritise the redesign of the structural architecture of the underlying system, rather than to focus on the symptoms. And although social innovation is used on many different levels, this field is not researched sufficiently. The urgency of problems about global warming and global inequality are especially motivating me to research what social innovation with a designer’s perspective can contribute to the needed redesign of our economic system. I am greatly passionate about the idea of being part of this transformation. Although numerous things that I have researched and written in this thesis have been overwhelming and disillusioning to me, the hope of changing these circumstances prevails over me.

A Design Perspective

Design Thinking to Solve Unconventional Problems

Despite all my fields of interest I still call myself a designer. Not only because of my background as a communication designer, but also because I have learned in my studies that design is much more than just managing the look, feel, and functionality of products. Design is simply the process and result of giving ideas a tangible form. Between its different definitions, the common link is that designers and the design itself meet human needs.

Inside this role, according to political scientist Herbert Simon, design has the function of problem-solving. According to Manzini (2015) are design's four fundamental characteristics that it is clearly expressed, easy to discuss, easy to apply, and easy to understand. He concludes that this design knowledge 'is desperately needed if we are to join the battle for a sustainable world' because conventional solution approaches to solve complex problems need a historical reference that is comparable to the problem. Design offers a 'rapid way of achieving tangible results that incorporate learning accumulated through a long series of previous experiences, through trial and error', but our today's need for a sustainability transformation on a global level is exceptional. He concludes that unconventional problems require unconventional methods.

I have learned to see design as a lens that can be applied in various forms to solve those kinds of complex problems. This approach is called design thinking. Originated from the for-profit business environment, nowadays, it finds reception in tackling problems that, for example, NGOs are facing (Brown and Wyatt, 2010). I have especially learned to use design thinking in this context of social and environmental challenges by thinking across boundaries and developing holistic and human-centred solutions. Through combining critical thinking (what is needed?), creativity (what is possible?), and practical sense (what is realistic?), design thinking is able to create technologically feasible, economically viable, and socially desirable innovations (Manzini, 2015; Plattner, Meinel and Leifer, 2016).

Combining Design Thinking with Systems Thinking

Despite its holistic approach, a design perspective alone often fails to understand the evermore increasing complexity of problems (Manzini, 2015). As a consequence, a few design thinkers are inferring that it is necessary to augment design thinking with systems thinking. This would enable design thinking to mould wicked social challenges instead of just products and services (Conway, Masters and Thorold, 2017).

In my projects during my social innovation studies, I also saw difficulties in analysing the root-cause problem, recognising interconnections and selecting leverage points, where a solution can be set. In my second studio practice unit, I, therefore, used systems thinking and observed a mutual complementation that improved the analytical part significantly.

While design thinking focussed on the in-depth understanding of a problem and uses an empathic perspective on individuals and groups, systems thinking keeps track of the bigger picture and analyses how groups relate to each other (Skoll Centre, 2018). Instead of designing a completely new solution, systems thinking considers that complex systems cannot be designed, but just redesigned. Former IDEO designer Vassallo (2017) demands, therefore, to update the whole concept of design thinking to tackle more complex problems. Organisational theorists Pourdehnad, Wexler, and Wilson (2011) even suggest seeing this combination of design and systems thinking as a natural evolution of design and, thus, as a new "generation of design". They argue that while the "first generation of design" was exclusively relying on professional design knowledge, the "second" recognised with design thinking the need for collaboration between designers and other professionals, but also the end user. It also includes ethnographic and anthropological studies to deliver better solutions. But in contrast, the "third generation of design" applies systems thinking principals to be able to analyse complex systems and overcome differing values, beliefs, and paradigms of the stakeholders.

Systems thinking tries to search for elements, interconnections, functions, and feedback loops to understand complex systems and ultimately to find leverage points to counter root problems of the system. Instead of the reductionistic design thinking approach – the idea that everything consists out of individual parts – it focusses on expansionism, which, in this context, means that every system is always a sub-system of a larger system. Systems thinker Chapman (2002) explains that this mechanistic and reductionist thinking is also a problem in conventional public policymaking because it is a major factor for public policy failure.

Beyond this, design thinking and systems thinking complement in their forms of logical interference: while design thinking is primarily using synthesis (abductive reasoning), systems thinking is primarily using analysis (deductive reasoning). Systems thinking pioneer Ackhoff explains that 'analysis is useful for revealing how a system works, but synthesis reveals why a system works the way it does'. This separation is partly based upon the different research methods, since systems thinking is looking at data, time graphs, and the history of the system and design thinking at ethnographic and anthropological approaches such as case studies and user behaviour (Pourdehnad, Wexler and Wilson, 2018).

In summary, design and systems thinking are very complementary approaches. They compensate each other's weak spots and, thereby, seem to have an advantage over mechanistic and reductionist public policymaking. Design thinking has the ability to create innovative and unconventional ideas, while systems thinking has the ability to detect the root-causes and best leverage points to tackle these problems. Altogether combining them can increase the possibility of creating sustainable solutions for complex social problems.

Current Economic System

To manage problems like the unsustainability of our economic system, it is important to understand the mechanisms that led to the creation of our current economic system. In this chapter, I will explain and discuss the general characteristics of our current economic system. All this will help to discover the root causes of unsustainability.

Economics by Design

Krugman, a Nobel Memorial Prize in Economic Sciences recipient, defines economics as 'the social science that studies the production, distribution, and consumption of goods and services' (Krugman and Wells, 2012). As a social science, it is in a row together with philosophy, sociology, anthropology, or political science. It should be emphasised that there is a clear distinction to natural sciences such as biology, chemistry, or physics, because, in our public life, economics has taken a very technocratic position. Economists often imply that economics is operating in the same way as the real physical world and that big questions concerning our societies can be seen as technical issues. Anthropologist Luyendijk (2015) writes about this that 'it creates the impression that economists are not in the business of constructing inherently imperfect theories, but of discovering timeless truths.'

Indeed, every economic system is built upon paradigms. With the change of paradigms in societies, its economic theories also changed. The predominant paradigm in our world today in neoliberalism. Its theory is the radical free market theory that strives for privatisation, austerity, deregulation, and unlimited free trade. An astonishing number of researchers around global warming and global inequality see the neoliberal paradigm ultimately as the root cause[1]. The New Economics Foundation writes for example:

> "Most profit-seeking firms function through the exploitation of social and natural resources; they take no account of them, except as inputs to production. In the logic of capitalism, especially of its neoliberal phase, there is no need to care for or sustain them, as long as they are available as inputs" (Coole, 2015).

Although the term "phase" implies a natural, temporary state, this neoliberal economic system is not natural, but designed. It is designed upon the same parameter Herbert Simon once

[1] I have found this conclusion during my research in the work of Eisenstein (2011), Piketty (2014), Klein (2014), Srnicek and Williams (2015), Coote (2015), Grisolia and Farragina (2015), Maxton and Randers (2016), Caradonna (2016), Mason (2016), Hickel (2017), Raworth (2017), Bregman (2017) and Guerot (2017).

indicated: with the function of solving a problem. Randers, one of the original authors of the 1972 Club of Rome report, and Maxton, the Secretary General of the Club, emphasise this:

> "Incidentally, it is worth making clear at this points the fact that many people are supportive of the extreme free-market model is not an accident, nor is it the result of some natural economic, or human, evolution. It is by design" (Maxton and Randers, 2016).

To redesign and transform the current economic system, it is, therefore, essential to understanding how, and with which aim this system was designed and established.

The Mont Pèlerin Society

Anthropologist Hickel (2017) and Maxton and Randers (2016) write that the neoliberal paradigm was developed in the 1940s. Outgoing from the Great Depression, laissez-faire capitalism[2] became very unpopular and after the Second World War, the world was dominated by either socialism or Keynesian capitalism[3]. The two economists Friedrich Hayek and Milton Friedman formed in this time the think tank Mont Pèlerin Society (MPS) along with other economists, who shared their free-market ideology.

Hayek believed that every intervention from the state into the economy would 'ultimately lead to totalitarianism', referring to fascist Germany and communist Russia. Whereas Friedman had the dream of an 'utopian perfection, a universe playing out according to simple, logical economic models, where everyone is acting in their own self-interest', which would 'yield the maximum benefit for all'. In his mind, every intervention into the market would distort this totally pure vision. From his thoughts arose today's conviction that the free-market is in accordance with "economic laws of nature" and with democracy and freedom. Taxes should be flat, price controls and minimum wages should be abandoned, public institutions such as education, healthcare, and pensions should be privatised, and social insurance should be cut so much so that it is not interfering with the labour market while free trade should not be restricted at all. These policies would lead to 'unprecedented growth and prosperity' (Hickel, 2017).

To increase their influence and promote their paradigm, MPS members established more than 450 right-wing think tanks in over 90 countries and helped to create the *Nobel Memorial Prize*

[2] A radical free market economic system without regulation, tariffs and subsidies and that prevailed in Western Europe and the USA in the 19th century and ended in the US with the great depression 1929 (Rothbard, 2008).
[3] A managed market economy with a relatively strong focus on social equity and welfare.

in Economic Sciences from which nine MPS members won later on (Maxton and Randers, 2016). Also, many journalists and economists from several universities joined the MPS. Since 1970, one of the most influential members has been Charles Koch, a US billionaire who — along with his brother — is donating to think tanks that fight environmentalism and deny anthropogenic global warming (Readfearn, 2014).

Implementation of the Neoliberal Paradigm

The economic crisis in the early 1970s was the turning point of the Keynesian paradigm because the theory could not find an answer to the problem of "stagflation"[4].

Hickel (2017) explains that the implementation of the neoliberal paradigm began in Chile. In 1973, under President Richard Nixon, the US fostered a military coup in Chile (Operation FUBELT), where the presidential palace, and with it also the democratically elected president Salvador Allende, was bombed and a military dictatorship under Pinochet was installed. Milton Friedman became a key advisor of dictator Pinochet together with the "Chicago Boys"[5] with the aim to test Friedman's ideas in the real world. After social service cuts, privatisations, and the removal of price controls, subsidies, and trade barriers, every third Chilean was unemployed in 1982. In 1988 — at the end of the experiment — the poverty rate was at 41% and the lowest incomes fell by 42%, while the highest incomes rose. All this made Chile one of the most unequal societies in the world. Concurrently, with this, the "Chicago Boys" also advised the military juntas, which the US installed prior to that in Brazil, Argentina, Uruguay, and Bolivia.

Maxton and Randers (2016) explain that when Reagan came into office in 1981, 22 of his 76 economic advisors were members of the MPS. Ultimately, Ronald Reagan decided one year later to reform the US economy with a neoliberal agenda. He cut the top marginal tax rate from 70% to 28%, raised payroll taxes on the low-income class and deregulated the financial markets. His assumption — that his administration can generate new wealth that would gradually "trickle down" to the society, proved wrong later[6]. In the UK, Margaret Thatcher's chief economic advisor and many other economists close to her were also members of the MPS. She followed Reagan's agenda and also implemented regressive taxation, deregulated the financial market, broke labour unions, cut public spending and privatised national

[4] This word is used to the phenomena of high inflation together with economic stagnation.
[5] The Chicago boys are a group of Chilean economists who studied at the University of Chicago under Milton Friedman. They were training due to a training programme that the U.S. State Department launched with the funding by the Ford Foundation and the Rockefeller Foundation in 1956.
[6] Even the inventor of this theory, Simon Kuznets, privately admitted that he had for this theory 'no evidence whatsoever' (Raworth, 2017).

companies (Hickel, 2017). From there on, members of the MPS promoted their neoliberal paradigm all over the world. Heads of state in Germany, Italy, Czech Republic, and Sri Lanka; finance, economics, and trade ministers in the US, UK, Belgium, and Hong Kong; as well as heads of the US Federal Reserve and officials of the Bank of England have been members (Maxton and Randers, 2016).

During the 1980s and 1990s, the IMF, World Bank, and US Department of the Treasury (USDT) brought similar neoliberal reforms[7] in form of structural adjustment programmes (SAPs) to the Global South. This economic program — also known as the "Washington Consensus" — was initially applied to Mexico, Argentina, Brazil, and India, and later on in sub-Saharan Africa, and Latin and South America. In contrast, states that were not affected by the Washington Consensus like China or the Asian "tiger states" had, in this time, the best economic development globally (Hickel, 2017).

Financialisation and Power Concentration

Neoliberalism's biggest direct impact was in the power transfer to the financial markets and the 'financialisation of everything' that followed (Eisenstein, 2011). Today, in the financial markets, there are 67 times more financial transactions than there are real goods or services. The even less controlled over-the-counter market (OTC) now includes transactions that exceed global GDP by a factor of 30. Over 90% of all existing money is solely moving in this financial world and contributes nothing to the real economy (Reiners, 2017).

Researchers from the Chair of Systems Design at the ETH Zurich analysed finance data from over 37 million corporations and found that merely 147 corporations control 40% of all assets of all transnational companies on the planet, while 133 of these 147 corporations are private financial organisations (Vitali, Glattfelder and Battiston, 2011).

Such an incredible concentration of wealth and power is not only dangerous for the stability of the economic system and our democracy, but it is also hindering a rational allocation of investments that are more than required in many parts of the world, especially for preventing global warming and reducing global poverty.

[7] They designed a set of economic policy prescriptions typically includes currency devaluation, higher taxes with contemporaneous lower government spending (austerity), food subsidy elimination, higher prices on social services, wage cutting, market liberalisation, privatisation of public corporations, enhancing the rights of foreign investors and focusing on export goods.

Neoliberalism's Concept of Human Nature

But the neoliberal paradigm is not only influencing politics, economies, and laws, it also shapes our society and culture. Political philosopher Srnicek and sociologist William (2015) write that 'neoliberalism sets the agenda for what is realistic, necessary and possible.'

Specifically, this means that neoliberalism created the paradigm that homo sapiens is by nature mainly striving for 'selfishness, greed, and self-gratification' (Klein, 2014) and that we are 'discrete and separate selves competing for scarce resources to maximize our self-interest' (Eisenstein, 2011).

Selfishness cannot exist without scarcity and in humanity's history, scarcity was ubiquitous. But in our modern world, we have no factual scarcity anymore[8]. Cultural philosopher Eisenstein, therefore, concludes that neoliberalism created the two central axioms that we live in scarcity and that people naturally seek to maximise their rational self-interest. Journalist Klein calls this shifted paradigm 'neoliberalism's single most damaging legacy'. She also sees, beneath this layer, the cause for the fundamental misconception of western culture that 'we stand apart from nature and can outsmart its limits'. In her opinion 'the real reason we are failing to rise to the climate moment is because the actions required directly challenge our reigning economic paradigm'.

Social epidemiologists Wilkinson and Pickett (2011) state, for example, the connection between our 'self-interested consumerism driven by status competition', our economic system, social inequality, and psychological threat[9].

'There is no such thing as society' was Thatcher's claim (Klein, 2014) and this neoliberal image of human nature changed fundamentally how we see us and the world today. In view of the current anthropologic state of knowledge, economist Raworth (2017) explains that this image of human nature is not contemporary anymore, because 'rather than narrowly self-interested we are social and reciprocating' and 'instead of isolated we are interdependent'.

[8] Considering for example that in 2011 the UN Department of Economic and Social Affairs (UN DESA) analysed that it would cost humanity only 3% of the world GDP (around $1.9 trillion at that time) to 'overcome poverty, increase food production to eradicate hunger without degrading land and water resources, and avert the climate change catastrophe' (UN DESA, 2011).

[9] Especially young people transformed since the 1950s from "a genuine self-esteem" to an "insecure narcissism". For instance, the average US-American child in the 1990s was more anxious than psychiatric patients in the early 1950s. While only 12% of adolescents at that time saw themselves as an "important person", today its more than 80%.

Cultural Origin

But pointing at capitalism or neoliberalism is not enough to explain the roots of our unsustainable economic system. Looking at former socialist countries proves that unsustainability is a core problem beyond every form of capitalism, considering, for example, that the Soviet Union and the Czech Republic had bigger carbon footprints during the cold war than Australia, which has, until today, one of the highest per capita carbon emissions in the world (Klein, 2014).

Beneath our economic and cultural paradigms, historian White (1967) sees even a further level: In his pathbreaking *Science* article *The Historical Roots of Our Ecological Crisis,* he argues that our reckless relationship towards our planet is rooted ultimately in the paradigm of Christianity. According to him, the belief advocated the dominion of nature, created anthropocentrism[10] and the belief that other beings were only made to serve humanity. The underlying behaviour of capitalist and socialist societies is therefore deeply rooted in our culture, which should be considered for any approach that aims to redesign the system.

Purpose and Goal of the System

The second necessary information for a systems thinking problems analysis is to find out the goal of the system. As Systems thinker Meadows (2008) points out, perpetuation and extension are the most important function of almost every system. In the case of our economic system, this means that the system requires economic growth.

Measurement of Growth

Today, we measure economic growth by a number called gross domestic product (GDP). Originally developed by economists Simon Kuznets and John Maynard Keynes in the 1930s, its goal was to help policymakers come out of the Great Depression. It calculated the monetary value of all goods and services in the economy, to have an overview of what was going wrong. Kuznets originally wanted to include well-being, human welfare, and exclude negative things like advertising, but with the breakout of the Second World War, Keynes proposed to include all monetary activities to have a better war-time measure[11] (Hickel, 2017).

The political focus on pure GDP growth came, according to Maxton and Randers (2016) during the 1980s: at the same time when the neoliberal paradigm was implemented in global

[10] The belief that humans are the most important being on earth.

[11] Bregman (2017) argues that during wartime 'there's no metric quite as useful as the GDP', because the horrifying circumstances make it is comprehensible to include destructive activities, borrow from the future, pollute the environment, go into debt, neglect family, communal life, health and free time.

economics. The GDP itself was not adjusted until today and therefore, wars, hurricanes, and floods, that devastate civilisations are good for economic growth. At the same time, we are not measuring welfare, wellbeing, equality, time, justice, or sustainability.The indicator frames life in a perspective where the natural world only values what can be extracted or built upon. For this goal, oceans, forests, and polar ice have no value except for the resources they provide in the short-term. Indeed, GDP counts 'consumption of geological capital as current income' (Caradonna, 2016).

Hickel (2017) argues that 'of all the economic ideas out there today', the GDP is 'perhaps the most hegemonic' concept that 'nobody thinks to question'. With the goal to increase the GDP, the need for exponential economic growth is inherent in the system. Zero GDP growth would cause the whole system to fall apart. For perpetuation, the current economic system needs around three per cent growth annually. This means that the whole world economy would double within one generation, more than quadruple within two generations, and nearly decuple within three generations.

Systematic Need for Growth

However, neither does the goal nor the measurement explain why exponential growth became inherent in our economic system. Eisenstein (2011) and Hickel (2017) see the reason for this behaviour in the debt-based monetary system, because, the way we create money in our economic system, systematically forces the creation of further money and therefore, growth[12].

The Bank of England explains that 97% of all money is nowadays created by private banks in the form of credit[13] (McLeay, Radia and Thomas, 2014). Hence, it is a business model of the private banks to make a profit with the created debt through interest. As a consequence, it is in their interest to increase the number of issued credits[14].

Eisenstein (2011) concludes that 'a credit-based, interest-driven system generates short-termism, competition, polarisation and greed'. Similarly, Meadows (2008) calls the interest rate 'one of the worst ideas humanity ever had', because it would 'provide a rational,

[12] On a macroeconomically level this means that exponential economic growth is necessary, because the debts are growing exponentially. It also means that borrowers can only increase their wealth, when the economy is expanding. Otherwise the money will concentrate on the side of the lenders (Piketty, 2014).

[13] They write: "Whenever a bank makes a loan, it simultaneously creates a matching deposit in the borrower's bank account, thereby creating new money." This process makes up to 97% of the whole money creation, while only 3% are created by the central bank.

[14] This debt is in everything we consume. Around 10% of the government spending's in the Global North countries is devoted to national debt, which means that 10% of all taxed goods are used to pay debt. Debt and interest are a significant factor in products, energy or rent. Eisenstein (2011) calls this 'a kind of a tribute, a tax on everything we buy, that goes to the owners of money'.

quantitative excuse for ignoring the long-term'. This is also taken up by Maxton and Randers (2016). They state that it 'enforces short-term thinking by using high-interest rates to discount the future costs and benefits of human activities', which is ultimately why they see high discount rates as one of the main reasons for our unsuccessful climate policies[15].

In general, the logic of exponentially growing debt will always lead to a crash of the economic system. In this case, debt is abolished through inflation or hyperinflation. Theoretically, a capitalistic economy can, therefore, grow infinitely, because the system-imposed limit corrects unbearably grown debt.

Hence, Kroll (2017), an economist at the World Future Council, points out that economic growth could always be part of our economic system and infers that the question should not be if and how much economic growth we need, but how economic growth is generated. In a sustainable economy with renewable energies and a circular economy, the purely monetary GDP could still grow despite a reduced material consumption. In this case, the capitalistic system could indeed grow indefinitely, but certainly not exponentially.

Interpretation and Discussion

Retrospectively, we can say that neoliberalism itself was originally developed by pure convinced ideology. Its purpose was to "defend" the "free world" against "totalitarian socialism" in the form of a "counter-revolution". But over time, it developed to a system, whose purpose is to serve the interest of multinational companies, political elites, and powerful individuals to perpetuate and extend their power. Therefore, the purpose of the system is immanent perpetuation and extension that is driven by the goal of economic growth, which, in turn, is systematically driven by our credit-based, interest-driven system.

With the extensive use of networks in the Global North and the support of violent coups, dictatorships, and forced structural adjustments in the Global South, within a few decades, the neoliberal paradigm became the hegemonic idea in all areas of life from economics, politics, culture to education. The economic system in our today's world certainly does not work exactly to what Friedman, Hayek and original MPS members had planned, but its paradigm, which legitimates the predominant global recklessness, is deeply anchored in the minds of the

[15] Short-term thinking caused by interest strives for the highest net present value (NPV), which is the sum of all future costs and benefits discounted to their value today. In an interest-based system $1.000 are more than $1.000 in one year, but through the neoliberal financial markets the costs in the future have no factual value. They give the example that 'with a 10% discount rate, $1 million of damage in fifty years has a consequence that is valued at just $9.400'.

people. Besides this, there was never a pure system in our ultra-complex global economic system, but only differently strong gradations of artificial models.

The demand for growth through our credit-based, interest-driven system is not sustainable and is a root-problem that underlies even the neoliberal paradigm. It led us into a state of reinforcing feedback loops where people need to consume more and more, and corporations need to produce more to keep the system functioning. But it would be wrong to argue that the credit-based system is the main problem. It is especially the economic system in its current neoliberal form that threatens our democracies and the wellbeing of all nations, but also this unsustainability has deep roots in Western-Christian culture.

This system has system-imposed limits, but only for debt growth and not for economic growth, which will be a problem on a planet with finite resources, if we do not change the way this growth is created. It also fails to give appropriate solutions for worsening global warming and inequality, which is why I see an urgent need for a redesign towards a sustainable economic system.

Sustainability

It is important to define how a "sustainable economic system" differentiates from our current system. Therefore, I want to look at the background and definition of sustainability. Today, the term sustainability is ubiquitous and is used in nearly all areas of life. But the fact that the history of sustainability in the mainstream is so short is an important indicator to understand humanity's unsustainable development.

Background

Historian Caradonna (2016) explains that modern sustainability has its roots in the sustainable yield forestry, where it was first discussed by the German mining administrator Hans Carl von Carlowitz in 1713[16]. Although the following industrial revolution was accompanied with different forms of resistance and critique, what we would classify today under "sustainability", the term itself was not relevant in the next 200 years[17].

The decisive caesura was the 1972 Club of Rome report *Limits to Growth*, which confronted the masses for the first time with limitations of our planetary system. The authors and system theorists Meadows & Meadows, Randers and Behrens (1972) concluded:

> "If the present trends in world population, industrialization, pollution, food production, and resource depletion continue unchanged, the limits to growth on this planet will be reached sometime within the next 100 years. The most probable result will be rather sudden and uncontrolled decline in both population and industrial capacity."

The term "sustainable" appeared in this report for the first time in its contemporary meaning and was described as a philosophy of social stability that leads to a world system 'capable of supporting human life' (Grober, 2012). It challenged the predominant economic thinking at that time, which assumed that in a free market, natural resources can never run out and that overconsumption and population growth have no negative consequences. Thus, it created a global debate about sustainability and growth. Since then, the idea of sustainability is accompanied by systematic limits and systems thinking (Caradonna, 2016).

[16] At that time the German mining industry expanded in such a high pace that the necessary deforestation caused an unexpected and acute scarcity of timber and as a consequence an energy crisis, which ultimately led many mining companies into bankruptcy, since timber was required as an essential energy source.

[17] The Oxford English Dictionary did not even list the terms "sustainable" or "sustainability" until 1965. Also, there is no single book in the English literature using the term *sustainable* or *sustainability* in the title before 1970, but from there on the amount of publications jumped explosively within a few years.

20 years later, the Rio Earth Summit declared that all humans 'are entitled to a healthy and productive life in harmony with nature' (UNCED, 1992), which advanced sustainability from an ambition to a "human right". From there on, sustainability was integrated into many governments, NGOs, businesses, and academic institutions. Since 2000, sustainability is also associated with non-environmental topics, which makes it an overarching framework. By this, sustainability developed from a marginal idea into a mainstream movement in just 20 years and, through its history, transformed from a method of managing forests in the 18th Century, over an environmental motivated reaction, to industrial capitalism in the 1960s and 1970s, to a multi-dimensional ubiquitous idea in the 2000s (Caradonna, 2016).

Definition

The term in general, due to its highly frequent usage by organisations and governments, became a fizzy buzzword. However, its definition is discussed since its uprising and therefore, it can be seen as a discursive field like *democracy* or *justice,* with no objective definability. Caradonna sees a similarity of most definitions around the 'desire to create a society that is safe, stable, prosperous, and ecologically minded'. In 1987, the UN World Commission on Environment and Development (WCED) defined sustainability as meeting 'the needs of the present without compromising the ability of future generations to meet their own needs' (WCED, 1987).

Three Dimensions of Sustainability

Caradonna argues that the difference between environmentalism and sustainability is that sustainability considers the relationships between the society, economy, and the environment, interconnected within a complex system. This relationship was originally established by the UN 2005 World Summit on Social Development. They classified sustainability into three interdependent and mutually reinforcing categories: economic development, social development, and environmental protection (UN, 2005).

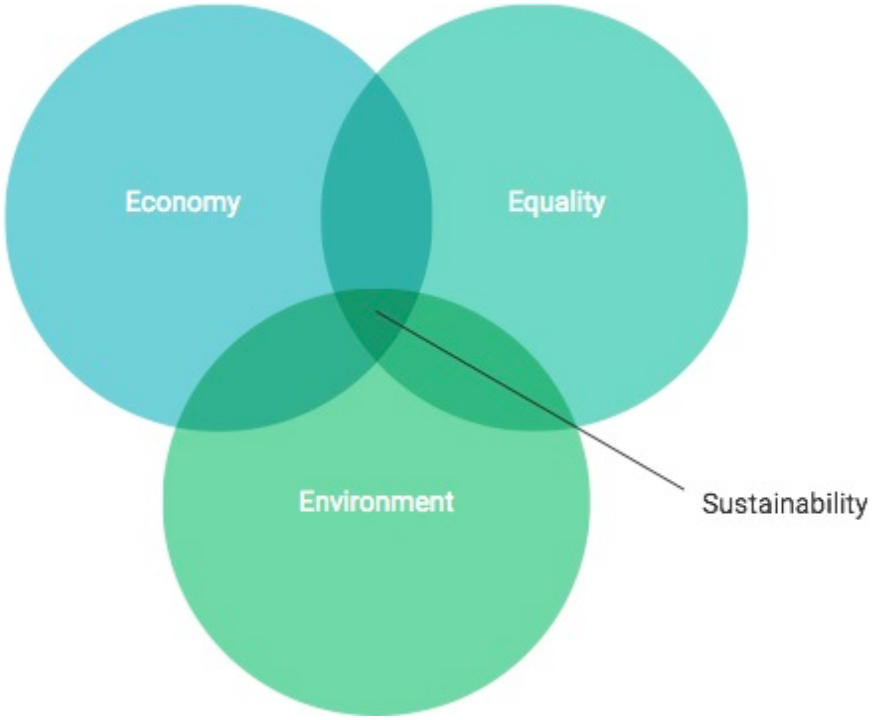

Figure 1: The Three E's of Sustainability

Since then, it is often visualised as a simplified diagram with the terms "environment", "equality", and "economy", showing that sustainability requires a balance between these three dimensions (*Figure 1*)[18]. Goodwin, co-director of the Global Development and Environment Institute (GDAE), argues that in contrast 'a socially unsustainable society is characterized by extreme poverty and/or an inability for citizens to live safe, meaningful, and satisfying lives. Even if an unjust and unhappy society somehow managed to live within its ecological limits, social unsustainability would inevitably lead to socio-political unrest and even revolution' (Goodwin et al., 2001).

In conclusion, this means that an economic system cannot be called sustainable when the economic and social part is not sustainable and that a sustainable economic system has to serve all three elements at the same time. In my research, I have found many proposals for a sustainable agenda such as the *New Social Settlement* from the think tank *New Economics Foundation* (Coole, 2015) and the 2016 report to the Club of Rome by Maxton and Randers (2016) that also connects these links and set them as their main focus.

[18] The economic dimension highlights the need for a system that allows to produce goods and services in the long term. Equality relates to wellbeing, democracy and justice. A sustainable society therefore requires 'a fair distribution of resources, equal opportunities for all citizens, social justice, health, mental well-being and the ability to live a safe and meaningful life, access to education, gender equality, democratic institutions, good governance, and political participation' (Caradonna, 2016).

Endemic and Immediate Problems

Nearly half a century after the 1972 Club of Rome report, Randers, one of the original authors, concludes that their advice was largely ignored, and that humanity is now in ecological overshoot, using 150% of the planet's sustainable capacity. He infers:

> "It would certainly be foolish to continue on the current path, because unemployment will remain high or become higher, inequality will rise further, conventional economic growth will gradually stall, and climate change will steadily worsen. We can say all this with certainty. The only way to avoid this future is to gradually shift to another economic system, one that is fairer and more sustainable" (Maxton and Randers, 2016).

To get an overview of the urgency of these problems, they categorise humanity's biggest problems into "endemic" and "immediate", whereby they write that 'almost all of these problems are the result of the current economic system', because 'all these problems have the same basic cause – the desire for endless consumption growth without due concern for the effects on the environment and inequality'.

Endemic Problems	Immediate Problems
Climate Change	Unemployment
Poverty	Inequality
Pollution	The Pace of Growth
Ressource Depletion	Migration
Biodiversity Loss	Social Friction
War, Terrorism and Conflict	Geopolitical Friction

A sustainable economic system that prevents global warming and excessive global inequality, would automatically counteract poverty, unemployment, migration, pollution, resource

depletion, biodiversity loss, and even conflicts or wars[19]. This is why I want to focus on the problems of global warming and global inequality.

Global Warming

Global warming with all its consequences, according to the former UN Secretary-General Ban Ki-moon, is the greatest challenge humanity has ever faced (Sturmer, 2014). To understand the problem, I will look at the current situation, the consequences and causes of the problem.

Failure of the Current Approach

The latest developments make it more and more likely that large parts of our planet will become close to uninhabitable and other parts inhospitable before the end of the 21st century. A recent study published in *Nature* by climate scientists Brown and Caldeira (2017) from the Department of Global Ecology Stanford concluded that 'there is a 93 per cent chance that global warming will exceed 4°C by the end of this century'. The New Economics Foundation even estimates that if the latest trends continue, we will see a rise in the area of 4 to 6°C by 2100 (Coole, 2015). Robert Watson, former director of the UN Intergovernmental Panel on Climate Change (IPCC), just pronounced recently that a three-degree warming is a realistic minimum. Solely, a 5°C warming would be the ultimate tipping point and, according to some of the world's leading global warming scientists, lead to "the end of human civilisation" (Rich, 2018).

Recently, we reached the 400ppm mark, which would lead to at least a warming by 1.5°C. To stay under 1.5°C, we need to keep 93% of our extractable fossil fuel reserves in the ground and stop the worldwide emission of CO_2 until 2020 (Hickel, 2017). In this context, it is interesting that the *Paris Agreement* — which aims to keep global warming below 1.5°C — will not come into force until 2020. The inability of the present system to solve this problem reveals itself just by looking at this grotesque plan.

Insufficient Awareness and Responsibility

In the media, global warming is dominated by fears around sea-level rise, but these expectations are not representing the true problems that global warming causes. Despite decades of public discussions about global warming, journalist Wallace-Wells (2017) argues

[19] In a world with abundant renewable energy, equal distributed resources, a low material consumption and no poverty, it is hard to imagine that that nations would still intervene each other for economic and geopolitical reasons like it is done today.

that most problems are not in the consciousness of the general public[20]. As Hickel (2017) describes, there is insufficient awareness about the consequences accompanied by an insufficient awareness of the responsibility for global warming.

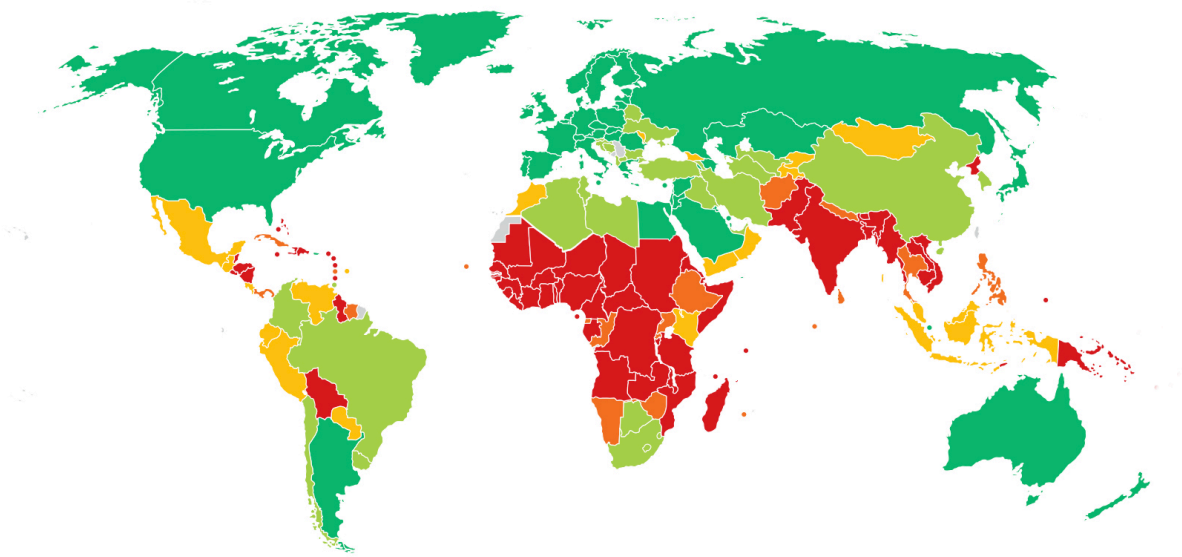

Figure 2: Multi-dimensional vulnerability to global warming (DARA and Climate Vulnerable Forum, 2012)

While the Global North is responsible for about 70% of all CO_2 emissions since the beginning of the industrial revolution, it only bears 12% of the total costs of global warming according to the Climate Vulnerability Monitor. 82% are, in contrast, paid by the Global South, which, in 2010, had $571 billion in losses due to drought, floods, landslides, storms, and wildfires. By 2030, this relation for the Global South will worsen and rise to 92% or $954 billion per year[21]. Deaths

[20] The examples he gives are wide-reaching. His main argument is that at four degrees warming just being outdoors will be unhealthy in many areas of the planet. The European heat wave of 2003, that caused 2000 deaths per day, will be normality during the summer. Also, for every degree warming yield will decline by around 10%, which means that at the end of the century we will probably have a 50% higher population and a 50% less effective agriculture. Climate plagues are also something many people do not consider. Through the heating, Malaria will come to yet unaffected regions and spread faster. According to the World Bank will it endanger more than 5 billion people by 2050. The increased amount of carbon dioxide will additionally reduce human cognitive ability by over one fifth. All these developments will increase the 'likelihood of armed conflicts' by 10 to 20 percent per half degree.

[21] Most affected will be India and Africa, although they just emit currently 1.4 and 0.9 tons of CO_2 per capita per year – compared to 16.4 tons of the average US American or 7.2 tons of the average Briton. They will bear costs of around 4-5% of their GDP annually.

related to global warming are also occurring 98% in the Global South[22]. Even this will increase to 99% by 2030 and make up more than 500,000 humans per year.

Overconsumption as the Main Driver

Another misconception, according to Hickel (2018), is that we are not only consuming in the wrong way, but the central problem is that we consume too much. In a World Economic Forum article, he has written that 'the great challenge of the 21st century is learning to consume less'. The richest 500 million people are responsible for half of all the emissions that humanity produces and the major driver for anthropogenic global warming is that we overshoot the planetary emission capacities by over 75%. This is directly linked to the rampant imbalance in global consumption: The poorest 1.2 billion just consume 1%, while the richest billion consumes 72% of all services and goods (*Figure 3*; UN, 2013).

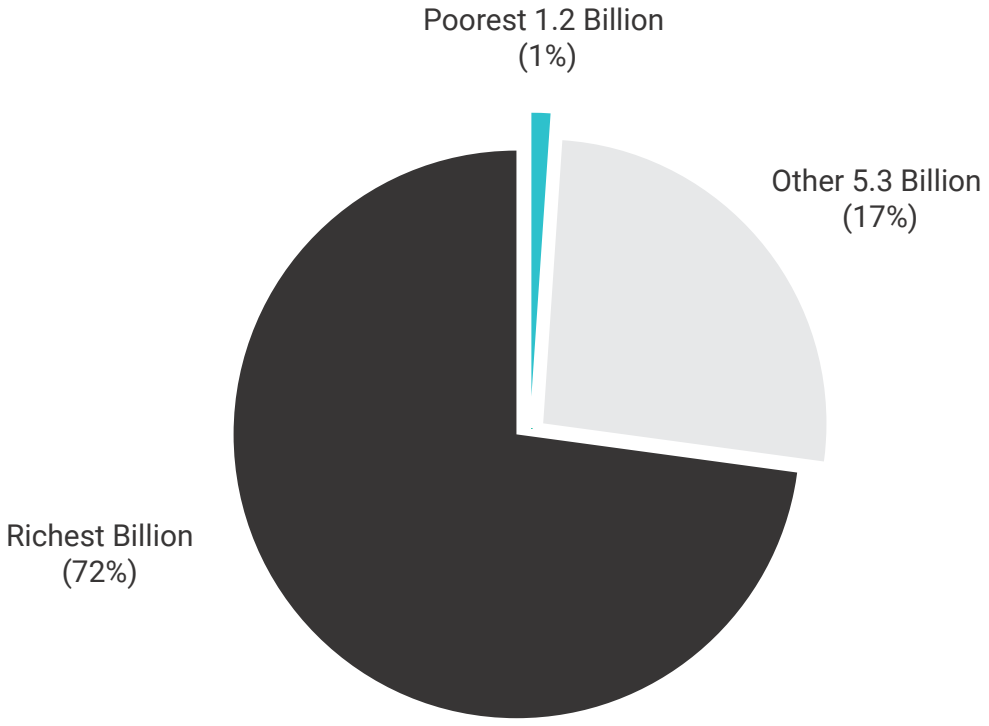

Figure 3: Global consumption by wealth (Data: UN, 2013)

This causes a massive material overconsumption, almost entirely because of the Global North. To have a sustainable material consumption — which includes everything from livestock,

[22] Many due to extreme weather events, but most of them due to global warming-related hunger and communicable disease.

metals, forests or fossil fuels — it would have to be around 50 billion tons per year. Our current consumption is 60% above this limit. If every human would consume as much as the average citizen of high-income countries, we would need 3.4 earths to sustain (Hickel, 2017).

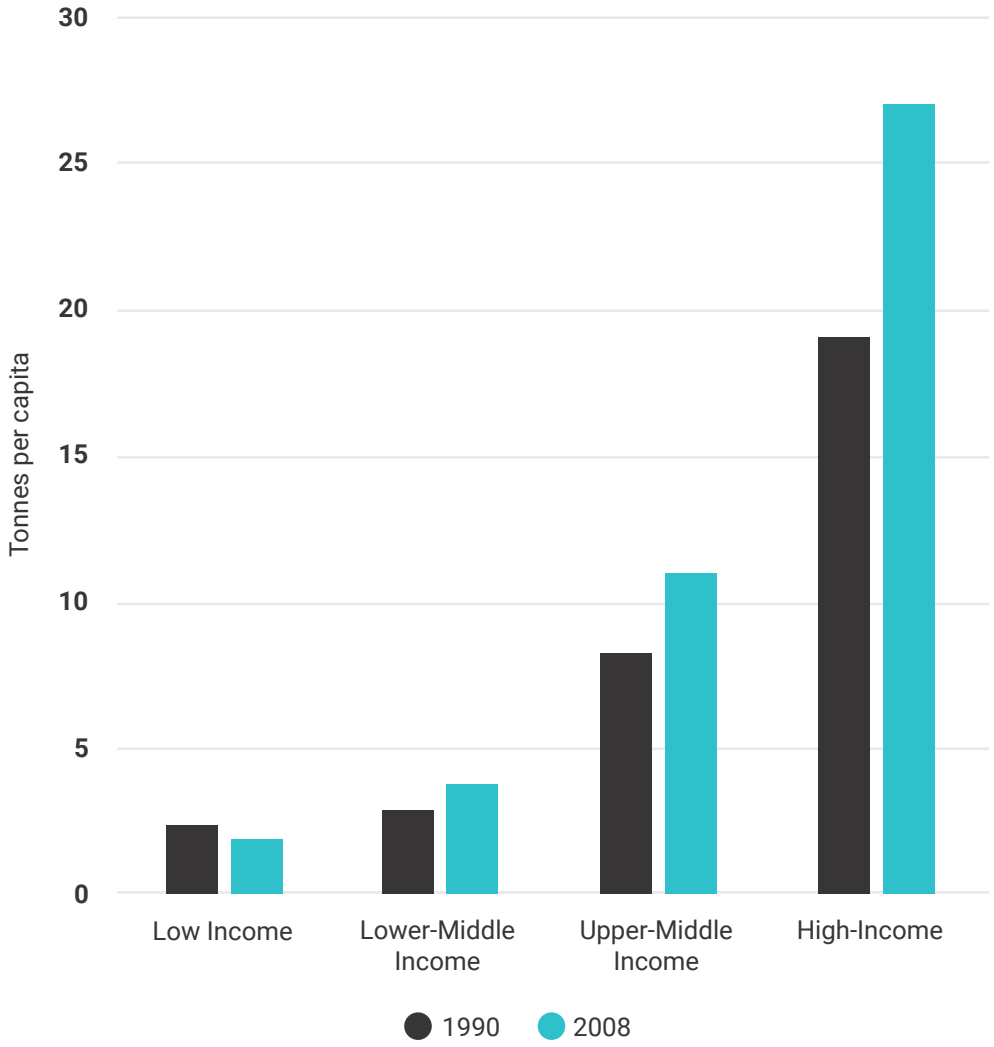

Figure 4: Material footprint of nations (Eora Global MRIO, 2018; Hickel, 2017)

To get out of poverty, the poor countries theoretically have to increase their consumption, but this is not feasible with the current model unless rich countries consume less and virtually distribute their consumption to people that need it.

The neoliberal approach of improving efficiency is not far-sighted enough, because it ignores the effect that technological progress increases resource efficiency, but corporations generally use this to increase the production, which in turn reduces prices and therefore,

increases consumption. This effect is called "Jevons paradox"[23] (Eisenstein, 2011; Zehner, 2012; Caradonna, 2016). Even a 100% regenerative economy would automatically lead to an increase in material use, which is why a cut in emissions, as well as material consumption, is inevitable.

Origin of Unsustainability: Human Nature or Social Paradigms?

Essayist Rich (2018) points out that we nearly understood everything about global warming since 1979 and that we could have prevented dangerous global warming relatively easily at that time[24]. But since then, the global emissions have increased by over 60% (Hickel, 2017).

James Hansen, former NASA climate scientist and one of the first political advocates of anthropogenic global warming, believes that we can trust the technology and the economics, but 'it's harder to trust human nature'. Based on this, Rich is saying that 'human beings, whether in global organisations, democracies, industries, political parties, or as individuals, are incapable of sacrificing their present convenience to forestall a penalty imposed on future generations'. His overall conclusion in the worldwide most popular article on global warming in 2018 is that 'human nature has brought us to this place'.

However, Klein (2018) answered that 'capitalism killed our climate momentum, not human nature', inferring that the paradigm shift to neoliberalism happened at exactly the same time when humanity became conscious about their impact. It was a "race" between these two paradigms — radical free market or ecologic regulation — and the free market idea "won", causing the debilitation of the public sphere and profits ahead of sustainability. Seeing it from this perspective, we may would not have dangerous global warming today if the neoliberal paradigm shift would not have been successful at that time.

Still, Hansen's and Rich's argument is not completely unfounded, but they mistake neoliberalism's paradigm about the "discrete and separate self" with human nature. Capitalism is just a small phase in the history of humanity and seeing this as absolute, does not do justice to the complexity of our species. Even if we trace humanity's unsustainable behaviour towards nature back to Christianity, as White (1967) argues, there are still plenty of examples of cultures that behaved differently. Meadows (2008) explains for example that many Native

[23] Economist William Jevons discovered in the 19th century that technological improvements in the usage of coal led to the increased consumption of coal in several industries.
[24] He calls the ten years that followed 'the decade we almost stopped climate change', arguing that if governments at this time would have prepared to slowly reduce emissions by only 20% until 2005, we could have prevented harmful global warming by keeping it below 1.5 degrees.

Americans made decisions based on effects of the seventh generation to come because they thought 'the longer the operant time horizon, the better the chances for survival'.

In the end, the answer is probably in between both opinions and cannot be reduced to one simple reason. It is neither human nature, nor capitalism or the interest system which prices the future at a discount, but a combination of all in a radical unregulated liberal form. Connecting both positions together means that a global sustainable economic system is technologically feasible and economically rational[25], but that short-term economic interests — driven by the underlying structures of the system — are competing against each other and preventing this progress.

Obstacles for Progressive Change

This competition is, for example, expressed in the form of fossil fuel subsidies. A recent study by IMF economists found that governments subsidise the fossil fuel industry with $5.3 trillion every year, which amounts for exceeding 6.5% of the gross world product (GWP) (Coady et al., 2017). If our governments would invest 6.5% of the GWP in renewable energy, instead of fossil fuels, global warming would probably not be a major problem anymore. According to Klein (2014), lobbying of old industries and their influence through climate is denying right-wing think tanks a central reason for this, rather than an economic logic[26]. They have a strong influence on the public opinion through different media channels. Today, 87% of climate denial books are, for example, linked to right-wing think tanks.

The influence is widely undisputed in social sciences: While a 2007 Harris poll found that 71% of US-Americans believed in anthropogenic global warming, only four years later, this number dropped to 44%. Similar developments can be seen in the UK and Australia. Scott Keeter, a senior survey advisor at the Pew Research Center, describes this as 'among the largest shifts over a short period of time seen in recent public opinion history'. Although these institutions want to keep the existing market mechanisms to persist in their power structures, it doesn't seem realistic that this free market will accomplish the biggest global economic transformation within one generation.

[25] The *Blue Map Scenario* by the International Energy Agency for example predicts that cutting CO_2 emissions by 2050 would cost about $46 trillion additionally. However, the savings on fossil fuel energy in this scenario would even by its most conservative be $54 trillion. Greenpeace's *Energy Revolution Scenario* aims for 85% reduction by 2050, would require higher initial costs but would also save money in overall.

[26] The economic argument is that cheap fossil fuel energy prices lead to a higher production and therefore to a competitive advantage and eventually a higher GDP, but nevertheless would an astonishing investment around 6.5% in renewable energy be the better investment in the mid and long term.

To stay under the target of 2°C, the Global North needs to cut its emission by 8-10% per year, which happened the last time during the Great Depression in 1929 (Klein, 2014). Without changing the fundamental logic of our economic system, this will not be feasible.

Global Inequality

The second problem field I want to focus on is inequality. This includes, as I have described, national as well as international inequality, poverty, and also unemployment. As I will explain, global inequality is directly linked to global warming, which is why it is important to reduce global inequality, if the aim is to reduce global warming. I will look again at the current status quo, at the origins of inequality and the consequences.

National Inequality

In 2014, three decades after the first implementations of the neoliberal reforms under Reagan, more than half of the US population had lower real wages than before. At the same time, the economy grew by 140% and the working hours rose by 9% (Maxton and Randers, 2016). In the UK, real wages have been falling since 2003 and in Germany, the real wages of 2014 were on the same level as that of 1992, accompanied by the biggest low-wage labour market in Europe, which is damaging the whole European domestic market.

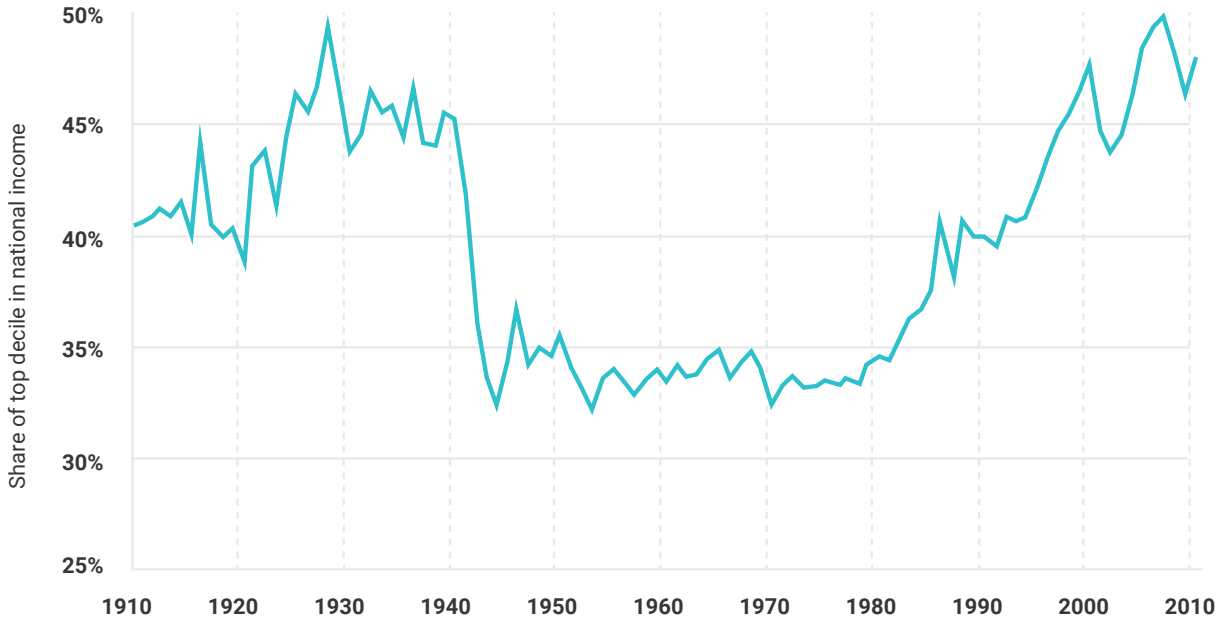

Figure 5: Income inequality in the US between 1910 and 2010 (Piketty, 2014)

Despite all the social and economic progress in this period, the gap between the rich and the poor today in the US, UK and Ireland, for example, is bigger than what it was over hundred years ago (Piketty, 2014; Hickel, 2017).

International Inequality

Hickel (2017) expounds the oppressive development of international inequality. Contrary to the often-expressed story of a global development that benefits the Global South and Global North at the same time, he indicates that the actual divide between them nearly tripled since 1960[27]. He writes:

> "Today, some 4.3 billion people – more than 60 per cent of the world's population – live in debilitating poverty, struggling to survive on less than the equivalent of $5 per day. Half do not have access to enough food. And these numbers have been growing steadily over the past few decades. Meanwhile, the wealth of the very richest is piling up to levels unprecedented in human history. As I write this, it has just been announced that the eight richest men in the world have as much wealth between them as the poorest half of the world's population combined."

The poverty line of $5 per day is the average of all national poverty lines in the Global South and as many scholars suggest, the new poverty line of $1.90 per day[28] is not adequate to survive. For children, for example, at least $5.00 per day is required to have 'a decent shot at surviving until their fifth birthday, having enough food to eat and reaching normal life expectancy'. Adjusting the poverty line results in a completely different picture of the poverty development in the last years. With the pre-2015 poverty line of $1.25 per day and the exclusion of China[29], extreme poverty did not improve from 1981 to 2010. But even more importantly: With the realistic average $5 poverty line, global poverty *increased* since 1981 (*Figure 6*).

[27] He also shows up that the extremes have been drifted more apart: 1960, at the end of colonialism, the income per capita in the richest country of the world in comparison to the poorest was 32:1 and by 2000 it was 134:1.

[28] The poverty line is based on the national poverty lines of the 15 poorest countries in the world, which makes it hard to relate this line to the circumstances in other countries. It was recently adjusted from $1.25 per day to $1.90 due to inflation. In India for example children living with $1.90 per day have a 60% chance of being malnourished. While India itself reported in 2011 that 680 million people 'lack the means to meet their essential needs', the World Bank reported just 300 million people.

[29] Hickel (2017) as well as Maxton and Randers (2016) propose this, because it developed as one of the few countries on its own in contrast to large parts of the rest of the world.

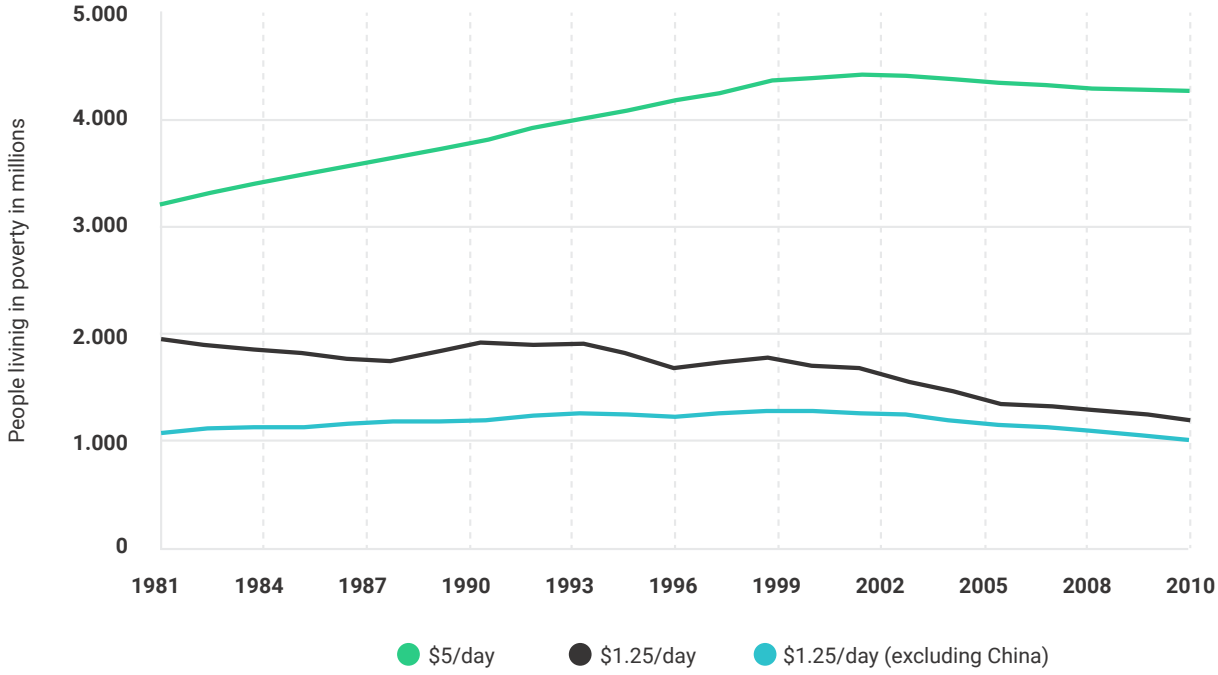

Figure 6: Poverty trends compared (PovcalNet, 2018; Hickel, 2017)

Hickel calls this the 'good-news narrative', a 'comforting story' that 'vindicates our civilisation and affirms our deepest and most powerful ideas about progress' and eventually, it 'enjoins us to believe that the global economic system is on the right track'.

Origins of Inequality and Poverty

Structural origins

Economist Piketty (2014) conducted a 15 years long study about income and wealth differentials, concluding that if we stick to our current economic system, unsustainable inequalities will radically undermine the values of all democratic societies. He draws an alarming image of a world that resembles the late 19th century where the middle class had vanished, and a huge part of the society struggled to have a humane life. His central thesis is that inequality has systematically increased as long capital returns are greater than returns of labour income through economic growth. It is a result of unlimited capitalism which, in his opinion, can only be reversed by state interventions.

Political Origins

Still, this does not explain why the inequality between the Global North and Global South is so extreme today.

Jeffrey Sachs, former director of the UN Millennium Development Goals, contended that poverty results due to natural accidents of geography or climate and that more development aid would be enough to overcome poverty (Hickel, 2017). However, economist Acemoglu and political scientist Robinson (2013) presented a comprehensible and well-documented answer in their eminent book *Why Nations Fail,* that neither the "geography" nor the "culture" or "ignorance" theory is tenable. They concluded that economic success depends first and foremost on inclusive economic and political institutions and that extractive systems like autocracy would prevent wealth creation.

Nevertheless, Hickel (2017) argues that poverty and the divide between rich countries and poor countries are not 'natural or inevitable', but instead, they have been 'created'. He argues that, nowadays, the main reason for global inequality is within the systematic structures of our neoliberal economic system. Often not considered in the popular narrative, in his opinion, are the vast destructions through Western colonialism[30], followed by the area of neo-colonialism[31] and structural adjustment programs by the International Monetary Fund (IMF) with the help of the World Bank (WB) and the World Trade Organization (WTO) that hindered these countries to build prospering democratic nations with inclusive institutions.

Comparing all annual gains from development aid that the Global South countries have ($128 billion in 2015 or 0.2% of the Global North countries GNI) to the outflows and structural costs or losses that the Global South countries have, shows that 'poor countries are effectively developing rich countries'. The outflows overshadowed the gains by a factor of 62. They accounted for approximately $8,029 billion in 2015 (*Figure 7*).

[30] As examples he takes India and China, which economies and average living standards collapsed during the colonial period. During the time their share of world GDP felt from 65% to 10%, while Europe's share tripled from 15% to 45%. Also, he argues well-documented that 'without the ecological windfall from the slave colonies, Europe would not have been able to shift its economic capacity towards industrialisation.'

[31] At the end of the colonial era in the 1960s the US and UK overthrew democratically elected governments in Iran, Brazil, the Dominican Republic, Indonesia, Ghana, Congo and Uganda. The United States also supported right-wing dictatorships in Bolivia, Ecuador, Haiti, Paraguay, Honduras, Venezuela and Panama, tried to overthrow the government in Nicaragua, supported radical rebels in Angola, which led to a 37-year lasting civil war, and supported the South African apartheid regime together with the UK. France manipulated several elections and governments in its former colonies Cameroon, Gabon, Côte d'Ivoire, Nigeria, Guinea, Niger, Congo Brazzaville, the Central African Republic and most importantly Burkina Faso. All coups, interventions and manipulations had according to Hickel the aim to protect of western corporation.

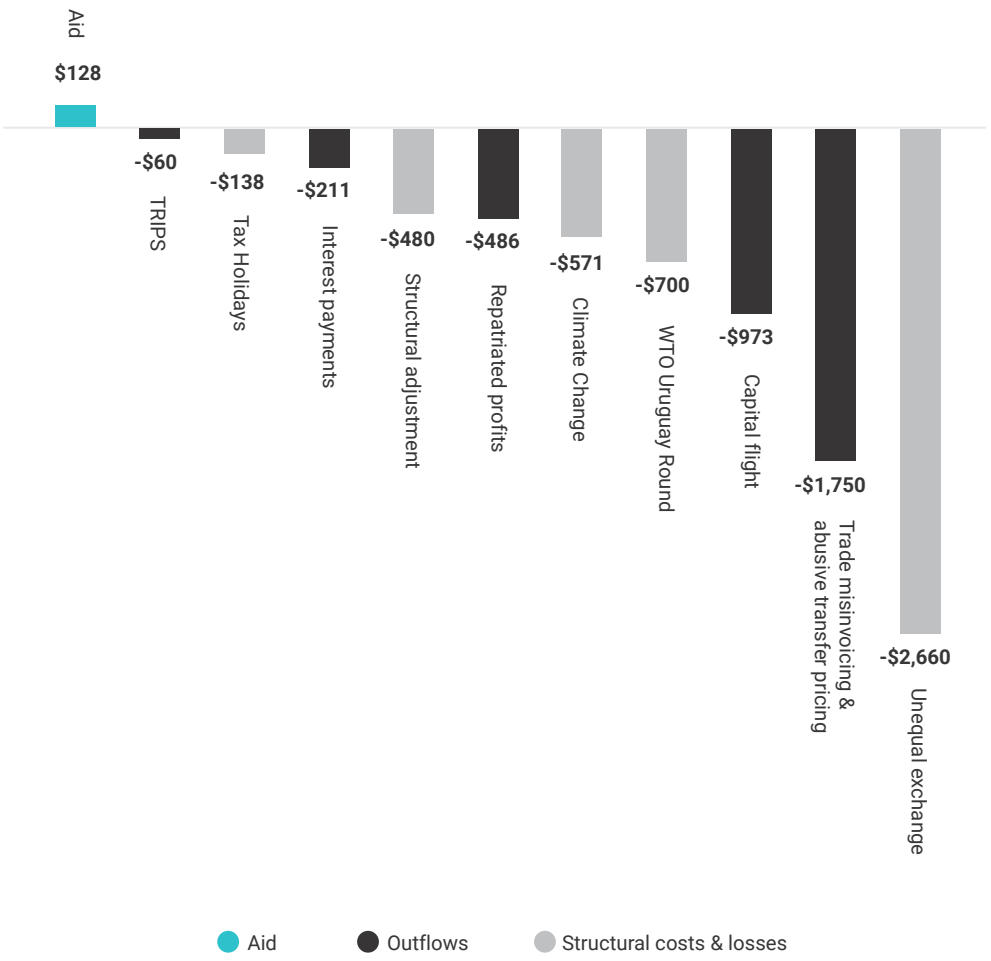

Figure 7: Comparing gains from aid to selected outflows and structural costs/losses in $US billions (see footnotes)

The major reasons according to Hickel are an unequal exchange[32], trade misinvoicing and abusive transfer pricing[33], capital flight[34], the WTO Uruguay Round[35], climate change[36],

[32] Based on the calculation by Gernot Köhler, a Professor of Computer Studies at the Sheridan College. The concept of unequal exchange is divisive, but the number is just considering the structural losses due to the price disparity of protected high wages in the Global North and unprotected dumping wages in the Global South.

[33] According to a study by the Global Financial Integrity (GFI) trade misinvoicing and abusive transfer pricing causes $1700 billion net outflows from the Global South to the Global North every year. Trade misinvoicing are outflows induced by reporting of false prices on trade invoices to move money directly into tax havens and secrecy jurisdictions and abusive transfer pricing is the illegal shifting of corporation profits between own subsidiaries in different countries with the aim of tax evasion, but sometimes also for money laundry or capital control circumvention.

[34] According to the GFI study the losses through 'leakages' in payment balances between nations account for $973 billion each year.

[35] The United Nations Conference on Trade and Development estimates that the market distortions from this agreement cost Global South countries $700 billion each year in lost export revenue.

[36] $571 billion economic damages through climate change that are almost entirely caused by the Global North according to the Climate Vulnerable Forum (CVF).

repatriated profits[37], the IMF's and the WB's structural adjustment programmes[38], interest payments[39], tax holidays[40], and the WTO TRIPS Agreement[41]. Ultimately, this means not only that the conception of what caused and causes poverty is incomplete, but also that it is quite the opposite.

Poverty Reduction in Times of Ecological Overshoot

Piketty's and Hickel's research show that our current economic system was not only unable to reduce poverty through growth but that it is also systematically increasing it. As a result, 95% of all economic growth humanity creates goes to the richest 40% and only 5% reaches the poorest 60%. The UNCTAD economist Woodward (2015) reasons that at this distribution ratio, it will take more than 100 years to eliminate poverty at the level of $1.25 per day and 207 years at the more realistic $5 poverty line. Woodward further adds that in this case, the global production and consumption would have to increase 175 times its size to $11,500 trillion. At the same time, the average per capita income on our planet would need to be $1.3 million per year just to guarantee a minimum income of $5 per day for the poorest people on the planet[42]. He concludes:

> "There is simply no way this can be achieved without triggering truly catastrophic climate change – which, apart from anything else, would obliterate any potential gains from poverty reduction."

Woodward sees the only possible way of avoiding such a nightmare scenario is by 'shifting our attention from global economic growth itself, and towards improving the distribution of the benefits of global production and consumption'. Hickel also concludes that 'if we want to have any hope of eradicating poverty without destroying our ability to inhabit this planet, we will need to adopt a completely different economic model – one that provides for a much fairer and more rational distribution of our wealth' (Hickel, 2017).

[37] The amount of profit foreign investors (mostly from the Global North) take out of the Global South every year according to the European network on debt and development (Eurodad).
[38] The average loses of potential GDP due to the structural adjustment period amount for $480 billion per year according to Robert Pollin, founding co-director of its Political Economy Research Institute (PERI).
[39] Global South countries pay $211 billion interest payments on their debt to foreign creditors (mostly the Global North) every year according to the World Bank.
[40] According to ActionAid the Global South loses $138 billion to tax holidays by multinational corporations.
[41] $60 billion obligations for foreign patents had Global South countries to pay extra annually, according to the World Bank.
[42] Although these numbers are just a theoretical linear extrapolation, they visualise the vast structural problem of our economic system.

Consequences

The socialist history has shown that societies cannot function without some degree of inequality. Monetary incentives have demonstrated effectiveness to motivate people for work or entrepreneurial risk-taking. Nevertheless, in almost all countries, inequality is exceeding the healthy condition.

All our global endemic and immediate problems are interconnected with each other and affect each other with feedback loops. Outgoing from the perspective that global warming and global inequality are the two top-level problems, it is important to reveal the interconnections and feedback loops between them. Especially, poverty has to be seen in a world with a factual abundance of all essential goods, as not a natural problem, but as a problem of inequality.

Short-term thinking and scarcity mentality

Our economic system systematically complicates long-term thinking. But this effect is even reinforced through poverty. George Orwell wrote in 1933 from his own experience that poverty at its core 'annihilates the future' (Bregman, 2017). Poverty forces one to live in the present and makes long-term thinking virtually impossible. People forced to live in poverty do not think about if their consumption, job, and ultimately political vote fosters sustainability. The same phenomena can be applied to undeveloped countries: Klein (2014) describes that it is a prevailing paradigm that Global South economies need to develop first before they can be sustainable.

Economists Mani and Mullainathan together with psychologists Shafir and Zhao (2013) proved what Orwell wrote over 80 years ago: Poverty reduces brainpower by narrowing the focus to the short-term perspective. They see a reinforcing feedback loop in poverty itself because 'the poor often behave in less capable ways, which can further perpetuate poverty'. Poverty creates distraction, reduces self-control, increases perturbation, which all depresses the cognitive ability. In their study, they have found that poverty corresponds with 13-14 lesser IQ points[43], which is comparable to the decline in IQ one would experience if they had a sleepless night.

Conspicuous Consumption and Slowing Economic Growth

Secondly, high inequality reinforces "conspicuous consumption" — the consumption of unnecessary (luxury) goods and services to show economic power and social status in the

[43] They have found this by analysing the cognitive ability of Indian sugarcane farmers before their harvest, when they were comparatively poor, and after the harvest, when they received their income.

public. The consumption of the upper class has a role model function and the more extravagant their consumption, the more it influences the consumption of lower income classes (Hwang and Lee, 2017).

But at the same time, inequality leads to a slowing of the economic growth once it begins to dissolve the middle-class. The latest *Global Risks Report* by the World Economic Forum concluded that rising income and wealth disparity is the biggest threat to our world economy in the next decade (World Economic Forum, 2017). Without a large middle class, this economic system does not have enough purchasing power and cannot function in the long term.

Unstable Democracies and Economies

Piketty (2014) even argues that 'there is absolutely no doubt that the increase of inequality in the United States contributed to the nation's financial instability' that caused the financial crisis in 2007, because the stagnation of the purchasing power of the lower and middle classes in combination with the unregulated financial market has led to evermore high uncovered debt.

Not to neglect is the risk that inequality is threatening our democracies. Piketty writes that 'it is hard to imagine an economy and society that can continue functioning indefinitely with such extreme divergence between social groups'. One risk factor is that wealthy elites accumulate power through the accumulation of money, which they can use in return to influence 'policy through donations and lobbying, in order to defend and strengthen their position' (Coole, 2015). This effect is again reinforcing inequality that is excluding the majority out of the political participation more and more. Therefore, sociologist and poverty researcher Patrick (2017) reasons that 'those living in poverty who choose not to vote often feel completely excluded and disconnected from the political process'[44].

Global Friction

Eventually, the Global South suffers the most under this system. As I laid down, they are the major victims of global warming, although they did just contribute a small part to today's situation. Overall, they are due to a huge amount of structural problems a net contributor with approximately 62 times higher outflows and costs than they receive development aid. The aggressive dominance by the Global North in the form of colonialism, neo-colonialism, and structural adjustments created primarily the big divergence between the north and the south today. Bregman (2017) describes it as 'apartheid on a global scale', because 'in the 21st century, the real elite are those born not in the right family or the right class but in the right

[44] For example, in the 1987 UK general election the turnout rate was for the poorest income group was 4% lower than for the wealthiest. By 2010 the gap had grown to a staggering 23 points.

country'. All these developments will displace large numbers of people from their natural home, which will further disrupt the global system: Gemenne (2011), an environmental geopolitician focussing on migration dynamics, concluded in a meta-study that between 150 and 300 million people will be displaced just through global warming by the middle of the century[45].

System Collapse

My problem analysis showed that our economic system in its current condition will not be able to solve the two biggest threats to humanity in the 21st century. It has completely failed to reduce humanity's ecological footprint sufficiently, leaving us no realistic possibility to "achieve" less than 2°C temperature increase until the end of the century. Instead, it brought us to a point where a catastrophic 4°C temperature increase is very likely. Also, it has created a greater inequality between the Global North and South than after the end of the colonial era in the 1960s, and a greater inequality within Global North nations than hundred years ago. It causes a systematic accumulation of wealth in the upper class, while the lower and middle classes are not profiting. To maintain these system structures as long as possible, this power concentration leads to manipulation of the public opinion through, for example, climate denial think tanks, making it harder to act against global warming. Also, this concentration influences political agendas, which in combination with the increasing inequality and perceived powerlessness paralyses our democracies.

Anthropologist and ecologist Diamond (2014) found that societies that exceeded their limits, destroyed their natural environment, consumed more than nature could sustain, ignored high inequality, and acted short-sighted in the interests of a few have something in common: they collapsed. By means of several examples like the collapse of the Mayans, the Anasazis, and the Easter Islanders he shows that an underestimation of long-term consequences, feedback loops, and delays were the crucial factors. Indeed, Diamond points out that only one or two decades after a peak in population, wealth, resource consumption, and waste production, the collapse began. His suggestions to prevent this are to overthink core values and enable an environment where long-term planning is possible.

[45] All predictions are highly debated between environmental migration scholars and range up to two billion in 2100. However, his predicition is a reviewed estimation that was created through critique of available predictions.

Applying Design and Systems Thinking

I have tried to look profoundly at the reasons and consequences of global warming and inequality and examined several interconnections and feedback loops. Seeing global warming and inequality through a systems thinking prism gives many systematic indications that enable the understanding of the questions of why the transformation to a sustainable economic system is not fulfilled faster and where the obstacles are rooted.

First, it is very natural that in a complex system, every change has its proponents and opponents. At least in the short term, it is the same for sustainability design interventions, although they are most likely benefitting everyone in the long-term. Concluding from my research, inequality can be seen as an accelerator (negative reinforcing feedback loop) and a friction (negative balancing feedback loop) for global warming, while global warming is, in turn, a reinforcing feedback loop for inequality. Even this reduced conclusion shows up the interdependency of these problems. Thus, I could not reveal and discuss this system in its entire complexity, but I think that — within the scope of this thesis — my approaches give sufficient reference points for further discussion.

In the last part, I want to apply design and systems thinking to the problems I have described. Therefore, I want to discuss the highest leverage points for design interventions to guarantee the highest possible impact and discuss solutions that are desirable, feasible, and viable in the long term.

Overcoming Bounded Rationality

As I have shown, a big resistance to sustainable policies arises from the fact that many people do not understand the full consequences of global warming and inequality. This is due to the complexity and the high amount of different interest groups that want to influence the opinion of the public for their interest. Most of these diffuse information flows are consciously designed.

In my research, I have found that the influences in the information flow are multi-layered and range, for example, from science-denying right-wing think tanks, over institutions like the World Bank, which are primarily reporting success stories, to governments that sign climate agreements that nobody is abiding by. All this is reinforced by corporations that permanently proclaim that we just have to increase the energy efficiency of production processes and maybe, reduce the amount of plastic packaging a bit, and then everyone can continue to consume without boundaries. On top of this, there are many corporations spending a lot of money to limit, bias, and dominate the flow of clear information to manipulate consumer

choices (Meadows, 2008). Altogether, this creates the subconscious feeling that the crisis around global inequality and global warming is managed 'somehow' with the aim to legitimate the economic system and preserve the business model of conventional industries as long as possible (Hickel, 2017).

All these distortions in the information flow, ultimately lead to the reinforcement of unsustainable system behaviour because they increase the bounded rationality of the individuals and, therefore, of the society. Herbert Simon used this term to describe the inevitable limitation of available information, which would always lead to distortions in the decision-making process. It often creates unconscious misjudgements regarding the long-term impacts on the whole system (Meadows, 2008). Especially in a consumer-based society, this bounded rationality is harmful when it is reinforced by the system because it damages the essential information flow. Since missing information flows is one the 'most common causes of system malfunction' (Meadows, 2008), designing better information flows can be an easy but powerful intervention. Meadows even assumes that 'most of what goes wrong in systems goes wrong because of biased, late, or missing information'.

To enable a system that supports the essential decision-making process of the consumer, a redesign of the systems information flows, incentives, constraints, and goals are necessary.

Price Distortions

A free market with free information flows would normally allow producers and consumers to make the best decisions for themselves and for the society (Meadows, 2008). Schumpeter (1949) had already argued that the consumer is responsible for the production progress and also Diamond (2014) sees the responsibility in the 'hands of consumers'. But due to price distortions such as externalities[46] and subsidies, reinforced bounded rationality, and manipulated information flows, this responsibility cannot be taken by consumers. These problems are either natural in a complex system or are even system imposed through the tendency of power concentration. Although price distortions are basically *manipulating* the free market and are, therefore, against the neoliberal paradigm, this contradiction, in the end, does lead to the dilemma that the system itself is undermining its balancing feedback loops.

A commissioned report by the Food and Agriculture Organization (FAO), for example, came to the result that global annual environmental costs of crop and livestock production are $2.96

[46] Externalities are costs occur through production and consumption processes, but that are not paid by the producer or consumer and are instead externalised to the society or future generations.

trillion per year[47] (FAO, 2015) and the total costs over all industries are $7.3 trillion per year, which equates to 13% of the global economic output (Trucost, 2013). This means that consumers who buy sustainable products pay an immense surcharge for products that damage the environment. The result is not only that competition in the market is prevented and innovation is undermined, but also that the consumer is not able to make the best decision anymore.

Validation of Assumption

Hence, since the price is not the adequate primary information medium, these consumption choices have to be clarified. I have made, upon this assumption, a survey in the UK, the USA, and Germany[48] to investigate three questions:

1. Are people aware of the systemic impact of their personal consumption choices?
2. Are people aware of the systemic global consumption inequality?
3. Are people aware of the systemic impact of global warming?

I have decided to keep the questions closed, concrete and descriptive to avoid misconceptions. For this, I have used Wallace-Wells' (2017) examples of the systemic consequences of global warming and the UN (2013) data about systemic consumption inequality. Also, during my research, I got to know of the fact that buying an average car overshoots the personal carbon budget by a factor of 10 before the car is even driven the first mile[49], which, in my opinion, is a good example of a missing link between consumption and production. The focus on sustainable mobility in the public is nearly exclusively on the usage of vehicles, but not on the production of the vehicles itself. The systemic impact — measured in lifecycle-analyses — is not widely considered.

[47] This is especially important when we consider that the global food system is responsible for 44-57% of all human generated greenhouse gases (UNCTAD, 2013). Instead of internalising the costs into the prices, they are even subsidised and by thus more manipulated.

[48] 104 people participated in the survey, whereas 78% were 39 or younger and 22% 40 or older. Although this age distribution is no representative, it can give a rough image about the issue.

[49] Based on a climate budget of 1.6 tons CO_2 equivalent per year (Williams and Waisman, 2017) and a Ford Mondeo, that causes around 17 tons CO_2 during its production (Berners-Lee, 2011). The climate budget is calculated on the amount of CO_2 that we can emit to stay under 2°C until the end of the century divided by the number of humans on the planet and divided by the amount of years until 2050. The amount caused by the production is calculated by Berners-Lee with the national input-output data and process-based life cycle analysis techniques. The auto industry has a footprint of 720kg CO_2 equivalent per £1000 spent, which sums up to 17.280kg CO_2 equivalent for a £24.000 Ford Mondeo. This means that a buyer of a mid-class car overshoots his annual climate budget by the factor 10.8. The statement that selling the car afterwards reduces the theoretical carbon footprint does not work, because with the purchase the consumer created a higher demand on the industry, which means that if he would have bought a used car, the demand for new cars would go down and alternative models for new cars could emerge faster.

The result of my survey was that only approximately one out of five people (18.27%) do know the systemic impact of one of the most important products in our society, which a majority uses nearly every day. However, a larger fraction of people (47.12%) know that their consumption is extremely disproportionately shared on a global level, but only a bit more than half of the people (53.85%) are aware of the systemic consequences of global warming, which matches with the findings of other surveys about the consensus on anthropogenic global warming[50].

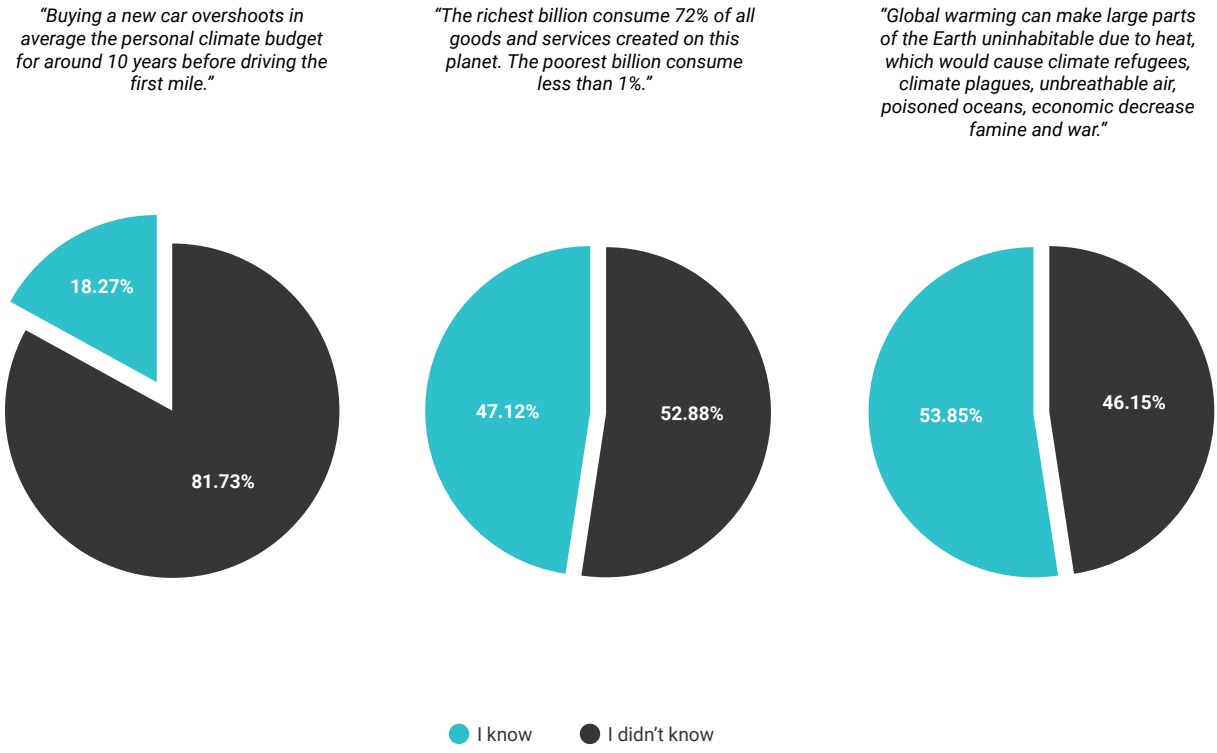

Figure 8: Three questions I have asked in my survey

In summary, this means that most people are not aware of the wide-reaching impact of their personal consumption, only every second person knows that the main driver for ecological overshoot is the social class they are a part of, and also, only one in every two people is aware of the wide-reaching consequences of global warming, which is caused by this overshoot.

[50] The Pew Research Center for example found that 57% of the US public is 'either disagreeing or unaware that scientists overwhelmingly agree that the earth is warming due to human activity' (Cook et al., 2013).

Improvement of Information Flow

Based upon my research, the reasons behind this bad information flow are multi-layered and range from the complexity of the global supply chain, policy resistance, and the phenomena of a "scarcity mentality" that increases short-term thinking which ultimately leads to the systematic tendency of the economic system, which overvalues short-term thinking by devaluation the future through discount rates.

But the underlying problem is that the price is not representing the real cost of the product and that additional information flow is unclear and too complex. Through ultra-complex supply chains, manipulated and unclear information flows, and the ubiquitously bounded rationality, even the most ethical motivated consumer cannot make the best decision in this system.

Current approaches are focussing on *educating* consumers. But from a systems thinking perspective, *repairing* the information flow is a more effective approach than every awareness campaign or attempt to change consumption behaviours through education (Meadows, 2008). As described is in a market economy, the price is the most influential information. But since the system is causing price distortions through its own behaviour, the market cannot solve this problem and a design intervention is required. Fixing price distortions through state regulations would lead to more efficiently operating market in which multinational companies have no unfair advantage, producers can innovate cleaner production processes, consumers consume more sustainable products, pollution and health costs are reduced significantly, and third parties are relieved of an unfair burden (Meadows, 2008; Rees, 2010; Eisenstein, 2011; Caradonna, 2016; Maxton and Randers, 2016; Hickel, 2017).

True Cost Accounting: Prices as the Main Information Source

A widely proposed model for this is "true-cost accounting". In an economic system with true-cost accounting, all price distortions such as externalities created by the behaviour of the economic system would be included in the price of the products and services. This would prevent under-pricing — which, in turn, would prevent overconsumption, inefficient resource use, and environmental pollution (Caradonna, 2016). Because most externalised costs and damages of global warming are affecting the Global South, such a system could indirectly even include payments for previous and current damages that the Global North caused. By this redesign, our consumption would automatically cause an alignment of the disparities of the

Global North and the Global South[51]. Zehner (2012) gives the elucidating example that through true-cost accounting 'grocery shoppers could identify the almonds with the lowest energy footprint simply by checking the price tag'.

Since I have heard about true-cost accounting, it was hard for me to understand why such policy concepts are not part of our public discussions. Frequently discussed topics in the public are in general conducted between ideological and political camps, but the idea that the costs of individual, unsustainable consumption should be paid by the consumer instead of the society goes beyond classic political ideologies and is against the liberal idea as well as every social idea of a market.

I have, therefore, asked a member of the German parliament and the committee on environment in the German liberal party (FDP), why he thinks that such policies have not been implemented yet. In his opinion, the problems lay in the complexity of the calculation to achieve concrete results that can be implemented in a policy reform and the fact that there is no proper concept yet for such an implementation that can be discussed. Open questions, for example, would be how the international trade would be affected and if consumers would need to pay more for products that cannot be produced yet without any natural costs.

Often I have read in the discussed literature that we just need ideas and not exact plans to change the economic system, but ignoring the political reality is probably the reason why such policies are not developed and discussed further on a broader level. In my opinion, a more practical oriented and human centric approach could help to solve the problem. In the end, it is the voter that needs to demand such policies and as long as there is no validated concept, policy opponents will appear more convincing. The behaviour of nonlinear complex systems cannot be predicted, so the preferred way should be to test concepts like this in iterative and small field experiments. Even for the implementation of a final policy proposal, an iterative process would be better according to the principles of design and systems thinking. Ehrenfeld (2008), sustainability scientist and author of the book *Sustainability by Design,* argues that small steps are necessary because, in the case of global sustainability, we have no time to plan policy reforms over decades and risk a failure.

[51] Scientists at the Stockholm Environment Institute calculated how this could function: The Global North country United Kingdom would for example need to transfer $49 billion to the Global South annually and reduce its emissions by 75% on 1990 levels, while the Global South country Swaziland could increase its emission by 59% for economic growth and would receive $80 million in compensation and assistance by Global North countries (Hickel, 2017).

Focus, Simplification and Empathy

I have described that our economic system is reinforcing the natural psychological behaviour of focusing on the assessment of the short-term risks over the long-term risks. Additionally, endemic problems are like global warming and global inequality, due to their intangibility, complexity, and lengthiness; and, in all societies, they are less prioritised than immediate problems like unemployment and migration.

Certainly, it is important that the framework of the economic system allows long-term thinking, but nevertheless, it is necessary to clarify the urgency of the problems. The systems thinking prism shows that focusing on global warming and inequality would have the biggest impact, but the human-centred design has to communicate this. Hence, not only does the language have to be simplified and focused, but also the topics. Bregman (2017) says that 'the greatest sin of the academic left is that it has become fundamentally aristocratic, writing in bizarre jargon that makes simple matter dizzyingly complex', and 'what we need is a narrative that speaks to millions of ordinary people'. He suggests, therefore, that advocates of progressive ideas need to learn from the reductionist thinking and proclamations of conservative nationalist movements that gained more and more momentum in the last years.

I have seen in my research that many scholars with a systematic and holistic perspective wrote amazing analyses about the problems in our economic system but ultimately failed to propose solutions that are desirable, feasible, and viable at the same time because they failed to reduce the complexity. By writing this thesis, I personally realised how intricate it is to break everything down to the essence, just as a designer should do it. Analysing the root problems through systems thinking is only the first step. Ultimately, it is about thinking as a designer to reduce the complexity without losing the context. As designer Maeda (2006) puts it: simplicity is eventually all about 'subtracting the obvious and adding the meaningful'. To counteract the reinforced bounded rationality, design should be used to do the same with sustainable economics.

Controlling System Tendencies and Policy Resistance

Focus, simplification and empathy could immediately be used to improve the information flow and bounded rationality, but to improve the information flow through better pricing, design intervention needs to overcome system tendencies and policy resistance.

Systemic Need for Regulation

I have described and discussed system behaviours that are caused by the structural logic of the economic system itself. To prevent such a behaviour, systems thinking opposes it with rules in the form of constraints and incentives. They are high leverage points that are able to prevent the unfolding of such system tendencies.

Especially because the neoliberal paradigm is strictly against any form of regulation and limitation, a systems thinking prism, which goes beyond any ideology, is necessary to understand the importance of them. Since the tendencies are system-imposed, the free market cannot correct the four crucial system tendencies of increasing inequality, ecological overshoot, power concentration, and price distortion as long there are no limits and regulations. In general, political ideologies at this point are divided. Liberal advocates would argue that no market intervention is still the preferable way, because the market would regulate itself if the problems are worsening too much.

However, a systems thinking perspective enables to understand that this behaviour is indeed natural, but not desirable. Political scientist Khanna (2016) ascribes this to the desire that every system tends to maximise "flow". Flows in our global system refer to the flow of resources, goods, capital, technology, people, data, and ideas. They are in general, limited by frictions such as borders, distances, and regulations, but connecting all these parts together is a fundamental property of all systems. Therefore, Khanna and designer Galbraith (2017) argue that in the long-term, flows overcome frictions, what systems thinker are explaining with the second law of thermodynamics[52]. Considering this, Khanna argues that 'the friction of the future is to control flow'.

In conclusion, this means that limitations and rules are necessary to control flow by strengthening balancing feedback loops. Khanna compares these necessary limitations and rules to traffic lights: Governments should calibrate the colours to manage the (traffic) flows. Without them, the (traffic) system cannot function. Applied to the neoliberal economic system, this means that a totally free system as Friedman and Hayek used to propose, will collapse as long as the system tendencies are not regulated. To say it in the words of Raworth (2017):

> "Today's economy is divisive and degenerative by default. Tomorrow's economy must be distributive and regenerative by design."

[52] The law is saying that entropy increases over time. In systems thinking that means that systems tend to move towards disorder and disorganisation, which increases in turn flows and weakens friction.

Policy Resistance

Systems thinking is able to explain the need for designing interventions in the form of rules, incentives, and constraints beyond any political ideology. But the bounded rationality of voters, consumers, and producers in combination with an economically motivated policy resistance are in practice, repressing design interventions that aim to regulate the system tendencies. In the long term, this policy resistance may even lead to a point where opposing goals of different actors within the economic system are benefitting no one.

In a world without policy resistance and bounded rationality, according to Maxton and Randers (2016), we could end all negative system tendencies of our economic system with a simple four-step framework:

1. Stop using coal, oil, and gas.
2. Transfer wealth from the rich to the poor on a continuing basis.
3. Regulate markets in the interests of the majority and the planet.
4. Reduce short-termism, especially within the finance sector.

But — due to opposing short-term interests — there is no political majority that favours reducing industrial production, shutting down most of the fossil fuel industry, drastically shrinking and restricting the finance sector, and unravelling free trade agreements. Therefore, they conclude that every solution has to be feasible, desirable, and viable in the short and long-term within an 'imperfect system' that is dominated by short-termism and 'extensive political manipulation'.

Alignment of Interests through Design

The system tendencies of ecological overshoot and price distortions are attributable to the general structure of a "common system", which makes selfish behaviour more profitable than behaviour oriented to the common good[53]. To achieve a sustainable economic system, where the best business decision is the one that enriches the society and the planet, a regulation and

[53] Many visionary business leaders have attempted to focus not just on profit, but also on the people and the planet (the *triple bottom line*) and hence tried to apply the *three E's of sustainability* (economy, equity and environment) into our economic system, but due to the competition on the market these principals can never completely be realised in the long-term (Eisenstein, 2011).

alignment of the short and long-term goals of all actors in the system is crucial. But this goal has, until today, not been achieved by any economic system.

Thus, it is no coincidence that a detractor of the current economic system like Eisenstein (2011) postulates in the end the same as Adam Smith and Milton Friedman, who originally invented exactly this system: While Eisenstein demands 'a system that aligns self-interest with the good of all', Smith and Friedman strived for a system where self-interest would create the maximum benefit for all (Friedman, 1982). This fundamental connection is not only revealing that the original motivation of both paradigms is actually compliant, but it also underlines the complexity of redesigning such an unpredictable system. Liberalism and neoliberalism were based upon the same noble idea as today's proposals that try to overcome those paradigms. They just underestimated the complexity of the system. Economists thought that the world works like in their models, but it does not. Such a complex system cannot be controlled or even predicted, but just redesigned. Khanna's term of "calibrating" the system is, in this context, well chosen.

Every design intervention in such a system has to be designed upon existing elements, interconnections, and functions. Interventions that overthrow the whole complex system — like neoliberalism in the Global South — without progressive iterations cannot be sustainable, because no one is able to predict their future behaviour. Most of the proposals I have discovered in my research, that are aiming to improve the sustainability of the system, are indeed trying to calibrate or redesign the system, but they do not consider policy resistance, bounded rationality, and divergent goals and paradigms. A universal basic income (Eisenstein, 2011; Klein, 2014; Mason, 2016; Maxton and Randers, 2016; Bregman, 2017), a regulation of the fertility in the Global North (Maxton and Randers, 2016), shorter workweeks (Klein, 2014; Coote, 2015; Maxton and Randers, 2016; Bregman, 2017), or a global wealth tax (Klein, 2014; Piketty, 2014) are, for example, controversial proposals, because they depend very much on political and personal worldviews and are hard to align with different opinions within the public and economy. Piketty himself says about his only proposed solution — a global wealth tax — that it is a 'utopian idea' and he sees 'no reason to think that things will change anytime soon', because it needs an incredibly high amount of international organisation to access bank information from all individuals on this planet and then tax only the ones with the most wealth (Piketty, 2014).

To create balancing feedback loops, the interests of every major actor in the system need to be aligned. In systems thinking, a common idea to overcome policy resistance is to give up ineffective policies and focus the energy on more constructive purposes (Meadows, 2008).

At this point, the combination of systems thinking and design thinking seems crucial, because without systems thinking, the problems are not tackled at their highest leverage points, and without design thinking, solutions are proposed that are neither desirable, viable, nor feasible, since they lack a holistic, empathic, and human-centred perspective.

Redistribution of Consumption and Wealth: An Intelligent Tax System

The complementation of design and systems thinking to align interests and overcome policy resistance can be demonstrated on the basis of the example of redesigning the tax system[54]. A redesign of the tax system based upon design and systems thinking principals would need to apply the four design characteristics (clearly expressed, easy to discuss, easy to apply, easy to understand), be implemented in an iterative and flexible fashion, and serve human needs and the needs of the society while aligning the different goals of the actors within the society by giving up ineffective policies. Also, it should enable a new perspective of taxes in general and try to find a way to avoid ideology afflicted discussion.

A radical simple and intelligent tax system that is not static like the current one but one that can steadily be adapted to the challenges of the 21st century would be, for example, a way to approach this. Ultimately, a gradual shift from taxing work to consumption[55] and finance in the form of transactions[56] could balance reinforcing feedback loops that are caused by the economic system itself. In a world that is in ecological overshoot, it makes more sense to tax consumption of resource-intensive goods rather than work, ideas, and entrepreneurial initiatives. Combined with a transaction tax, the labour market risks caused by the digital revolution could be anticipated (Eisenstein, 2011), tax evasion on a large scale could be made impossible (Feige, 2000), and the financial market would be stabilised through preventing high-frequency trading and short-term thinking. At the same time, wealth would be redistributed more effectively than currently, because wealthy people transfer a disproportionate share of transactions (Feige, 2000). On top of this, an intelligent tax system redesign could also be used

[54] Taxation is not only 'perhaps the most important of all political issues', but also an 'eminently philosophical issue' (Piketty, 2014). This means that taxes are in some way a reflection of the paradigm that is predominant in a society, which is why they are in systems thinking a relatively low leverage point (Meadows, 2008). But at the same time, they build the foundation for goals, rules and balancing feedback loops within the system and they are more tangible what makes them from a design perspective important.

[55] The idea of shifting taxes onto polluters and resource consumption was developed by A. C. Pigou, Herman Daly, Paul Hawken and numerous environmentalists (Eisenstein, 2011). This would cause theoretically higher burden on lower income households but could be prevented through a progressive taxation on luxury goods, while basic goods could be taxes lower. This system would also allow to tax for example services lower than material goods and local goods less than international ones.

[56] Economist Feige (2000) calculated that an automated payment transaction (ATP) tax of 0.3% on all transactions could replace all taxes in the US, assuming that the total amount of financial transactions would decrease by 50% afterwards.

to include true-cost accounting. This approach would, therefore, be a good example of overcoming policy resistance by aligning goals and using design principles.

Such a new approach would require a completely different view on taxes. Influenced by the history of taxes as a tool of oppression and exploitation, the image of taxes is consequently negatively prejudiced. They are more perceived as a punishment rather than as a contribution to the society. We "punish" productive work and good consumption. With a redesign of the system, it would, hence, make sense to give it a new "image" and maybe name them what they are: a contribution. Every form of unsustainable consumption would thus be a contribution to the planet and societies of the world from which the goods and services were derived from.

Changing the Systems Goal and Paradigm

Finally, it is necessary to change the goal and paradigm of the system. From a systems thinking perspective, transcending paradigms and changing goals are the highest leverage points to intervene in a system.

As I have described, today, our primary goal is to increase economic growth. Meadows (2008) writes that 'if you define the goal of a society as GNP, that society will do its best to produce GNP'. Altogether, a wartime measurement should not be the goal of a civilisation that is facing a critical tipping point. It seems obvious that we need to change our goal. All these changes require ultimately a paradigm shift. Paradigms are the sources of everything within a system and also its goals. As long as we do not overcome the hegemonic paradigm of neoliberalism, we cannot change a goal or redesign anything in the economic system. Redesigning the goal and paradigm is, therefore, certainly the most important part of a design intervention, but to achieve this, the challenges around controlling bounded rationality, policy resistance, and system tendencies go hand in hand.

A New Goal

My systems thinking analysis highlighted the need for a new goal of the economic system to be sustainable. It is generally the precondition for discussing what in our society is *valuable* and what is seen as *progress.* Hickel (2017) says that setting a new goal is 'the ultimate democratic act'. One fundamental problem with our current goal is that it was not set democratically, but unilaterally by technocratic economists and politicians. It is a single abstract wartime number that measures 'everything except that which is worthwhile', as Robby Kennedy once said in 1968 (Rogers, 2012). Considering the fact that the GDP indicator is more than 80 years old and completely inadequate for every issue humanity is facing in the 21st century, the need for new measurement is immense.

Costa Rica, for example, has a higher life expectancy and wellbeing than the US despite its GDP per capita only being 20% of that of the US. Interestingly, the average happiness-level in the US peaked in the 1950s with a real GDP per capita that was roughly 25% compared to today. This example emphasises that greater equality, good relationships, and strong social guarantees make humans happier and not high levels of income and consumption. Thus, Hickel reasons that we should not see Costa Rica as underdeveloped, but as well developed. Costa Rica provides high levels of human well-being with a minimum amount of ecological pressure and is, thereby, maybe the most efficient economy in this world. The predominant development story is that Scandinavian countries are the ideal aim of many societies, but considering our planetary boundaries, our goal should be to be like Costa Rica rather than Sweden.

Since cutting back 75% of production in the Global North cannot be a solution, our economies need to focus progressively more on services and information goods like software rather than material goods. Material goods, in turn, need to be designed to be long lasting and be treated as more valuable through higher prices (Eisenstein, 2011). Through a simultaneous focus on circle, share, gift, decentralised and localised economies that are reflected in the measurement of the goal, people would not need to give up every kind of material consumption.

In my research, I have found many different proposals such as the *Genuine Progress Indicator* (GPI)[57], the OECD's *Better Life Index*[58], the New Economics Foundation's *Happy Planet Index*[59] (Hickel, 2017), and the *Doughnut*[60], a visualised indicator designed by economist Raworth (2017). Measuring, for example, the progress of the US according to the GPI, which includes e.g. equality, pollution, and crime, shows that no progress happened between the mid-1970s and today (*Figure 9*). This number should be alarming enough to immediately change the goal of the system.

[57] The GPI is based on the GDP, but includes household, volunteer work and equality and subtracts pollution, resource depletion and crime.
[58] The Better Life Index measures eleven dimensions of social and environmental well-being.
[59] It measures life expectancy, happiness and ecological footprint.
[60] The Doughnut visualises the shortfall of social foundation and overshoot of planetary boundaries.

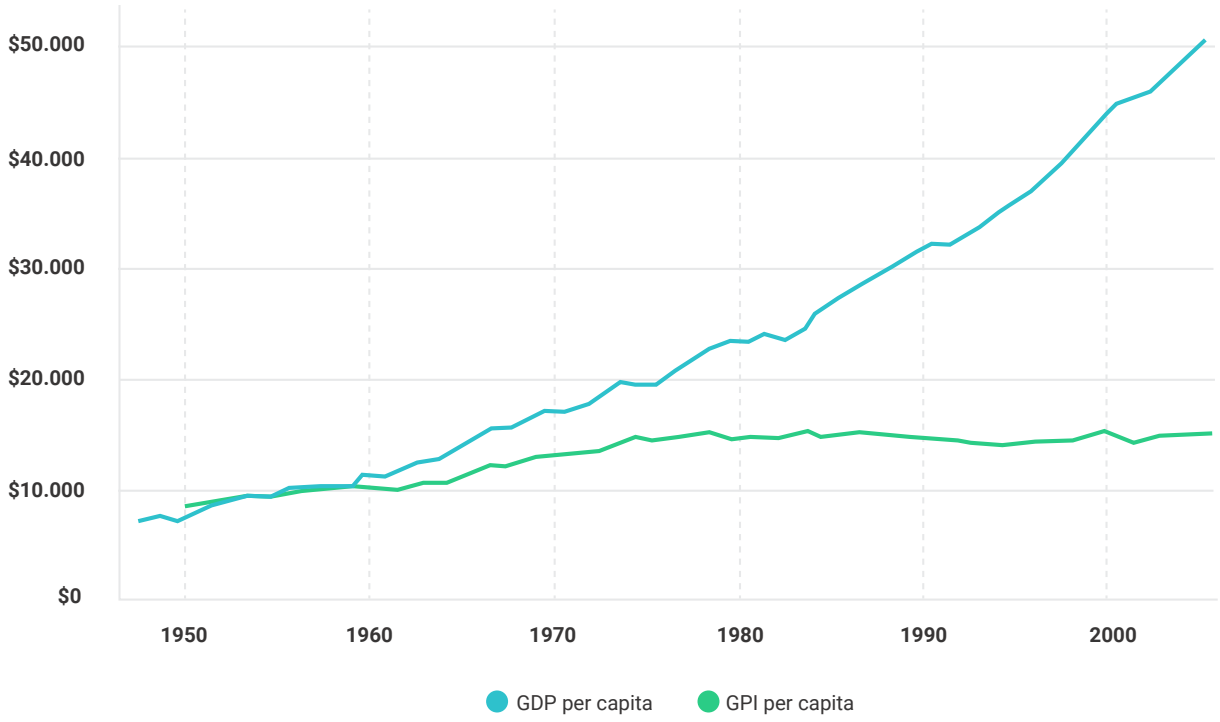

Figure 9: Global GDP and global GPI per capita in constant 2005 US$ (Hickel, 2017)

Beyond-GDP, an initiative by the European Commission, European Parliament, Club of Rome, OECD, and WWF, aims to integrate a new measurement into the 'decision-making progress' of politics (Chancel, Thiry and Demailly, 2014). Globescan (2011), a public opinion research consultancy, has researched that two thirds of the people in countries like Australia, Brazil, Canada, France, Germany, and Russia want to have a new measurement, but even after five years since the start of the initiative, they just concluded that 'it is still too early to single out the "best" Beyond-GDP indicator'.

Despite the high demand for new measurements, there is no proposal I have found that can measure essential indicators like wellbeing, equality, justice, pollution, and sustainability and track, at the same time, the necessary economic transformation that I have described. In my opinion, alternative proposals like the GPI are superior to the GDP, but to appeal to voters and politicians, it has to be simpler, more tangible, and appealing, while providing enough neutrality like the GDP. Designing a new goal requires a human-centred, empathic perspective, not just an economic one. Finally, it is an advantage that the general consensus is already aware of the need for a new measurement. But replacing the GDP and setting a new goal requires awareness about the impact of the goal in the economic system and the need for a limit. Caradonna (2016) writes that the most important thing is to make clear that the decision to

focus on GDP growth was made by economists and politicians and it did not occur as some kind of "natural" historical development. Only this would enable a shift to a different goal.

Design of Limits

As I described, the system needs exponential economic growth as long as it is interest driven. Systems thinking offers an understanding that every system has limits to growth and if they are not self-imposed, they are system-imposed. Even though the system has balancing feedback loops such as removing debts in times of crisis through high inflation, this is not a sustainable solution and does not solve the basic problem, namely the need for exponential growth. If we do not actively design the limit of our economic system, we will sooner or later reach the limit unintentionally which will most likely lead to a collapse, as the 1972 Club of Rome report or the research of Diamond (2014) indicates.

Often this demand for limitless economic growth is seen as the main property and critique of capitalism. Historian Harari (2018) writes:

> "Capitalism's belief in perpetual economic growth flies in the face of almost everything we know about the universe."

But the argument that it is "capitalism's belief" is fundamentally wrong: The four classical economists Adam Smith, Thomas Malthus, John Stuart Mill, and David Ricardo, who are regarded as the original inventors of today's capitalistic free market system, were early critics of limitless economic growth[61]. Eisenstein (2011), Mason (2016), and Hickel (2017), therefore, see a new goal as a necessary first step to make the economic system sustainable, but after all, a redesign needs to address the main underlying driver of growth: debt.

Debt comes with interest and interest means that debt grows exponentially in the long-term on a macroeconomic scale. Debt also enforces short-term thinking by using interest rates to discount the future. To completely overcome short-term thinking and the need for growth, we would need to abolish a debt and interest-based system, which is completely incompatible

[61] Smith for example wrote in 1776 in *The Wealth of Nations* about the *full complement of riches* that would be the ultimate fate of most economies in form of a *stationary state*. Based on this Mill envisioned a mature and prosperous state, where the economy reached its maximum amount of wealth, consumption and population. Malthus, Smith and Ricardo shared the assumption that economic growth must be limited, because the amount of land and resources within the planetary system is fixed, which would make an ever-growing expansion impossible (Caradonna, 2016).

with every economic system we had since the 15th century[62]. Even Eisenstein, who proposes an interest-free system, admits that such a radical system change is just feasible due to a drastic caesura in the form of an economic crisis.

The topic itself is so complex, extensive, and fundamental that many economists are thinking about alternative approaches. While, Raworth (2017), for example, proposes the "S curve of growth" (*Figure 10*), Maxton and Randers (2016) think that 1% growth is enough. Other economists like Kroll (2017) argue that degrowth is aiming for the wrong thing because we can also have growth without more unsustainable material consumption. We cannot have zero growth, so we need to redesign the goal of the system to enable economic saturation in development by design. The aim should be to give the economic system the ability not to grow without removing the general possibility of growing.

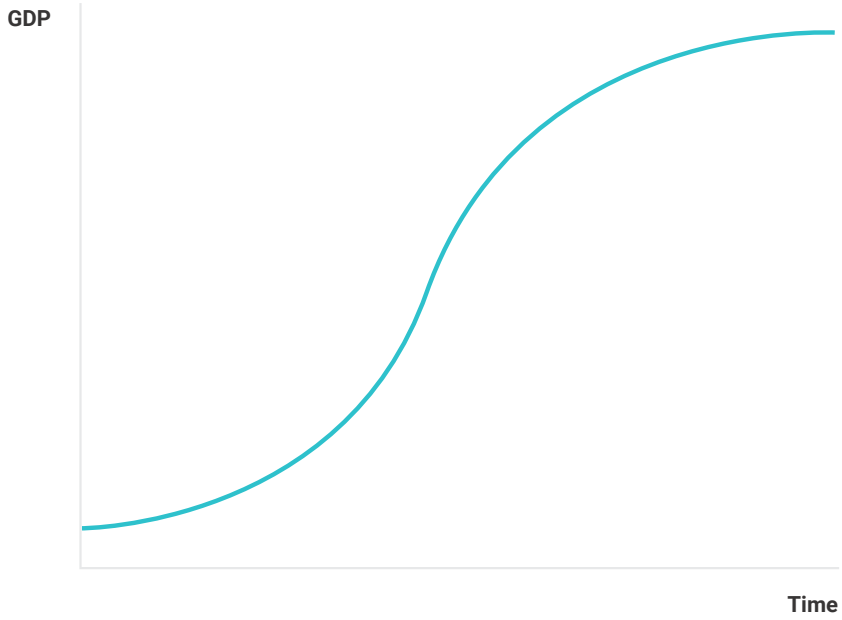

Figure 10: The "S-curve of growth" (Raworth, 2017)

However, the amount of necessary economic growth depends on the number of issued credits and the interest rates. "Sovereign-money" initiatives like the *Swiss sovereign-money initiative* or the British *Positive Money* initiative aim to bring the money creation back to the central

[62] Harari (2018) explains that the credit-based system was established through imperialism. Before the discovery of America, the expectations of a *better future* were not consensus and rich people invested their money in their own amusement instead of risk investments. Since then the belief in a better future is part of everything that makes up our societies, which is why it seems impossible to completely abolish this idea.

banks or introduce a full-reserve banking[63], which would enable limiting the "borrowing of the future" and focus on long-term planning. But, although, these steps could be pathbreaking, a recent referendum in Switzerland was rejected with over three-quarters of all votes.

To understand this surprising result, I have interviewed a risk manager, who is living in Switzerland and working in one of Switzerland's biggest financial service companies *Zurich Insurance*. In his perception, the biggest obstacle was the fear of losing economic competitiveness through such a radical step. But he also inferred that the referendum was solely focussed on regulating the banking system, rather than regulating growth, which means that the context was different, and the referendum was just aiming to change the rules, but not the goal of the system. This example coincides with my secondary research and shows that on the one hand, the goal of the system has to be changed first and on the other hand, the information flows have to be improved though focus, simplification, and empathy.

Paradigm Shift

Until now, I could describe and discuss the four system tendencies of increasing inequality, ecological overshoot, power concentration, and price distortion and show how a design and systems thinking perspective can help to design interventions on the leverage points of goals, rules, feedback loops, and information flows. But every attempt to manage global warming and global inequality will be unsuccessful without a change of the system's paradigm because it is the highest leverage point of all and influences everything in the system (Meadows, 2008). Therefore, the last part of this thesis will be about the question of how a paradigm shift can be achieved.

Theories of Paradigm Shifts

The term "paradigm shift" itself was invented by philosopher Thomas Kuhn in 1962 (Ehrenfeld, 2008). In his book *The Structure of Scientific Revolutions* he wrote that 'the major turning points in scientific development associated with the names of Copernicus, Newton, Lavoisier, and Einstein' (Kuhn, 1962). The reason behind this, according to Kuhn's research, is that human activities are habitual, and it is a characteristic of our species to do things in always the same way until they do not work anymore in their normal way. At this point, humans use their creativity until someone else is offering a new structure. In other words: we just follow the rules until the system collapses.

[63] This means that private banks would need to keep the full amount of each loan the issue as a reserve in the central bank.

This is exactly what happened in the 1970s when neoliberalism replaced Keynesianism as the paradigm in the economic world. Friedman (1982) wrote about this in the retrospective:

> "Only a crisis - actual or perceived - produces real change. When that crisis occurs, the actions that are taken depend on the ideas that are lying around. That, I believe, is our basic function: to develop alternatives to existing policies, to keep them alive and available until the politically impossible becomes the politically inevitable."

But the neoliberal system had a crisis in 2007 and Piketty's (2014) pathbreaking study of the neoliberal idea fundamentally disproved the idea that a free market would lead to the maximum benefit for all. Actually, Piketty showed that exactly the opposite is true[64] and that redistributive interventions are necessary to protect democracy. The elementary neoliberal paradigm has lost its legitimacy, but this evidence did not cause a paradigm shift anywhere, contrary to Kuhn's and Friedman's assumption. Outgoing of my research, the explanation is probably that economics is simply not a natural science, but a social science and overcoming its paradigms is more about overcoming a philosophy rather than overcoming a scientific theory.

Ehrenfeld (2008) discusses that apart from this theory, there are many other theories that could explain how paradigm shifts are happening. One theory is saying that technological improvements are causing paradigm shifts, the "dialectic model" by Hegel and Marx is saying that unstable conditions and the subsequent revolutions are the main drivers, while another theory by e.g. psychologists Ken Wilber, Clare Graves, and futurist Willis Harman is assuming that a permanent "evolution in human consciousness" is the reason. By contrast, Biologist Humberto Maturana developed the model of the "rationalist belief" that was further developed by philosopher Jürgen Habermann, arguing that human interaction in form of language and "rational argumentation" is the driver. But, ultimately, Ehrenfeld concludes that 'in the case of unsustainability, the system is so large and complex that no Einstein [who disrupted a predominant paradigm in physics through his relativity theory] is likely to come forth with a neat new paradigm'. He also says that approaches like education and rationality are not feasible because 'the present system would first have to change dramatically' and social

[64] He writes: 'Specifically, it is important to note that the fundamental r [rate of return on capital] > g [economic growth] inequality, the main force of divergence in my theory, has nothing to do with any market imperfection. Quite the contrary: the more perfect the capital market (in the economist's sense), the more likely r is to be greater than g'. So, the freer the market is, the more wealth is transferred to a single group and the more inequality is created.

revolution or human evolution are too 'time-consuming processes' that we 'cannot afford to play out'. In his opinion, 'there is a way to sustainability, and the way is design', because:

> "Sustainability can emerge only when modern humans adopt a new story that will change their behaviour such that flourishing rather than unsustainability shows up in action."

Questioning the Story of the Paradigm

Hickel (2017) says that 'the official success story has helped keep people on board with our existing system for a long time' and adds that 'if that story falls apart, so too will their consent.' This indicates that we probably do not need an economic collapse, scientific disruption, human evolution, or social upheaval, but a "collapse" of the current "story".

This means, for example, that the four system tendencies (rising inequality, ecological overshoot, power concentration, and price distortions), which I have detailed in my analysis, need to be communicated more efficiently and precisely. Hence, focusing on a key message and permanent repetition is crucial[65]. The aim is to keep information flows as focussed and simple as possible according to the four design characteristics described by Manzini (2015). Through its analysis, systems thinking can detect these failures in the old paradigm, whereas, a design perspective can "point" at them and promote the new one in the public because it understands the human needs.

At the same time, progressive thinking organisations and individuals need to focus on the anomaly that our current economic system is treated as *natural* to take the inviolability of the paradigm. Meadows (2008) describes that once people realise that no paradigm is "true", people can choose whatever will help them achieve their purpose.

A New Paradigm for a New Model of Society

If there is one common ground throughout my research, it is that thinkers of a sustainable society see a new model of society at the core of a redesign. This goes beyond a new common goal or aligned interests. Ultimately, it is about reinventing the idea of the society and the commons. Klein (2014) says that 'we need to start believing again that humanity is not selfish and greedy', and that 'interdependence rather than hyper-individualism, reciprocity rather than

[65] What is today a mantra in design or marketing was already discovered in the 19th century in a crowd psychology study by polymath Le Bon (2018), was influential to disparate political persons in the 20th century such as Roosevelt, Mussolini, Hitler or Lenin, and contributes today again to the success of right-wing politics.

dominance, and cooperation rather than hierarchy' are the natural human virtues. It has to be made clear that democracy, wellbeing, and peace — the most fundamental ideas of our societies — depend on solving global warming and global inequality, the two challenges of the 21st century. And even when societies and their governments are currently trying to move back from the *global* to the *national*, there is no way that these challenges can be solved without a globally sustainable thinking and ultimately, without a global sustainable economic system.

Our culture was created upon the paradigms of early Christianity, over imperialism, the enlightenment, to industrial capitalism, and liberalism. Ehrenfeld (2008) says that it 'may take another epochal time (if we can survive that long) to replace the cognitive and material elements of our cultural structure'. Humanity cannot afford to make any large mistakes or wrong turns in this position, which is why we need to accept the complexity of our system and dare unconventional but iterative approaches.

Also, learning from the history of neoliberalism means to understand that a new paradigm has to be developed interdisciplinarily and not only by economists and politicians. Such a redesign needs new perspectives and inputs such as the guidance and ethics of philosophers, the creativity and empathy of designers, and the analytics and overview of systems thinkers. Every movement in the past shifted cultural values by showing humanity a better version of itself. These movements liberated the political imagination and did not only generate new answers but also changed the questions themselves. That is why, perhaps, the most important contribution design and systems thinking can offer for the shift of the paradigm is the offering of new perspectives and imagination together with the knowledge of communicating it effectively and empathically.

Conclusion

The goal of this thesis was to investigate if a combination of design and systems thinking can contribute to the transformation to a sustainable economic system. I have found that managing the two central global challenges in the 21st century — global warming and global inequality — requires a balance between economy, environment, and equality.

Because the four system tendencies of ecological overshoot, rising inequality, power concentration, and price distortions are not controlled enough, the current economic system is not sustainable. The predominant neoliberal paradigm is a major driver for this, but the unsustainability is also founded historically in western culture and the idea of pricing the future at a discount in the form of interest.

The enormous consequences of global warming and global inequality make it inevitable to come up with new concepts. They are primarily damaging people in the Global South, but in a globalised world, they will affect everyone in the long-term. Current solution approaches are often failing either to address the root-problem or are not suitable for policy reforms, because they are not desirable, viable, or feasible. Thus, I have shown that the necessary redesign would benefit from empathy and analytical overview by combining critical thinking, creativity, and practical sense.

As already proposed by a few designers and systems thinkers, the combination of design and systems thinking can have positive complementary effects and by this, enable us to think across boundaries and develop holistic and human-centred solutions. For a redesign of the economic system, this means that they can help improve information flows, overcome bounded rationality and policy resistance, and ultimately, build the foundation for the emerging of a new goal and paradigm, that embraces all areas of life.

A systems thinking approach is necessary because the underlying problems are interconnected, reinforcing themselves, and therefore, cannot be solved by single and uncoordinated design interventions. Also, an unconventional problem-solving approach — like it is found in design thinking — is needed to find solutions for problems that humanity has been unable to solve for decades.

To show what a combination of both ideas could deliver, I have discussed and developed approaches that are representative. They range from improving the information flow through true cost accounting, empathic language or problem simplification, over alignment of interests in the form of a redistributive and intelligent tax system, to eventually designing a new goal and paradigm for a new social model by questioning the neoliberal “success story” and offering new perspectives and imagination. Altogether, these approaches and perspectives of

designers and systems thinkers can rectify and enhance the whole discourse around sustainable economics that is currently predominantly conducted by policymakers and economists.

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