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**PaaS: a model for socially and environmentally
responsible companies
and for an inclusive circular economy?**

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Introduction

Beyond ownership equals more equality?

“Earth is exactly at the crossover point; in the year 2020 (± 6), the anthropogenic mass, which has recently doubled roughly every 20 years, will surpass all global living biomass. [...] This quantification of the human enterprise gives a mass-based characterization of the epoch of the Anthropocene”¹.

The current production and consumption models are not sustainable. Many people and the planet are paying a very high cost to allow a small and wealthy part of the global population to keep their polluting lifestyles. New forms of production and consumption are needed from an environmental and social perspective. The way we produce and consume (or use) products has to be reshaped as well as the role of the companies in the society. Changes in consumers' behaviours go hand in hand with the

¹ Elhacham, E., Ben-Uri, L., Grozovski, J. et al., *Global human-made mass exceeds all living biomass*, Nature 588, 442–444, 2020, <https://doi.org/10.1038/s41586-020-3010-5>.

reshaping of companies. Considering the material scarcity ahead, businesses need to take more responsibility for their use of materials, natural capital and resources. Some companies, simply for marketing reasons or because they truly decided to embrace the transition to a just and regenerative economy, already started. Examples of B-Corps and purpose driven companies are increasing all around the globe.

Looking at the circular economy space and at the shift in business models, the product-as-a-service is considered by many as the most disruptive and impactful one in the transition to the circular economy, a model beneficial for clients, materials, energy and companies².

The *product-as-a-service system* could represent a way to call companies to their responsibility and an alternative to a society of overexploitation of resources³. Many pilot projects and companies are exploring the shift from *ownership* to *usership*. The present research aims to understand if, in this shift of ownership and responsibility of products, lies a relevant potential for a more equal society and more responsible companies.

Ownership has a cost beyond the price tag: the things we own use a lot of space, require maintenance along the way, and can be difficult to get rid of. Without systems to take back and reintroduce what we no longer need back into the loop⁴, many products end up in the landfill. Washing machines can stand idle up to 90% of the year just like cars and clothes, while the fashion industry has more than doubled its production output in the last fifteen years as *fast fashion* has boomed in popularity and each item is worn fewer times than in the past.

Car, bike, scooter sharing systems as well as clothes, furniture and electronics tools rentals are popping up in many cities around the world with different results, while sustainable alternatives to ownership in other sectors are slowly increasing. Actually, the sustainability of the benefits of shifting to a rental market is still an object of

² Tukker, A [2004]., *Eight Types of Product-Service System: Eight Ways to Sustainability? Experiences from SusProNet*, Business Strategy and the Environment, 2004, Vol. 13, pp. 246-260.

³ Rau, T., Oberhuber, S., *Material Matters*, Bertram + de Leeuw Uitgevers BV, 2016.

⁴ Webster, K., *Wealth of Flows*, Ellen MacArthur Foundation, 2nd edition, 2017.

discussion. Just recently, it was brought into question in the fashion sector.

Anyway, while the discussion on the long-term sustainability of the product-as-a-service business model is very much open, many startups and companies are taking the plunge by offering access over ownership. Some examples are showing that *disownership* is possible and actually also suited for future living. Key to the success, though, will be the involvement of the consumers and increasing their acceptance towards the adoption of circular alternatives.

All of the above considered, the present research focuses on the *performance economy*⁵ in the white good sector and on its impact on a social and a on business level. Hotels, taxis, office printers, public transport, rental vehicles: performance economy is nothing new and it is in place in many aspects of our life and companies. The research focuses on the case of energy efficient household appliances like washing machines, dishwashers and fridges. High quality and energy efficient white goods, in the cases analysed in this research, are given as a service to people with low income and people living in energy poverty. In the *case studies* people do not pay for the full price of the appliance upfront, they pay a monthly fee for the use of the product, that also includes the maintenance and the delivery/picking up service.

Considering the rising inequalities around the world, the present work tries to understand if and how *disownership* can be a way to fight increasing inequality. In theory *disownership* could allow people with low income to have access to high quality products that they would not be able to afford otherwise. Shifting from products to services could, still in theory, bring a kind of democratisation in society and reduce the so called *poverty premium*. From an environmental point of view, it could imply- it is not a reality yet, if it ever will be- that only the best products are being used and reused and *planned obsolescence* could become, actually, obsolete.

This is only in theory. The reality is much more complex. Many questions are there and the connection of product-as-a-service with inequality has to be explored. Can going beyond the concept of ownership bring more equality and inclusion in our present society? This is the starting point of the whole research project.

⁵ Stahel, W., *The Performance Economy*, Palgrave-MacMillan, 2006.

Elaborating it further and also more practically: how can we make sure consumers- or more precisely users-, especially the ones with a low income or living in poverty, take full advantage of the accessibility of high quality, sustainable and energy efficient products in a circular economy?

Cultural mindshift, behaviour and system change can play a crucial role in it as well as technology. Technology and how it is shaped and delivered to the users is often seen playing a fundamental role⁶ in allowing more people to access the service. Actually technology is not responsible for more or less equality on its own. A much bigger role could be played by the companies and how they position themselves in business and society.

Considering the rise of purpose driven companies and B-Corps on one hand, the expansion of the *performance economy* on the other hand and, finally, the efforts to decrease inequality in society and to reach the UN SDGs, the present research aims to understand if the product-as-a-service is a model that can give people with a low income access to high quality products that they would not have access to otherwise. Also, on the consumer side, the research investigates if the access to high quality and energy efficient appliances changes the sensibility of the users towards sustainability and green choices and if, in the long term, it reduces inequality in society. The research tries also to understand the role of the companies in our societies, their responsibilities on a social and environmental level towards the products and the services they offer on the market.

The first chapter explored the limits of the modern economy, the increasing inequality as well as the poverty premium, the current energy poverty and the transition to a just and inclusive circular economy. The meaning of things, the relation of people with ownership and its burdens are analysed together with the rising of the sharing economy and new consumption models for users and companies. Considering that some scientific literature considers the *performance economy* and the product-as-a-service business models as the ones having the biggest potential in reducing the resource consumption, while having a positive effect on the environment, previous

⁶ Atkinson, A.,B., *Inequality: What Can Be Done?*, Harvard University Press, 2015.

research found out some of the barriers that hinder the consumer acceptance toward the *usership* of the product, instead of the possession.

The second chapter focuses on the companies' side and their role and responsibility in the transition to a circular economy. Starting from the moral economy and the expansion of purpose driven companies, it tries to understand better how the economic system ended up accepting something as counterproductive and counterintuitive- at least from an environmental point of view- as *planned obsolescence* of products. Companies opting for a product-as-a-service business model are increasing in many sectors, from consumer goods to fashion, as also data about diffusion of rental and leasing practices show. The household appliance sector was closely explored as the cases presented in the research belong to the white goods sector.

The third chapter is the core of the empiric research. It is based on two different pilot projects, one ended in 2021 after seven years in The Netherlands and one currently ongoing in the Flanders region in Belgium. Two different partnerships, both having BSH Home Appliances, a BOSCH owned company, among the partners as appliance manufacturer, piloted a circular business model based on the leasing of washing machines, dishwashers, fridges. The maintenance and the delivery/ picking up service were included in the monthly contribution fee requested from the users. Both pilot projects have a specific target group: people in energy poverty in the case of the Papillon project, the Belgium one, and people living in social housing with a subsidised rent for the Besparen in huis met goede apparaten, the Dutch project. The research aimed to identify and map the expectations, the motivations and the satisfaction of the partners and of the participants in the project. The goal was to understand if and how product-as-a-service business models can be a path to follow in order to create a more inclusive circular economy.

On the companies side, through the interviews with representatives of companies like Bosch, Turntoo, Eigen Haard and Samenlevingsopbouw, the research explores the idea that, through giving access to high quality appliances, companies make their machines and products more accessible to all people and, thus, in the long term the product-as-a-service circular business model can reduce inequality in society.

The fourth chapter builds on top on the previous ones and tries to understand more about the empirical results of the research, what are the lesson learned thanks to the pilot projects on the consumers' and the companies' side that can be useful in the next years in order to create circular business models that, aside from considering the environment and the economy, are also inclusive for the people and convenient for those in poverty.

Product-as-a-service business model and the shift in the ownership of the products could be one of the ways through which we can redesign our economy- eliminating waste and pollution, circulating products and materials, and regenerating nature- in order to reduce emissions and meet the targets set out in the Paris Agreement⁷, but it needs to be carefully structured and managed starting also from the issues of privacy, data and freedom.

Fixing the economy to fix climate change is undeniably the biggest challenge we have ahead in our future. How we can achieve that must inevitably pass through the inclusion of the most marginalised and disempowered people in society, bold policy decisions and responsible companies.

⁷ Paris Agreement available at <https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement>.

Chapter 1

Circular economy: rethinking things, possession and inequality

1. Limits of the modern economy: the rise of the circular economy

The modern consumer linear economy has a fundamental flaw, which promotes unsustainable consumption: the more companies make and sell, the more they earn. More materials and products are in circulation, more money the companies make.

However, in the latest years, it has become even more clear that the current production and consumption models are not sustainable for the people, the environment and the companies. Everyday climate change, rising temperatures, increasing number of natural disasters, environmental issues, social inequality and unsustainable economic growth underline the need to reshape our economy and societies. It's necessary to rethink the models and the role of the companies, which

until now have been able to take advantage of the market without being accountable for the *negative externalities* of their actions.

At the same time, companies, big and small, are fundamental actors in the effort to accomplish the 17 Sustainable Development Goals [SDGs]⁸ by the UN by 2030 in order to achieve a better and sustainable future for all. In order to reach these goals, companies need to take responsibility for their use of materials, natural capital and resources as well as their social impact. Some of them have already started⁹.

In the second decade of the 21st century, the hope to create a better economic system, in regard of the impact of the businesses on the environment, has been placed into the shift from a *linear economy*, based on the “take, make, dispose” model of production and on fossil fuels, to a *circular economy*, an approach that, according to one of the most quoted definition from the Ellen MacArthur Foundation, “*defines an industrial system that is restorative or regenerative by intention and design. It replaces the ‘end-of-life’ concept with restoration, shifts towards the use of renewable energy, eliminates the use of toxic chemicals, which impair reuse, and aims for the elimination of waste through the superior design of materials, products, systems, and, within this, business models*”¹⁰.

In the last decade the interest on this shift from a linear towards a circular economy has been rapidly growing and an extensive amount of work, researches and reports have been created [Ellen MacArthur Foundation, 2012; European Commission, 2015; Geissdoerfer et al., 2017; Kirchherr et al., 2017; Prieto- Sandoval et al., 2018].

In the last years many researchers have dove deep into circular economy and its different aspects. According to Ulgiati et al., the ultimate goal of promoting a circular economy is the decoupling of environmental pressure from economic growth. The decoupling is made possible through a regenerative economy able to grow without corresponding increases in environmental pressure. In order to shift to a more

⁸ UN SDGs available at <https://sdgs.un.org/goals>.

⁹ In December 2018 Patagonia changed its company mission statement with ‘*Patagonia is in business to save our home planet*’. <https://eu.patagonia.com/gb/en/company-info.html>.

¹⁰ *Report Towards the Circular Economy - Economic and business rationale for an accelerated transition*, Ellen MacArthur Foundation, 2013, pag. 8.

sustainable and environmental friendly economy, as it is still focused on the economy and on the need of the companies to run their business, system, in circular economy “*success stories also point out the need for an economic return on investment, in order to provide appropriate motivation for companies and investors*”¹¹.

The great majority of the research of the circular economy has been focused on the *circular business models*, which can facilitate corporate innovation towards sustainability and create, at the same time, competitive advantage [Bocken et al., 2014]. Some researchers have connected the business models with the value of the materials and how to keep it in the flow for as long as possible. While linear business models downgrade the value of materials and products after use, circular business models tend to preserve this value at the highest possible state [Velte & Steinhilper, 2016]. The preservation of this value is made possible through the take-back of the used products [Ellen McArthur Foundation, 2015; Lewandowski, 2015] and circular strategies for their life extension like remanufacturing or repair.

Focusing though on the circular business models and their impact and highlighting as the value created by use of a service is central in the circular economy, Tukker suggested the product-as-a-service business model as the most disruptive, impactful in the transition to the circular economy and beneficial for clients, materials, energy and companies¹².

In this circular business model the companies keep the ownership and the responsibility of the products they introduce in the market. Being the products built to last or not, easy to repair or not, the product-as-a-service model could be a way to call companies to their responsibility and a more sustainable alternative to a society of overexploitation of resources¹³.

¹¹ Ghisellini P, Cialani C, Ulgiati S, *A review on circular economy: The expected transition to a balanced interplay of environmental and economic systems*, Journal of Cleaner Production [2015], p. 1, doi: 10.1016/j.jclepro.2015.09.007.

¹² Tukker, A., Eight types of product-service system: eight ways to sustainability?. *Business Strategy and the Environment*, 13[4], 246-260, 2004.

¹³ Rau, T., Oberhuber, S., *Material Matters*, Bertram + de Leeuw Uitgevers BV, 2016.

Companies are crucial actors in building a more environmentally and socially sustainable economy, but they are not alone. Consumers are another important actor of the circular transition. In shifting to the product-as-a-service business model, the involvement of the consumers and their acceptance towards the adoption of circular and sustainable alternatives is fundamental. Looking at the users of the products, in 2019, in the report *Completing the Picture*, the Ellen MacArthur Foundation added finally a note on the role of the consumers, stating that to fully accomplish a circular economy *"A transformation is also needed in the way goods are produced and used, as energy used for production alone contributes to slightly less than half of global GHG emissions"*¹⁴.

The role of consumers brings in the picture the social element of the circular economy. Looking again at the definition of circular economy then, for the topic of this research, it is relevant and helpful the definition given by Kirchherr et al. They define the Circular Economy as *'an economic system that is based on business models which replace the end-of-life concept with reducing, alternatively reusing, recycling and recovering materials in production/distribution and consumption processes [...] with the aim to accomplish sustainable development, which implies creating environmental quality, economic prosperity and social equity, to the benefit of current and future generations'*¹⁵.

In Kirchherr's definition there are the three pillars- environmental, economic and social- that in the definition of the Ellen MacArthur Foundation mentioned above is missing.

The full picture becomes clearer with the entrance of the social element of the circular economy. The 'new' economy, as the circular economy is also defined, is not just about changing our production systems, the materials and the energy we use. To deeply change our economy toward a more circular one, next to the improvement of the present production models, its logistics, its energy usage, it is also necessary to consider the role of the people. It becomes fundamental to change the consumption

¹⁴ Report *Completing the picture: how the circular economy tackles climate change*, Ellen MacArthur Foundation, 2019, p.15.

¹⁵ Kirchherr, J., Reike, D., & Hekkert, M. [2017]. *Conceptualizing the circular economy: An analysis of 114 Conservation and definitions*. Resources, Recycling, 127, pag. 4.

models, which are no longer adequate because of their environmental load and their social inequality, which are two clear indicators of current resource use inefficiency.

As it is possible to understand from the complexity of the topic, the circular economy has a broad underlying interdisciplinary framework. While the economic and the environmental element of the circular economy are often at the centre of the conversations, Merli et al. call for a greater attention to be assigned to the strategies for social and institutional changes, strategies that should also be able to transform the upstream process of production and consumption with a radical change of consumption and production patterns. As Merli et al. state *"Considering business model strategies, scholars mainly focus on studying closing material loops strategy, while slowing the loops, which requires a radical change of consumption and production patterns, is only marginally included with respect to CE implementation"*¹⁶.

The recent comprehensive review of the academic literature on the circular economy by Merli et al. clearly points out an important research gap: current academic discourses focus primarily on business models, cleaner production approaches and optimising performance and efficiency, but only marginally consider social and institutional implications.

The researches on the social consequences of circular economy and how to connect circularity and inclusivity are at the very beginning. Some initial discussions about the benefits and guiding principles of an inclusive circular economy are starting to emerge inside and outside the academic research. In particular, Alexandre Lemille highlights the need for a Circular Economy 2.0 or a Circular Humansphere that integrates the end of inequality and financial exclusion. Considering especially the dichotomy between ownership and usership connected with the product-as-a-service business model, Lemille sees circular economy as a way to end the *"inequality of economy access where current barriers to entry to our global markets are very high: ownership of goods, obsolescence of products, price-as-sole-reference for the "TruValue" [in reference to the TruCost method] of anything we create, scarcity of prime resources"*.

Leaving aside the more appropriate and environmentally sound use of resources, it is

¹⁶ Merli R., Preziosi M., Acampora A., *How do scholars approach the circular economy? A systematic literature review*, *Journal of Cleaner Production* 178, 2017, pag. 703.

relevant for the goal of this research to understand how, on one side, this new more sustainable economy is characterised by circular business models and innovative employment opportunities [Ellen MacArthur Foundation 2012; Stahel 2014], as well as, on the other side, by enhanced wellbeing and clear impacts on equity within and among generations, considering both resource use and access.

Actually, many have underlined how the unbreakable link between *environment* and *social equality* is strong and noteworthy. Already in 1987, the World Commission on Environment and Development stated “*A world in which poverty is endemic will always be prone to ecological and other catastrophes*”¹⁷.

It is clear that the social aspect of a circular economy is very well tight with a more equal and environmentally sustainable society. The current linear economic system creates extreme forms of inequality, as we can observe on a daily basis in today's societies. The risk we are running in shaping a new regenerative economy is to repeat again the same mistake- to build a world of deep inequalities- if we don't manage and plan for more equality and inclusion in some ways.

This is an open issue pointed out also by the United Nations Industrial Development Organisation [UNIDO]. In its recent report on Circular Economy¹⁸ UNIDO shows concern around the fact that “*while circular economy takes into account two pillars of sustainability—environmental and economic performance—it risks leaving out an essential third pillar: inclusiveness. Simply put, the circular economy could cut poorer countries out of the global supply chains they've worked so hard to enter*”.

As seen until now the shift to a circular economy promises to solve environmental concerns and to lead us to a regenerative future while cutting waste out. Together with useless waste, a circular economy for all people would cut out poverty and inequality. To better understand how crucial the topic is for the future societies, next paragraphs show how social inequality and its connection with environmental issues

¹⁷ World Commission on Environment and Development, 1987. Our Common Future Report available at <https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf>.

¹⁸ Circular Economy - United Nations Industrial Development Organization available at https://www.unido.org/sites/default/files/2017-07/Circular_Economy_UNIDO_0.pdf.

is an unavoidable topic to create a more equal and fair society.

2. Increasing inequality: social and environmental consequences

“By now, inequality is ballooning in almost every developed country. In the U.S., the gap between rich and poor is already wider than it was in ancient Rome- an economy founded on slave labor. In Europe, too, there’s a growing divide between the haves and the have-nots.” [Rutger Bregman]¹⁹

In modern societies, as inequality is increasing and the gap between people able to afford some things and others that are not is broadening, it becomes more relevant to focus attention on the people in their role as consumers/ users and on their access to things and services.

Among other authors, Joseph Stiglitz in *The Price of Inequality* and Kate Pickett and Richard Wilkinson in *The Spirit Level* have identified many instrumental reasons why people should be concerned about inequality. They argue that we should reduce inequality of outcome because it has negative consequences for the society: according to the authors mentioned above, increased inequality is at the roots of the lack of social cohesion, increased crime, ill-health, teenage pregnancy, obesity, and many other social problems.

Global extreme poverty is expected to rise in 2020 for the first time in over 20 years as the disruption of the COVID-19 pandemic compounds the forces of conflict and climate change. According to the World Bank Group today there are 689 million people still living below the poverty line- less than \$1,90 a day. Half of the poor are children. Women represent a majority of the poor in most regions and among some age groups. About 70 percent of the global poor aged 15 and over have no schooling or only some basic education. On top of it, 200 million women do not have access to a responsible motherhood system and 100 million people will be in a state of extreme poverty by 2030 if serious climate change actions are not taken soon. About 132 million of the global poor live in areas with high flood risk, while 700 million people

¹⁹ Bregman, R., *Utopia for Realists: And How We Can Get There*, Bloomsbury Publishing, 2014.

living in the regions most vulnerable to the consequences of climate change, territories that are affected by floods, droughts, rising sea levels²⁰.

Between 1988 and 2008, the majority of the countries worldwide experienced a growing inequality within their borders, with the consequent disappearance of the middle classes. Over those same 20 years, global inequality fell slightly overall [mostly because the poverty rates fell in China], but it increased significantly at the extremes. In the 1980s, the richest 10% of the population in OECD countries earned 7 times more than the poorest 10%, while now they earn nearly ten times more. Considering other forms of wealth, the situation does not look any better: in 2012, the richest 10% controlled half of all total household wealth and the wealthiest 1% held 18%, compared to only 3% for the poorest 40%²¹.

Also from a macro perspective, inequality levels are impressive: the seven countries included in the G7 together account for about 60% of the world's net wealth, 40% of its production and only 10% of its population. In August 2019, at the G7 summit in Biarritz, in France, the leaders of the G7 countries had to face and discuss the challenge of inequality in the world. The phenomenon could be measured not only in terms of income, but also in terms of access to education, health care and even drinking water and its effects go far beyond undermining the strength of the nations. In fact, according to Zamagni, in addition to the inhuman pain inflicted on people, inequality makes the status quo unsustainable, justifiably fuelling popular protests that destabilise the democratic framework of many countries and erode their social capital.

Also looking at the national level, long at the forefront of research on inequality, Atkinson [2015] and Piketty [2014] have demonstrated that, despite the post-war tax and the welfare settlements had a levelling influence, by the 2010s the high income countries of North America and Western Europe have returned to pre 1914 levels of income and wealth inequality. Inequality is a common problem of the most advanced

²⁰ World Bank Group, Poverty and Shared Prosperity 2020 Report, available at <https://www.worldbank.org/en/publication/poverty-and-shared-prosperity>.

²¹ Keeley, B. [2015], *Income Inequality: The Gap between Rich and Poor*, OECD Insights, OECD Publishing, Paris. <http://dx.doi.org/10.1787/9789264246010-en>.

economies, and also a common threat to their stability.

Already in 2014 the rising inequality, particularly within the advanced economies, was one of the topics of the treatise on 'Capital in the Twenty-first Century' by the French economist Thomas Piketty. While there is considerable evidence of reduced inequality between nations [IMF, 2017], within advanced nations the situation is different. Piketty and his colleagues [Piketty, 2014; Piketty et al., 2017] have shown that the post-tax income of the richest percentiles of the US population received a rising share of the national income over the past half century. By 2015, the richest 10% of the population received almost 40% of the national income, higher than at any time since 1945. The post-tax income share of the richest 1% had risen even faster than that of the top 10%, and by 2015 stood at over 15% of the national income, higher than at any point since 1940.

In his book *Inequality - What can be done?* [2015], Atkinson puts forward fifteen concrete proposals in order to reduce inequality and balance the wealth distribution in the society. Differentiating between *pre-distributive policies*- those that act on the endowments and opportunities of life of individuals- and *redistributive policies*- those that modify the prevailing rules of the system-, Atkinson suggests that tax systems has to be progressively modified and that tax evasion has to be counteracted through the closure of tax havens. Other proposals aim to implement targeted human capital investment plans, to adopt a minimum wage of people, to include a specific distributive clause in competition law, to intervene in inheritance matters to adjust the intergenerational transmission of inequalities.

Atkinson and Piketty are not the only ones trying to understand how to reduce inequality. In a recent interview, also the Nobel Prize in Economic Sciences Robert Solow²² suggested that inequality "*now it's just a topic you can't ignore. Society has changed. And one of the ways in which the society has changed is, as everyone now knows, [we have] vastly more inequality than we used to have. This great inequality of wealth should concern everybody, because it can't help but influence or control politics. One of the things you can buy with vast wealth is votes in Congress. It's going to affect*

²² The productive career of Robert Solo available at <https://www.technologyreview.com/s/614860/the-productive-career-of-robert-solow/>.

legislation that affects the labor market and property, not to the advantage of wage earners”.

While Solow concerns mostly about the risks of inequality connected with unbalanced power and politics, other authors like the epidemiologists Richard Wilkinson and Kate Pickett looked at a series of health and social issues across OECD nations. They argue that the benefits of equality do not have consequences only for the less fortunate members of society. Inequality has damaging impacts across the nation as a whole. Wilkinson and Pickett studied a set of high-income countries in their 2009 book, *The Spirit Level*. They found out that inequality, and not wealth, has the most effects on social welfare of the rich nations.

Even more relevant for the topic of this research, Kate Raworth, in her *Doughnut Economics*, highlights the connection between environment and inequality, by linking extreme social inequalities and severe ecological degradation and saying *“to put it bluntly, these trends echo the conditions under which many earlier civilizations have collapsed”*²³.

According to Raworth, inequality, social capital and ecological degradation are all connected:

*“Societies can be deeply undermined by income inequality. [...] Higher levels of national inequality, it turns out, also go hand in hand with increased ecological degradation. Why? In part because it fuels status competition and conspicuous consumption, summed up in the only-half-joking US bumper sticker, ‘He who dies with the most toys wins’. But also because it erodes the social capital that underpins the collective action needed to demand, enact and enforce environmental legislation. And social norms – such as using less water during a summer drought, or recycling household waste – are far more likely to be adhered to in a society that regards itself as a community of peers”*²⁴.

According to Raworth, reversing the widening gaps of income and wealth is

²³ Raworth K., *Doughnut Economics: Seven Ways to Think Like a 21st-Century Economist*, Chelsea Green Publishing, 2017, p. 132.

²⁴ *ibid.* p. 144-145.

fundamental in order to get into the Doughnut. Her the fifth way to think like a 21st-century economist according to Raworth is “Design to distribute - From ‘growth will even it up’ to distributive by design”. Raworth states:

“At the start of the 21st century, we have transgressed at least four planetary boundaries, many millions of people live in extreme deprivation, and the richest 1% owns half of the world’s financial wealth. These conditions could be driving us towards collapse. If we are to avoid such a fate for our own civilization, we need to transform the current global economic system from one that is divisive and degenerative to one that is distributive and regenerative by design”²⁵.

Also the UN Department of Economic & Social Affairs published a Working Paper in 2015 that investigates the negative correlation between income inequality and environmental quality. It suggests that inequality has a bad impact on environmental outcomes through several channels. The findings of the paper show that the reduction of inequality will have an important role in achieving environmental sustainability. Looking mostly at main four channels [household, community, national, and international], the paper found that:

“The rich tend to consume and pollute more than the poor, and hence redistribution of income in favour of the poor households has the potential to be more favourable for the environment. The concrete outcome however depends on several other factors. The community channel works through the role of equality in facilitating collective effort necessary for the protection of common property [environmental] resources”²⁶.

While much attention in recent years has been focused on how income inequality is connected with economic growth and social development, the link of income with environmental sustainability has remained relatively unexplored. Yet, there is some empirical evidence demonstrating that income and wealth inequality can negatively impact environmental sustainability.

²⁵ *ibid.* p. 132.

²⁶ Islam Nazrul S., *Inequality and Environmental Sustainability*, UN DESA Working Paper no. 145 ST/ESA/2015/DWP/145, 2015, p. 24.

The rich, even though they represent a small social group in terms of number of people, can often move national decision making towards their own interests, which may be closer to policies that are negative for the environment. Also, inequality of political power deriving from income inequality may allow the rich to 'dump' pollution on disempowered people, while they can protect themselves from the consequences of pollution in different ways. As an outcome, income inequality may generate a society with a higher aggregate level of pollution than would have been possible in a more equal society.

Evidence shows that greater income inequality is associated with greater loss of biodiversity. Recent studies highlighting this relationship include Mikkelsen, Gonzalez, and Peterson [2007] and Holland, Peterson, and Gonzalez [2009]. Based on the results, the authors of this study conclude that *"a 1% increase in the Gini ratio is associated with an almost 2% rise in the number of threatened species"*²⁷.

Another example of a negative correlation between income inequality and environmental outcome has been discovered looking at the consumption behaviour. Dorling and other researchers examined the relationship of income inequality with personal consumption and generation of waste among affluent countries [Dorling 2010a, 2010b, 2011 and Dorling, Barford, and Wheeler 2007]. Their findings show that rich countries with higher inequality use more resources and produce more waste per person.

An earlier study from Boyce, in 1994, focused on the same topic. Boyce found that the level of an environmentally degrading activity depends on the balance of power between the winners, who get the net benefits from the negative activity, and the losers, who stand the net costs. The more powerful the winners are in the power balance, the more environmental degradation occurs. Greater inequalities of power and wealth lead according to Boyce to bigger environmental degradation for three main reasons: the excess of environmental degradation driven by powerful winners is not compensated by the environmental degradation prevented by powerful losers; inequality increasing the valuation of benefits harvested by the rich and powerful

²⁷ Mikkelsen, G. M., Gonzalez, A., & Peterson, G. D., *Economic Inequality Predicts Biodiversity Loss*, PLoS ONE, 2007, p. 2.

winners relative to costs dumped on the poor and less powerful losers; and, finally, inequality increases the rate of time preference given to environmentally damaging resources by the poor and the rich by increasing their poverty and political insecurity, respectively.

From what we have seen until now, it becomes more clear the link between inequality and the social and the environmental risks connected to it. As we are also discussing the limits of the modern economy and of the construction of a new economic order- the *circular economy*-, which might involve more responsible companies and more aware consumers, it is also very important to understand the link between inequality and economic growth. In doing so, it becomes useful to go back to Piketty and to his bestselling work *Capital in the Twenty-first Century*.

The French economist argued that rising inequality was a direct and inevitable effect of the declining growth rate. On the contrary, the reduced inequality in the societies through the first half of the 20th century was a result of the rising economic growth, built on increased labour productivity. This is the idea behind what became known as '*trickle-down theory*': the hypothesis that economic growth is the best way to reduce the inequality that divides society and undermines political solidarity. According to Piketty then, inequality is an unavoidable element of societies with a slow growth rate.

Not everybody agrees with Piketty. According to Tim Jackson the idea that rising income inequality is an inevitable consequence of falling growth rates is incorrect. Jackson affirms that under the appropriate conditions, an economy with a declining growth rate might equally be leading towards lower income inequality and greater stability of employment. Jackson connects inequality with the "*growth fetish*" in his paper *The Post-growth Challenge: Secular Stagnation, Inequality and the Limits to Growth* where he says:

"The rising inequality and political instability witnessed recently in advanced economies is neither an accidental aftermath of the financial crisis nor an inevitable result of declining growth rates. Rather, these phenomena are a direct consequence of continuing to cling to the 'growth fetish', at a time when economic [and resource] fundamentals are

pointing in a different direction. The 'post-growth' challenge of the title is not so much about trying to 'turn growth off' but rather about protecting social progress and environmental integrity in the face of what some well-known economists are now prepared to call the 'new normal' [Summers, 2014; Galbraith, 2014; Storm, 2017]"²⁸.

Also Kate Raworth is of the same opinion:

"In the 20th century, one simple curve – the Kuznets Curve –whispered a powerful message on inequality: it has to get worse before it can get better, and growth will make it better. But inequality, it turns out, is not an economic necessity: it is a design failure"²⁹.

If inequality is a by-product of the economic system built in the last centuries, in order to reduce or erase it, it is crucial to rethink growth and prosperity then. For Jackson the '*growth fetish*', which has dominated Western political thinking for over half a century, lies at the heart of the problems that advanced economies are now facing. The push for endless growth has to be blamed for delayed ecological innovation, exacerbated financial instability and reinforced inequality. This goal of endless growth has continued to benefit the few for the past decades, but, looking at the current situation, it is not anymore a valid strategy to ensure a better life for the many.

In order to reduce inequality, it is necessary to shape an inclusive and fair economy. Because, actually, a lot of people in modern societies are left behind also by old and illogical burdens, that weigh only on the low income people contributing to their exclusion from the society. One of these burdens is the so-called *poverty premium*.

3. The Poverty Premium

According to the Italian economist Stefano Zamagni what makes poverty intolerable today *"is the fact that it is not the consequence of a global 'production failure', of an inability of the production system to ensure what is necessary for everyone. It is not,*

²⁸ Jackson T., *The Post-growth Challenge: Secular Stagnation, Inequality and the Limits to Growth*, Ecological Economics 156, 2019, p. 237.

²⁹ Raworth K., *Doughnut Economics: Seven Ways to Think Like a 21st-Century Economist*, Chelsea Green Publishing, 2017, p. 27.

*therefore, the scarcity of resources, on a global level, that causes hunger and various deprivations. Rather, it is an 'institutional failure', that is, the lack of adequate economic and legal institutions, the main factor responsible for this"*³⁰.

The institutional failure that Zamagni mentions in the quote above is responsible for some burdens that make poverty even less acceptable. The term *poverty premium* is the notion that the 'poor pay more' for essential goods and services. Created by the American sociologist David Caplovitz in 1963, it is used to describe the phenomenon according to which poor people tend to pay more for essential goods and services because they lack the consumer options that people with medium and high income have.

The essential goods and services for which poor people might pay more could include:

- Additional costs directly resulting from having a low income, for example because it lowers the flexibility of the payment methods;
- Additional costs connected with a low income even though not directly resulting from it, as it could be the additional chance that someone with low-income lives in a high-crime area where insurance premiums are higher;
- Additional costs that all people across income groups can experience, but that lower-income households are more likely to experience, like not being able to choose among different utility tariffs, and which place a disproportionately high burden on low-income households' resources.

The phenomenon, even if it is visible in many different countries, has been particularly explored and studied in the UK. Save the Children, in the UK Poverty Rip Off report of 2010, shared the challenges that affect families putting their children's

³⁰ Zamagni Stefano, *La disuguaglianza strutturale nella stagione della rivoluzione digitale*, I quaderni dell'economia civile n.6, Aiccon, p. 8.

T. from Italian text: *"È risaputo che la povertà [assoluta] non è una tragica caratteristica di questi tempi, ma ciò che la rende oggi scandalosa e, perciò, intollerabile, è il fatto che essa non è la conseguenza di una "production failure" a livello globale, di un'incapacità cioè del sistema produttivo di assicurare il necessario per tutti. Non è pertanto la scarsità di risorse, a livello globale, a causare fame e deprivazioni varie. È piuttosto una "institutional failure", la mancanza cioè di adeguate istituzioni, economiche e giuridiche, il principale fattore responsabile di ciò".*

health at risk because they end up paying more than for their wealthier peers for some services such as energy, cookers and household items, credit and insurance. Lack of access to the best online prices, bank accounts and managing their budget via cash all together are some of the reasons that force the poorest families to accept the worst deals around. In the report that was a call for eradicating the poverty premium, Save the Children invited the government intervention in the utilities, financial and food sector. The report explored the poverty premium connected with higher prices paid for energy bills and fuel, water bills, cash machines, bank account, insurances and food.

The research from the University of Bristol "*The Poverty Premium – When low-income households pay more for essential goods and services*"³¹ calculated that the average annual poverty premium per low-income household in the UK in 2016 was £ 490 per year with peaks of £ 1,680.

The report considered what people with a low income pay for goods and services in comparison with those with higher income for not switching to the best fuel tariff, for not paying by cheapest billing method, for premiums related to where people live, for using high cost for credit or for paying to access money or to receive paper bills. It does not take into account the times in which low-income households avoid paying poverty premiums simply because they can't afford to and instead go without. Of course not all low-income households experience all the components of the poverty premium.

The research identifies two main sets of factors which play a crucial role in low-income households paying more: demand-side factors which reflect a low-income household's preferences, needs and circumstances; and supply-side factors which show how supply markets shape the choices available and decide particular costs associated with some services [see Fig. 1]. Finally, there is a third set of factors that is not placed clearly on either the demand or the supply side as it is possible to see in the graphic below.

³¹ Davies S., Finney A. and Hartfree Y., *Paying to be poor: uncovering the scale and nature of the poverty premium*, University of Bristol's Personal Finance Research Centre, 2016 www.bristol.ac.uk/geography/research/pfrc.

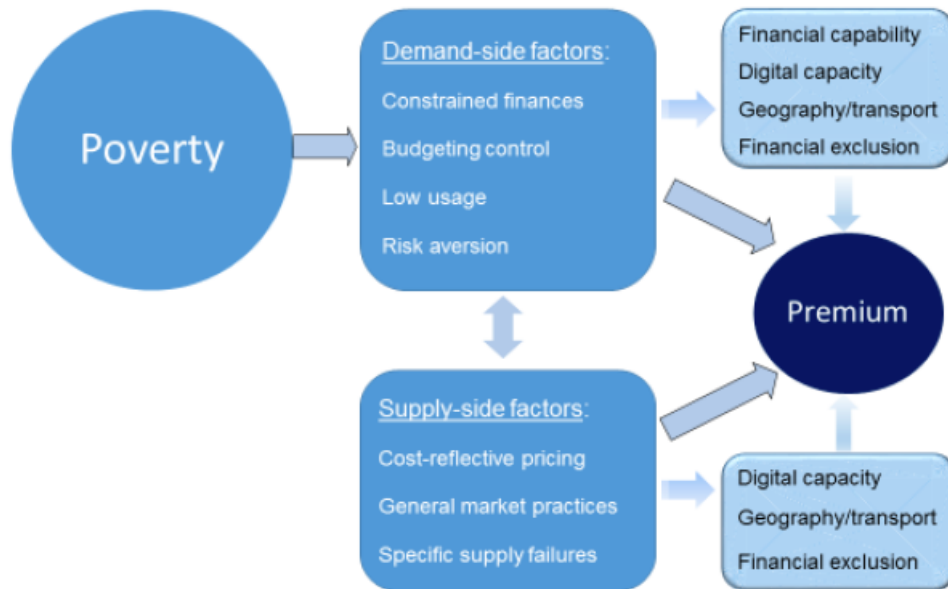


Fig. 1 Conceptual framework for understanding pathways to the poverty premium.

Source: Davies S., Finney A. and Hartfree Y., *Paying to be poor: uncovering the scale and nature of the poverty premium*, University of Bristol's Personal Finance Research Centre, 2016
www.bristol.ac.uk/geography/research/pfrc, p. 23

Those factors that create the *poverty premium* need to be taken into account once again today when we look at the services economy. The product-as-a-service business model that promotes the use against the ownership creates a system in which many people are easily included and can take full advantage of the services. At the same time, though, other groups of people for many reasons are not able to enjoy the offer. The reasons can be connected with income: the service economy often leaves behind people that don't own a credit card or of a bank account. Many of these services have a geographic coverage and reach only people living in big cities, cities or city centres.

Thinking about the geographical distribution of the services, the shape of the areas that are served makes a brutal distinction between the group of people that is in and the group of people that is out. And this is just looking at the city areas, without considering remote and marginal towns.

The same considerations can be made thinking about public transports: where people live and the lack of private means of transport make a big difference in the goods and services households are able to access and thus the higher or lower price they pay for reaching a certain destination.

As the service economy rethinks the concept of ownership, it would be relevant to create an inclusive and fair society if it also reduces inequality and counterbalances the *poverty premium*. The great societal challenge that *disownership [usership]* brings is to allow people, and in particular the low-income ones, to access high quality products that they would not be able to afford otherwise. In rethinking the concept of ownership businesses, governments and policies can decide to focus on inclusion and wealth of the low income groups of people. The result of the adoption of a circular business model with the shift from product to service could lead to a kind of democratisation as the tools and the services are accessible to the people that could benefit them the most. Before looking at the potential- definitely not obvious- outcomes of the shifting from ownership to usership, next paragraph explores more the issue of poverty and energy poverty, trying to give a better understanding of the bigger picture.

4. Poverty and energy poverty

The Sustainable Development Goals Report 2021 by the UN is not much positive about the reduction of inequality, especially after the outbreak of COVID19 crisis, as shown by the adjacent image (see Fig. 2).

There is a crucial consideration that needs to be underlined around energy poverty and fair and inclusive transition to a circular economy. People with a low income or living in poverty, as also shown by the Papillon project and by the Towards an inclusive energy transition in the European Union: Confronting energy poverty amidst a global crisis (2020) report of the EU Energy Poverty Observatory, are forced to be sustainable. The heating use is reduced to the minimum as well as the usage of light and of appliances if there are there. The amount of showers and, thus, the use of water in these contexts is less because of economic problems. People living in poverty live ecologically to keep their energy bills as low as possible.

In weeks in which the public opinion and the European governments are facing the issue of increasing electricity bills and critical gas supply, it is important to keep in

mind that the problem of inefficient and energy guzzler appliances implies also to look at the bigger picture. It means to consider the energy poverty issue that an increasing amount of people are experiencing around the world also due to COVID19 crisis. Energy poverty can affect individual households that are more vulnerable or marginalised from the rest of society, or it can affect entire neighbourhoods or rural communities that collectively may not have access to energy services.

Energy poverty- a situation where a household cannot meet its domestic energy needs- is subject to increasing policy attention within the European Union. Alleviating energy poverty is a key precondition for achieving a just transition towards sustainability. Also, truly fighting energy poverty that is strictly linked to the *premium*

poverty (as seen in previous paragraph) requires a deep understanding of the customer's problem and underlying needs.

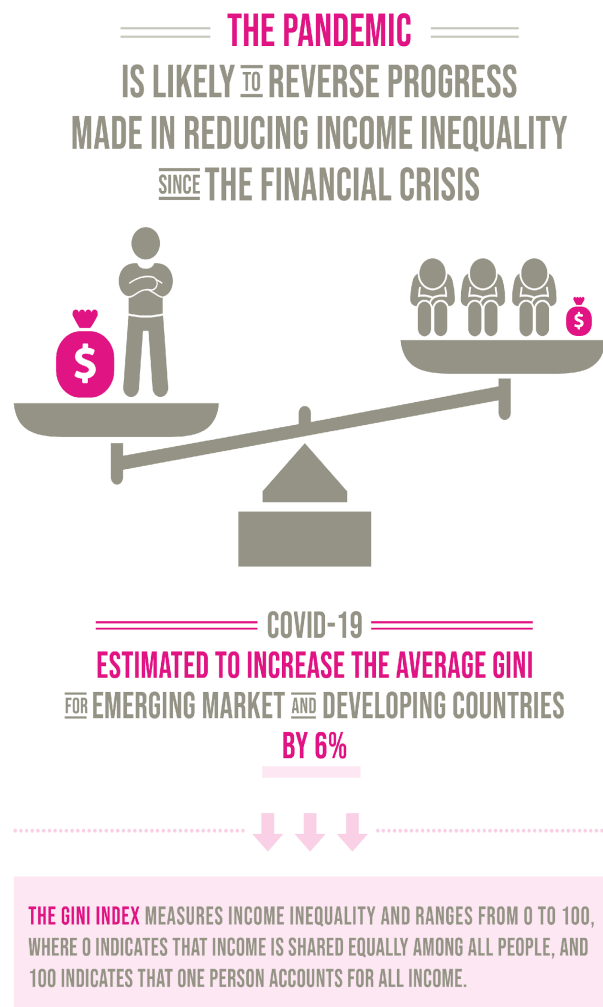


Fig. 2 The impact of the pandemic on income inequality. Prior to COVID-19, the average Gini index for emerging market and developing countries had been falling. However, the World Economic Outlook, October 2020 of the International Monetary Fund estimates that COVID-19 will increase the average Gini index for these countries by 2.6 points to 42.7 (a 6 per cent increase). This will reverse the fall in inequality since the global financial crisis in 2007–2009. For low-income countries, the impact is projected to be even larger, despite the fact that those countries made less progress in reducing inequality since 2008. Source: The Sustainable Development Goals Report 2021

According to the EU Energy Poverty Observatory³², in 2018 37.4 million people were unable to keep their home warm while 33.8 million people had arrears on their utility bills in Europe³³. Looking at the Italian situation, in 2018, 14.1% of households reported that they were unable to keep the home adequately warm which is significantly higher than the corresponding EU average at 7.3%. Conversely, for 2018, 4.5% were unable to pay their utility bills on time due to financial difficulties, while the respective EU average is 6.6%³⁴.

This is an interesting element to highlight because it has social, economic and health effects. There is an increasing body of empirical evidence from an economic perspective showing a relationship between energy poverty and poor general and mental health (Churchill and Smyth 2020; Llorca et al. 2020; Kahouli 2020; Rodríguez-Álvarez et al. 2019; Thomson et al. 2017; Grey et al. 2017; Lacroix and Chaton 2015). Poor health may cause energy poverty and energy poverty may cause poor health. This suggests that fighting energy poverty in society could decrease the stress on the health system and become a very handy tool for policy makers.

Developing policy measures for the eradication of energy poverty represents a meaningful paradigm shift that requires decision makers to focus on the intended impacts of energy-use in addition to the supply-side. As the United Nations Secretary-General António Guterres called on all governments to cooperate on a just, inclusive and sustainable energy transition at Friday's High-Level Dialogue on Energy on September 24th, 2021 declaring *"We have a double imperative – to end energy poverty and to limit climate change. And we have an answer that will fulfil both imperatives: Affordable, renewable and sustainable energy for all"*³⁵.

Energy poverty and climate change are seen in the context of the UN as intimately connected twin crises as well as accelerating actions towards clean, affordable energy for all will reduce emissions and provide energy to the 759 million people who presently lack access to electricity and the 2.6 billion who cook with unhealthy fuels.

³² EU Energy Poverty Observatory <https://www.energypoverty.eu>.

³³ EU Energy Poverty Observatory - Towards an inclusive energy transition in the European Union: Confronting energy poverty amidst a global crisis (2020) report available at [ENERGY POVERTY](#).

³⁴ EU Energy Poverty Observatory - [Member State Report Italy](#).

³⁵ Dialogue available at [High-level Dialogue on Energy | UN Web TV](#).

If energy poverty is a worldwide problem, there are differences across developed and developing regions as well as within countries. Whereas most developed countries may have high equitable access, they may not have adequate policy measures in place to guarantee a high sustainability and resilience of energy services needed by all households.

Developing countries, by contrast, may also have low equitable access in entire territorial units that reflect uneven infrastructure development, ineffective institutions, and insecure enabling environment for private sector investment.

In many cases, developing countries do not have access to washing machines and electronic appliances in the first place, thus circular business models like product-as-a-service are far from becoming a reality as well as a perceived need while a shared community system of tools, like a library of tools, or a appliances system used by more units might be more likely to be relevant.

Looking at the Indian case, for example, the demand for washing machines is mostly in urban areas, which account for a major percentage of sales. Residents in urban areas consume in quite different ways than those who live in rural areas. In the country, the use of washing machines is rapidly increasing because of growing family incomes, improved technologies, an increase in the number of nuclear families, rising personnel expenses, a rising tendency of working women, and the availability of consumer credit in urban areas.

Washing Machine Penetration Rate in India, By Urbanization, 2020



Fig. 3 Washing machine penetration rate in India and comparison between urban and rural areas. While in the urban India washing machine are diffused 6 times (20%) more than in rural India (3%), in the whole country only 8% of the households have a washing machine. Source: Statista, *White goods penetration rate among electrified households in India in 2020, by urbanization*, 2021.

In total, 8% of the households in India have a washing machine: while in the urban areas 20% of the households has the appliance, in the rural areas only 3% of the households has a washing machine.

All these data and considerations show that shaping an inclusive circular economy and transitioning to more sustainable practices worldwide are undeniably huge societal challenges and that one answer does not fit all.

5. The transition to a just and inclusive circular economy

In a TED Talk from July 2020³⁶ about how city mayors are taking action on climate change, Eric Garcetti, mayor of Los Angeles and chair of C40 Cities, claimed that *'shade is an equity issue'* implying that, around the world, the poorest and the most marginalised communities live in areas with no trees and high levels of environmental degradation and pollution. Once again, this is the proof that environmental issues almost always touch on social inequalities. The lack of shade in some contexts is an indicator of many other neglected ecological injustices. Turning cities into greener space must mean bringing nature and a clean environment to the underserved. The same kind of consideration can be made thinking about the circular economy and the most marginalised groups in our society.

Many social and political issues have so far been neglected in planning for the circular economy transition. As well as in the contexts of low-carbon transitions and digitalisation of the economy, considerations of justice- also intergenerational justice as pointed out by the philosopher Roman Krznaric in his *The Good Ancestor*³⁷- and social equity are as important for the circular economy transition.

Climate justice can not be ignored by policy makers and companies. The UN 2030 Agenda demonstrates that environmental, social and economic sustainability objectives cannot be separated from each others. As the links between the environmental issues of climate change, overconsumption of resources and waste generation, and social issues of inequality and the future of work become increasingly

³⁶ TED Talk, [How city mayors are taking action on climate change](#), 2020.

³⁷ Krznaric, R., *The Good Ancestor How to Think Long Term in a Short-Term World*, WH Allen, 2020.

obvious, the urgency to connect environmental with social justice is gaining in significance.

The concept of a '*just transition*', that refers to a transition that ensures environmental sustainability, decent work, social inclusion and poverty eradication, in the last years has entered the debates and research on sustainability policy. The focus on '*just transition*' entered especially in the contexts of climate change and low-carbon energy transition.³⁸ The term and the concept of '*just transition*' brings together concerns about social justice in the transition to a sustainable economy and society.³⁹ A just transition is needed to reduce inequalities within and between countries, and to ensure that the commitment of the UN Sustainable Development Goals to leave no one behind is fulfilled. Just transition is important not only from an ethical perspective; it is also critical in ensuring the long-term sustainability of the transition process itself. If until now the concept of just transition has mainly been applied in the context of low- and zero-carbon transitions, the same principles and considerations are relevant as well for the circular economy transition.

A just transition to a circular economy has to happen among the people in the same country as well as considering the different countries. The joint declaration of the European Alliance for a Just Transition⁴⁰ calls for participation and social and civil dialogue and the integration of a strong social dimension into all policies while ensuring that they are delivering on the climate and biodiversity objectives. Social and environmental issues and objectives are once again intertwined. Also, the New European Bauhaus, launched last year from the European Commission- even though it aims mostly at the building sector-, is based on three main pillars: beauty, sustainability and inclusion.

A Just Transition to the Circular Economy (JUST2CE) is an Horizon 2020 program just started in September 2021, based on the assumption that a critical evaluation of the CE paradigm, of its economic, societal, gender and policy implications, and of the outcomes of its implementation has not been conducted yet. JUST2CE aims at

³⁸ *Promoting a Just Transition to an Inclusive Circular Economy*, Chatham House, 2020.

³⁹ Heffron, R. and MaCauley, D. (2018), 'What is the 'Just Transition'', *Geoforum*, 88, pp. 74–77, <https://www.sciencedirect.com/science/article/pii/S0016718517303287>.

⁴⁰ European Alliance for a Just Transition <https://alliancejusttransition.eu>.

understanding, in a critical and thoughtful way, under which conditions a responsible, inclusive and socially just transition to a circular economy is possible and desirable, what technical, geopolitical and social factors can enable or hamper such transformation and how these aspects can contribute to the development of transitional policy measures.

Considering all the above, a just transition to a more circular economy is connected as well to changing business models in order to fulfill the needs of a broader and increasing population. With that in mind, the current research explores if the leasing model- product-as-a-service- can help poor and disempowered people access to high quality products.

The transition to a circular economy, however, cannot happen without considering the huge differences in the society and, once again, without looking at the bigger picture when thinking about issues like pollution and climate change. People with low income or living in poverty, included the participants in the two pilot projects objects of the present research- the Dutch *Besparen in huis met goede apparaten* and the Flemish *Papillon* project- are not the biggest consumers of materials, products and services nor the biggest CO₂ emitters in the society.

Climate change is, first of all, caused by the insane consumption of the richest people in our global society as it is evident in the Oxfam Report *Extreme Carbon Inequality*⁴¹ from 2015. According to the report, the 50% of global lifestyle emissions are emitted by richest 10% of the population, the 90% of global emissions by richest 50% of the population, while the poorest 3.9 billion people emit only 10% of the CO₂ emissions⁴².

Even further, *Confronting carbon inequality*, a 2020 report by Oxfam and the Stockholm Environment Institute (SEI) that aims to put climate justice at the heart of the COVID-19 recovery, reveals that the extreme carbon inequality in recent decades has driven the world to the climate brink. From 1990 to 2015, a critical period in which annual emissions grew 60% and cumulative emissions doubled, the richest 10% of the world's population- around 630 million people- were responsible for 52% of the cumulative carbon emissions – depleted the global carbon budget by nearly a third (31%) in those 25 years alone. That happened while the poorest 50%- 3.1

⁴¹ Oxfam, [Extreme Carbon Inequality](#) Report, 2015.

⁴² Oxfam, [Confronting carbon inequality](#) Report, 2020.

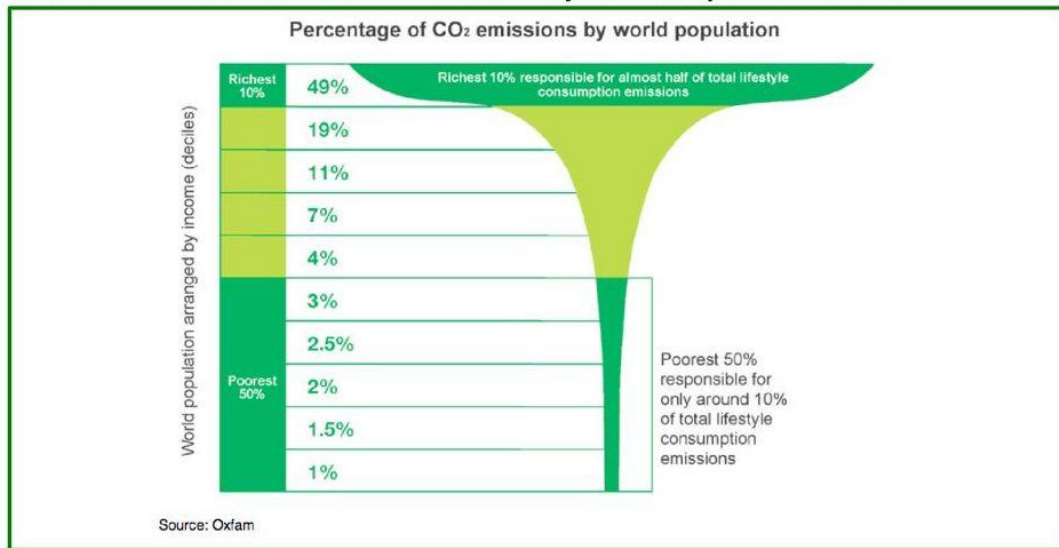


Fig. 4 The image shows the connection of the world population arranged per income (deciles) with the percentage of the carbon dioxide emission by world population due to lifestyle consumption.

Source: Oxfam, [Extreme Carbon Inequality Report](#), 2015, p. 4.

billion people circa - was responsible for just 7% of cumulative emissions, and used just 4% of the available carbon budget. The richest 1%- 63 million people circa- alone was responsible for 15% of cumulative emissions, and 9% of the carbon budget – twice as much as the poorest half of the world’s population. The richest 5%- around 315 million people- was responsible for over a third (37%) of the total growth in

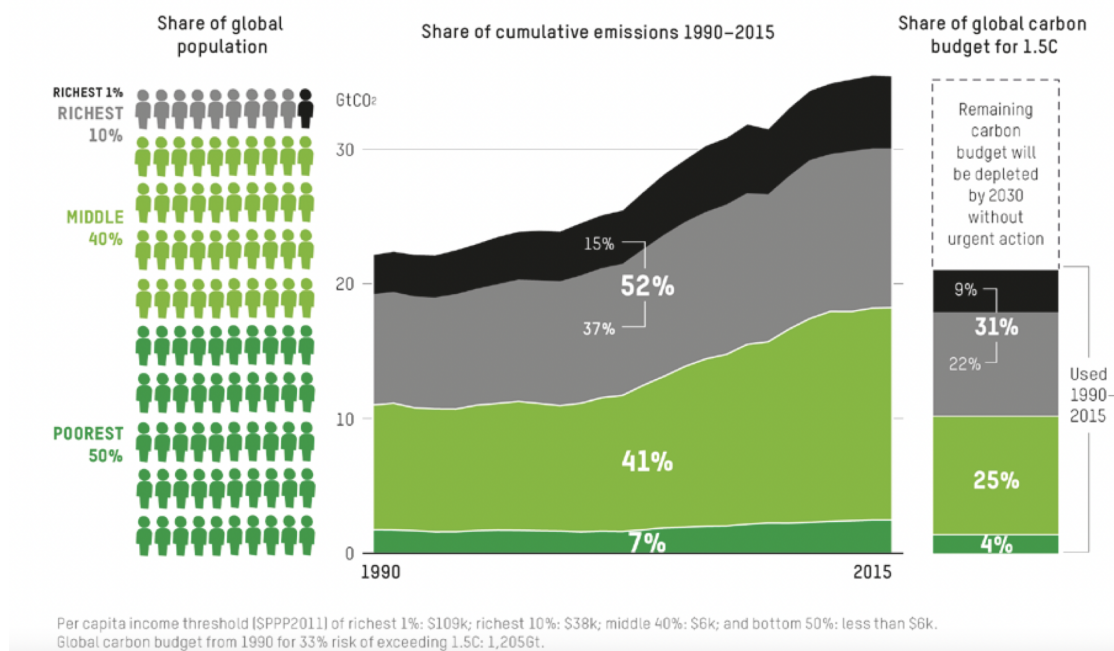


Fig. 5 The share of cumulative emissions from 1990 to 2015 and the use of the global carbon budget for 1.5C linked to the consumption by different income groups.

Source: Oxfam, [Confronting carbon inequality Report](#), 2020, p. 3.

emissions, while the total growth in emissions of the richest 1% was three times that of the poorest 50%.

Another paper by Oxfam⁴³ shows huge carbon inequality in Europe as well. The emissions cuts in the European Union since 1990 have been achieved only among lower and middle income EU citizens, while the total emissions of the richest 10% actually has grown. Also emissions reductions in the EU have coincided with rising economic inequality, leaving emissions among the richest Europeans unacceptably high even while they fall among lower income groups.

According to a new study by the Berlin-based Hot or Cool Institute⁴⁴, a resident of Canada has an average lifestyle footprint more than six times bigger than someone in Indonesia. To address this disparity, the study suggests governments adopt the idea of a "fair consumption space", as a guiding principle for sustainability and the transition to a low-carbon society. The "fair consumption space" would allow the remaining carbon budget to be distributed in a fair manner. Lifestyle carbon footprints need to be reduced by 91-95% by 2050 in high income countries, compared with 76% in lower-middle income countries, according to the analysis.

Considering these analyses, from a policy perspective, it is crucial that the EU places the fight against inequality at the heart of its domestic efforts to reduce emissions. To achieve the deeper reductions that are now needed, all sections of European society must do their fair share.

Policy makers looking to lower emissions need to focus on the biggest polluters. While it is fundamental to provide people in energy poverty with energy efficient appliances, the biggest potential in reducing CO₂ emissions and fighting climate change lies in the richest and wealthiest part of the population. As there is inequality in who causes climate change and who experiences its consequences, also it is unequal who can fix it. Looking at wealthy people in their roles as consumers, investors, role models, organisational participants and citizens, a recent paper⁴⁵ highlighted how while, on one hand, people with high socio-economic status

⁴³ Oxfam, [Confronting carbon inequality in the European Union](#), 2020.

⁴⁴ Hot or Cool Institute, [1.5-Degree Lifestyles Report | Hot or Cool](#), 2021.

⁴⁵ Nielsen, K.S., Nicholas, K.A., Creutzig, F. *et al.* The role of high-socioeconomic-status people in locking in or rapidly reducing energy-driven greenhouse gas emissions. *Nat Energy* (2021). <https://doi.org/10.1038/s41560-021-00900-y>.

disproportionally affect energy-driven greenhouse gas emissions directly through their consumption and indirectly through their financial and social resources, on the other hand they can have a huge impact and potential influence on greenhouse gas emissions while aligning their investments, organisational choices and actions as social and political change agents with climate change mitigation goals.

Well-designed public policy and projects funding programs are, then, crucial for creating a more sustainable economy and to transition to less polluting practices while ensuring inclusion and fighting inequality. In order to promote a circular economy, many governments have already started deploying smart industrial policies, new infrastructure developments for waste management and reverse logistics. Governments have also established targets in specific areas, mostly in recycling, recovery and resource efficiency.⁴⁶ A combination of policy tools including regulation, taxation, training and incentives are considered to be the main instruments that foster a circular economy with maximum benefits for society⁴⁷. At the same time, investments and policy efforts could be directed into reuse, remanufacturing, sharing and servitization of tools and appliances, always with a focus on inclusion and reduction of inequality.

With the main goal of understanding more about people's attitude toward energy efficiency and appliances, the European Social Survey (ESS) explored the European Attitudes towards Climate Change and Energy. Looking at energy-saving behaviours, the ESS Round 8 from 2016 looked at the demand side of energy, at people's willingness to take efficiency (investing in technology) and curtailment (changing regular behaviours) measures. Regarding changing regular behaviours, results from the ESS show that a large majority (74%) of the overall population of the EU/EFTA area claims that they often, very often or always does things that can be done to reduce energy use, such as switching off appliances that are not being used, walking for short journeys, or only using heating or air conditioning when really needed. Similarly, regarding efficiency measures, at the specific question about how likely people would buy the most energy efficient home appliance, many people indicate

⁴⁶ Morsetto, P. (2020), 'Targets for a circular economy', *Resources, Conservation and Recycling*, 153, <https://doi.org/10.1016/j.resconrec.2019.104553>.

⁴⁷ European Economic and Social Committee (2019), *SOCIAL DIMENSION OF CIRCULAR ECONOMY – REPORT OF THE WORKSHOP*, Circular Economy Stakeholder Conference workshop report, 6–7 March 2019-

that they would buy one of the most energy efficient appliances, with a mean of 7.9 across the 21 EU/ EFTA countries, on a scale ranging from 0 “not at all likely” to 10 “extremely likely”. While there is cross-national variation in the responses, the differences between countries in reported energy-saving behaviours are relatively small.

All the considerations connected to the just transition and the fair share of climate effort for the different parts of our societies are crucial to make the circular economy also work for human development, and to align the circular economy with the SDGs. Without addressing the human elements, the circular economy will not deliver on important social goals such as improved health, decent working conditions, or reduced inequality.

6. Ownership, meaning of things and sharing economy

As already mentioned in the previous paragraphs, one of main elements challenged by the circular business models for the high potential impact that it might have on resource efficiency and materials is the concept of ownership and the connected responsibility of the products. The absence of ownership for the consumer/ user is actually at the core of the product-as-a-service model (more on it in paragraph 9 of this chapter).

The ownership of a product has a cost beyond the price tag and beyond the one-time transaction that is made to buy that product. The things we own use a lot of space, require maintenance along the way and, when they break, it can be difficult to get rid of them. Without systems to take back, remanufacture, update and reintroduce the product back into the loop what we no longer need- all systems that are included in the wide spectrum of the circular economy-, many things end up in the landfill after having been used for a relatively short amount of time considering the materials and the energy used to produce them.

The idle time of products- the time during which an asset like a machine could be working but is not- is quite costly if we consider the price paid for the full product. Washing machines and dishwashers can stand idle up to 90% of the year just like cars

and clothes. Looking at the fashion industry, the production output has more than doubled in the last 15 years as fast fashion has boomed in popularity as well as the environmental footprint. Fashion items and shoes are cheap, but each item is worn fewer times than in the past. Products then might not be so cheap if their total price is divided by the amount of times they are used.

On one hand, electronic items or clothes ending up in the landfill or at the recycling facilities just after a couple of uses are a huge problem for the environment. On the other side, ownership fulfils the possessive instinct that people have and their desire to mark out their own territory.

Many authors and researchers in the past decades have explored the durability of products, the human need of owning things and, also, the connection between objects and status symbols.

According to Hannah Arendt:

*"The durability of the human artifice is not absolute; the use we make of it, even though we do not consume it, uses it up. All single things can be constantly replaced with the change of generations which come and inhabit the man-made world and go away. [...] The things of the world have the function of stabilizing human life, and their objectivity lies in the fact that—in contradiction to the Heraclitean saying that the same man can never enter the same stream—men, their ever-changing nature notwithstanding, can retrieve their sameness, that is, their identity, by being related to the same chair and the same table"*⁴⁸.

As Tuan argues *"Our fragile sense of self needs support, and this we get by having and possessing things because, to a large degree, we are what we have and possess"*⁴⁹. We are what we have: many authors like Van Esterick [1986], Feirstein [1986], Rosenbaum [1972] agree on it. We are what we possess: this is probably the most

⁴⁸ Arendt H., *The Human Condition*, Chicago: U. of Chicago UP, 1958, p. 136.

⁴⁹ Tuan Y., *The Significance of the Artifact*, *Geographical Review*, 70 [4], 1980, p. 472.

basic and powerful fact about consumer behaviour.

The idea that we look at our material belongings as parts of ourselves is not new. It was not born with consumerism in the second half of the 20th century. Already in 1890 William James, who laid the foundations for modern conceptions of self, affirmed that *“a man's Self is the sum total of all that he CAN call his not only his body and his psychic powers, but his clothes and his house, his wife and children, his ancestors and friends, his reputation and works, his lands, and yacht and bank-account. All these things give him the same emotions. If they wax and prosper, he feels triumphant; if they dwindle and die away, he feels cast down, - not necessarily in the same degree for each thing, but in much the same way for all”*⁵⁰.

A century after James, in 1981, Mihaly Csikszentmihalyi and Eugene Rochberg-Halton wrote a whole book on *The meaning of things. Domestic symbols and the self*. According to their research *“the things with which people interact are not simply tools for survival, or for making survival easier and more comfortable. Things embody goals, make skills manifest, and shape the identity of their users. [...] To understand what people are and what they might become, one must understand what goes on between people and things”*⁵¹.

In 1982 Csikszentmihalyi continues:

“A person who owns a nice home, a new car, good furniture, the latest appliances, is recognized by others as having passed the test of personhood in our society... the objects we possess and consume are . . . wanted because ... they tell us things about ourselves that we need to hear in order to keep our selves from falling apart. This information includes the social recognition that follows upon the display of status symbols, but it

⁵⁰ James W., *The Principles of Psychology*, Vol. 1, New York: Henry Holt, 1890, pp. 291-292.

⁵¹ Csikszentmihalyi M., Halton E., *The meaning of things Domestic symbols and the self*, Cambridge University Press, 1981, p. 1.

includes also the much more private feedback provided by special household objects that objectify a person's past, present, and future, as well as his or her close relationships”⁵².

From what we have read until now things are crucial in shaping human personality and life. Already in the above mentioned book by Csikszentmihalyi and Rochberg-Halton of 1981, though, the element of the ecological awareness starts to be present as it is getting clear that human species to survive needs to preserve patterns in respect of the chemical, physical, and biological systems that have their own goals on planet Earth.

Recently, also Tim Jackson underlined the importance of things connected with identity and social role:

“It is perhaps not surprising to discover that the desire for novelty is linked intimately to the symbolic role that consumer goods play in our lives. [...] material artefacts constitute a powerful ‘language of goods’ that we use to communicate with each other – not just about status, but also about identity, social affiliation, and even – through giving and receiving gifts for example – about our feelings for each other, our hopes for our family, and our dreams of the good life. [...] But stuff is not just stuff. Consumer artefacts play a role in our lives that goes way beyond their material functionality. Material processes and social needs are intimately linked together through commodities. Material things offer the ability to facilitate our participation in the life of society. And, in so far as they achieve this, they contribute to our prosperity”⁵³.

The previous quotes and authors highlight a very strong link between material possessions and social life with people, theirs and other communities. Objects mean status in almost all the cultures, even though which object means something different among different cultures and contexts around the globe and in different periods of time.

⁵² Csikszentmihalyi M., *The Symbolic Function of Possession: Towards a Psychology of Materialism*, paper presented at the 90th Annual Convention of the American Psychological Association, Washington D.C., 1982, pp. 5-6.

⁵³ Jackson T., *Prosperity without Growth – Economics for a Finite Planet*, Routledge, 2009, p. 114.

Also in Rochberg-Halton: *"Valued material possessions [...] act as signs of the self that are essential in their own right for its continued cultivation, and hence the world of meaning that we create for ourselves, and that creates our selves, extends literally into the objective surroundings"*⁵⁴.

Material possessions represent also a personal archive that allows people to reflect on their own past and see how they have changed. Through heirlooms, the family is able to build a sort of museum and give to individual family members a sense of permanence and place in the world that can stretch beyond their own existence and accomplishments.

If, on one hand, the construct of extended self suggests that possessions can make a positive contribution to our identities, on the other hand researches on materialism suggest some of the negative consequences of relying on objects to provide a meaningful life.

What is worth to notice from all the quotes above is that they are all about things and material possessions and never about experiences. Today, though, the old concept that we are what we own could be modified considering forms of possession and uses that do not involve ownership. This is a mind-set shift that many authors did not miss. If, in 1988, Belk argues and theories that we are what we own, the same Belk in 2013, with the explosion of the Internet and the development of new consumption practices, affirms that we have many ways to express our own identity without ownership.

In the last two decades, new consumer preferences and consumption models led to sharing practices. The most common ones are known as *"collaborative consumption"* [Botsman, and Rogers, 2010], *"the mesh"* [Gansky, 2010], *"commercial sharing systems"* [Lamberton and Rose, 2012], *"co-production"* [Humphreys and Grayson, 2008], *"co-creation"* [Lanier and Schau, 2007; Prahalad and Ramaswamy, 2004], *"prosumption"* [Ritzer and Jurgenson, 2010; Toffler, 1980], *"product-service systems"* [Mont, 2002], *"access-based consumption"*, [Bardhi and Eckhardt, 2012], *"consumer*

⁵⁴ Rochberg-Halton, E., *Object Relations, Role models, and Cultivation of the Self*, Environment and Behaviour, 16 [3], 1984, p. 335.

participation” [Fitzsimmons, 1985], and “*online volunteering*” [Postigo, 2003]. All these phenomena are linked to the birth of several for-profit and non-profit businesses. Some of these businesses are flourishing, while some others had a short life and a quick failure.

The *sharing economy*, term that includes all these sharing and collaborative consumption practices, has two common elements:

- The use of temporary access non-ownership models for using consumer goods and services;
- The reliance on the Internet to run the full system.

Looking at the products used by the sharing economy companies and how the sharing system works, the increased urbanisation facilitates efficient and cost-effective reverse logistics in order to reclaim materials for reuse. The centralised value cycles also allow temporary access to objects. Many platforms [like eBay in the first place, but also more recently Peerby and Stuffstr], rental services and companies understood that a great value could be harvested and a huge business opportunity lie in previously used/owned objects that are not at the end of their life.

Due to many different and contemporary factors, among which new lifestyles and the worldwide growing urbanisation, according to which by 2050, an estimated 6.3 billion people, around 68% of the world population- compared to the 55% of today- will live in cities, the value that people give to objects is changing and will change.

The meaning given to material possession is changing together with the identity of people, which is becoming more and more fluid. Also, the value that people attribute to experiences over possession is increasing as platforms like Airbnb showed in the past years.

While there are family memories or objects to which people might be strongly attached and want to own, there are many other objects in daily life that we use and we do not have the need to own like light bulbs, mattresses, washing machines or also cars and scooters.

The social and generational change is clear if thinking about cars. While previous generations bought their first car at the beginning of their own adult life and career, current consumers are- gradually- getting used, mostly in urban areas with different other mobility options, to postpone the purchase of the first car or even live without it.

On the extreme side of this change in preferences, there are strong communities around the globe that are giving up material possessions and consumerism like: debt free community- the movement is quite big in the United States and often welcomes the many people finishing education with big mortgages to pay back or not able to afford health insurance-, minimalists- currently great contributors of the movement are the American authors, podcasters and filmmakers Joshua Fields Millburn and Ryan Nicodemus, know as The Minimalists⁵⁵, who promote a minimalist lifestyle, also through their podcast, followed by more than twenty million people- and essentialists⁵⁶- who are following the systematic discipline for discerning what is absolutely essential, including essential material possessions, and what is not-. Next to them from Australia to Indonesia, from Israel to Mexico, there are Buying Nothing Project⁵⁷ groups, born with the aim of sharing objects locally, based on the gift economy complementary and parallel to local cash economies, in order to create resilient and strong communities and reduce the impact on the environment.

Minimalism, essentialism and the Buy Nothing Project are first world problems and choices. Even if they have some common elements with the degrowth movement related mostly to reduce our consumption in society, these communities are mainly aiming for a meaningful and happier life that could be reached through giving more value to experiences and time spent with people, on one hand, and the decluttering of non essential stuff and without the burden of things and duties on the other hand. More than criticising the current system of endless economic growth, these experiences are looking at personal choices in private and working life. They are a call for discerning what is absolutely essential, then eliminating everything that is not, so

⁵⁵ <https://www.theminimalists.com>

⁵⁶ McKeown G., *Essentialism: The Disciplined Pursuit of Less*, Virgin Books, 2014.

⁵⁷ <https://buynothingproject.org>

it is possible to make the highest possible contribution toward the things that really matter, with physical objects, relationships, work decisions, etc. As, indeed, claimed by Meissner the minimalist narratives resist yet at the same time promote capitalist cultures of growth (Meissner, 2019).

After highlighting the limits of the linear economy, the rising inequality in our society and the poverty premium that weighs on the poor, this paragraph dove deeper in the human interaction with objects, which is very complex and flexible over time. Status symbols are still strong indicators of wealth, but less than in the past or often in a different way. Thinking about modern leaders, they do not often link their image with material possessions apart from their house or unless they show products made by their companies. Material wealth is only a small part of what wealth can mean today. Freedom, time, health, and access to places are often other indicators of wealth. If we think about Steve Jobs, Elon Musk, Jeff Bezos, Al Gore, Greta Thunberg they are more known for the events, the parties, the ceremonies they attend, the experiences they get access to and the people they meet compared to which objects they own. Also because objects are not just symbols, they can also be burdens.

7. The burdens of ownership and new consumption models for users and companies

“Every right implies a responsibility. Every opportunity, an obligation. Every possession, a duty”. [John D. Roosevelt]

As we have partly seen in the previous paragraph, recent changes in lifestyle have given impetus to the non-ownership approach to consumption. Next to urbanisation and consumption preferences, it is important to understand which other reasons made these changes possible and desirable.

In the 1970s, according to Berry and Maricle [1973], private and business consumers mainly rented goods for utilitarian reasons. In the last decades though, as people became more educated, sophisticated, adventurous and traveled more, it would seem that they now also look more for experiences [not merely utility] than for consuming

a product [Silverstein and Fiske, 2005]. As a consequence, next to sharing objects, a growing number of modern consumers are considering more and more to rent or lease goods as an alternative form of consumption [Watson, 2006]. One of the reasons for which people prefer renting or leasing products is that those who live the culture of non-ownership are able to keep money, storage capacity- in their space, but also in their mind- and quality of life. Highlighting the power of experiences opposite to the ownership of things James Wallman [2014] created the word *stuffocation*, to express how materialism and the constant desire for more *stuff* makes millions of people in developed countries joyless, anxious and even worse depressed.

On the other hand convenience-oriented consumers seek products and services, which provide time-saving and comfort [Luqmani et al., 1994]. Berry et al. [2002, p. 4] describe “*the consumers’ time and effort perceptions related to buying or using a service*” as service convenience.

Renting allows the renter to access the goods without assuming the burdens of ownership. Owning something brings with the possession also some duties like:

- the risks connected with product alteration and/or obsolescence [think about DVD players in the Spotify era or the VHS and DVD becoming obsolete with Netflix, Amazon Prime or Sky];
- the risks linked with making an wrong product choice [a drill or a juicer that will not be used because it does not fit the purpose anymore because the conditions are changed or there is a better and stronger new model];
- the responsibility for maintenance and repair of the product;
- the full cost of goods that the consumers rarely use.

The burdens of ownership include the responsibility of maintaining, repairing, keep paying costs during the lifetime of a product that could be a car as well as a piece of clothes or a house. In a more environmentally conscious or, we could say, “moral” way, the responsibility of owning something is also connected with the luxury and the right to use certain materials in a world of finite materials. The possessions that are permanently in our houses in a world of finite products are per se not available for others. Those very unique objects and materials, in a finite world of elements, are in

hands of the owner which should have the moral duty to keep them at their best and use them at their full potential before, hopefully, putting them back in the loop at the end of their life.

On this same page, in order to protect the materials and paying them respect for the services that are providing to people, Rau and Oberhuber created in 2015, based on the Universal Declaration of Human Rights, the Universal Declaration of Material Rights⁵⁸.

Moeller and Wittkowski dug deeper into the reasons why people prefer renting consumer goods in comparison with the actual transfer of ownership. The results of their research show that the demand for non-ownership services is negatively influenced by “possession importance”, the importance that a person gives to full ownership, and positively influenced by “trend orientation” and “convenience orientation”. Other determinant factors proposed to participants in the research, among which “environmentalism”, did not play a role in the preference for non-ownership modes of consumption.

Of course the *usership* of the products, the leasing, the renting, the sharing of objects and materials have some effect on the environment. Thinking about different forms of non-ownership, collaborative consumption models are recognised as one of the best available options on the consumer side to switch from the present business-as-usual model to the more environmentally friendly circular economy [Ness, 2008; Preston, 2012]. These collaborative models [e.g. sharing, bartering, lending, trading, renting, gifting] are based on a shared ownership among multiple consumers. But at the same time, as the ownership is at the core of our present consumption model, the loss of ownership is one of the strongest potential barriers that could limit the development of such systems [Tukker 2015]. Another common barrier to the expansion of these consumption models is that consumers need to be located within a certain community or location [e.g. big cities] or should be part of a larger network for easy access to such schemes [Preston 2012].

The reduction of the environmental impacts associated with the different forms of

⁵⁸ <https://theuniversaldeclarationofmaterialrights.org>.

usership activities is potential, but it is not automatic. For example, some research shows that, in North America, members of car sharing systems reduced by 30% their driving time compared to the period they owned a personal car. While it seems that sharing services promote social cohesion [Ness 2008; Preston 2012], it is not accurate to say that all the non-ownership forms have a lower environmental footprint.

On the phenomena of the sharing economy and *usership* it is worth mentioning the work by Ivana Pais. In particular, while dividing the sharing economy practices in six different classes, Pais includes in one of the classes “rental schemes run by companies specialising in goods, which are generally under-used when the users have exclusive private ownership of them (“rental economy”). The sharing economy is introducing collaborative social forms able- at least ideally- to embed economic relations within social ones.

In the light of the sociological concept of reciprocity and looking at how Karl Polanyi analysed the economy as an institutionalised process comprising three “forms of integration” between economy and society- *exchange, redistribution and reciprocity*-, Pais suggests three different variants of reciprocity- *collaboration, reciprocity* in the strict sense, and *common-pool arrangement*- in order to classify and interpret the phenomenology of the sharing economy ranging from car sharing to time banks, from “social street” to crowdfunding. Sharing practices emphasise the relevance of reciprocity mechanisms, whereby exchanges of a commodity depend on individuals and their social ties, as well as on redistribution dynamics, which are regulated by a centralised entity. Through the primacy of reciprocity and redistribution, market exchanges come to be re-embedded in society in new and interesting ways [Arcidiacono, Gandini, Pais, 2018].

Looking at new forms of consumption and sharing items, Arcidiacono and Pais [2018] studied also the new paradigm of *prosumerism* in which consumers play a more active role assuming the double role of customers and business partners, because they own useful “idle capacities” material and immaterial, to be activated and invested within the company. Prosumers share assets and skills, produce contents or are responsible of entire phase of production. As mentioned by Arcidiacono and Pais, this shift, while it could support and embody alternative production chain renewing its distribution of value, it could just represent a business strategy to take the control

of the voice and resistance of consumers discharging over them production costs and market failures.

Furthermore, the risks of rebound effects in leasing and sharing tools need to be considered, there are good premises for a positive impact on the environment. Non-ownership is more than just a marketing trend, it is instead a crucial factor towards sustainable development [Botsman and Rogers, 2010] and circular economy, as also recognized in the last years by the European Economic and Social Committee [EESC 2014].

The companies active in the space and how they shape the offer play a crucial role in creating a less harmful system for the environment. Of course companies have not waited longer in trying to harvest this new business opportunity. Suppliers and companies are offering a mixture of “ownership” and “non-ownership” models of consumption to their customers.

In the transition to a more sustainable society, firms have been experimenting with new ways of meeting consumer demands that might also have the characteristic of being less harmful to the environment.

For example, firms may offer product-service combinations in which a shift takes place from supplying products to offering services in order to reduce material consumption [Vezzoli et al., 2012].

The phenomenon is obvious, for example, in the car sector in which BMW, next to its usual car sales business, is also part of a joint venture with Daimler AG that owns the car sharing service Share Now. The same is happening with FCA and its Leasys CarCloud service.

Companies are also earning some competitive advantages from the shift to these service based models. With renting, the service provider can exactly predict when the product will come back available on the market. Moreover, the rental of goods allows the collection of information about consumers and their preferences. Thanks to the availability of data, companies can make an accurate selection of service offerings, communication and promotional instruments when the renting contract expires

[Grewal et al., 2004]. When a user rents a product, he has to bring it back to the renter when the rental period ends. With the consumers back in the store, with a good customer relationship built through time and the data of the consumers preference collected in the months of the usage of the product, a follow-up contract could be signed in a much easier way. Seen from this perspective, the non-ownership for the users could represent a great chance of customer retention for the companies. The same collected data on the customers have great value for the company strategies and product development [Knox and Eliashberg, 2009].

One of the first sectors to jump into this new opportunity, as already mentioned with the BMW and FCA examples, is the mobility one. Probably because means of transport have always been kept outside of our houses and because we were already used to not owning a bus, a train or a place to take a ride, there is a high consumer acceptance of the mobility as a service model. Car, bike, motorbike, scooter sharing systems are popping up in many cities around the world with different results [for a deeper understanding of the phenomenon *Sharing Mobilities: Questioning Our Right to the City in the Collaborative Economy* by Arcidiacono D. and Duggan M., Routledge, 2019].

Following the mobility example, sustainable alternatives to ownership are slowly increasing in other sectors. Some startups and companies are trying to tackle the issue by offering access over ownership and showing that *disownership* is possible and, actually, also well suited for future living.

In many sectors, both business to business than business to consumers, innovative business models are embracing service-based approaches and replacing consumers with users. Businesses effectively incentivise users to return products after use, also as part of their supply strategy in response to the expected resource scarcity of some strategic raw materials in the near future. For many products, the service-based business models reduce product idle time, and further maximise material values [i.e. better retains value].

Finally, business models, which deliver functionality rather than ownership break the vicious circle on which the linear economy is built “the more companies make and

sell, the more they earn". That's the reason why the link between production, sales volume and profit does not exist anymore in the *performance economy*.

8. The *Performance Economy*

The term *performance economy* is used to refer to people and companies that use rather than own products thanks to leases, pay-per-use or pay-for-performance contracts, collective ownership, sharing platforms, and so on. These consumption models are the basis for an improved performance in the circular economy, as theorised by Walter Stahel.

The performance economy allows companies and/or service providers to retain the ownership, and thus the responsibility, of the objects, while the users get the access, the service of such objects, through renting, leasing, and sharing. Selling the performance is characterised by the fact that users pay a price per use fixed in advance. In the performance economy users get mobility, lighting hours, washing cycles, air conditioning while they are not the owners of the cars, of the bulbs, nor of the washing machines, dishwashers or conditioners.

In the performance economy, economic actors sell results instead of objects; they keep the ownership of objects and the embodied resources and internalise all liability over the full product-life. These economic actors may be the manufacturers of the objects or also fleet managers operating them; in both cases, they aim to sell the use of these objects as a service over the longest period of time possible in order to maximise their profits.

The *usership*, opposite to the ownership, implies that the property of a product, and thus the responsibility for the materials, the maintenance and the end of life, are on the producers or on the providers of the service [in some cases the two stakeholders overlap].

According to the Swiss engineer Walter Stahel, who, in 1982, was the first to theorise the performance economy:

“The PE, selling goods and molecules as a service, function guarantees or results and performance, is the most sustainable business model of the Circular Industrial Economy because it internalises the costs of product liability, risk and waste, and thus constitutes a strong financial incentive to prevent losses and waste. The PE is highly profitable because it maximises the profit potential by exploiting sufficiency, efficiency and systems solutions.

Maintaining ownership of objects and embodied resources creates corporate and national resource security at low cost. [...] If producers retain the ownership of their goods, the goods of today are tomorrow’s resources at yesteryear’s commodity prices. [...]

The PE redefines the role of the supply side, but also implies a radical change of the demand side, from owner-ship to user-ship of objects. But is this really new? Aristotle had already stated that real wealth lies in the use, not the ownership of goods, two thousand years ago”⁵⁹.

Relevant to this research, there are two different sets of potential consequences of the performance economy: one affecting the society and the people, the other one impacting the market and the companies.

Considering the potential consequences of the performance economy, people- or companies- do not pay the full price of the product. As mentioned above they pay a monthly fee or a usage fee every time they use the product. Thus everybody, including people with a low income, could get access to high quality products without being forced to buy on the market the cheapest- or the average- option of the product they are in need of. This could positively impact the environment and society as high quality products are often energy efficient.

For example, if a greater number of households with low income are able to access to high quality appliances through a pay-per-use model, they would be able to save more money through the reduced energy costs associated with a more efficient and high quality product [as mentioned in paragraph 1.3 the energy bills were one of the main elements contributing to the poverty premium]. For the environment, the wider use of pay-per-use and similar models would mean in turn lower greenhouse gas emissions.

⁵⁹ Stahel W., *The Circular Economy: A User's Guide*, Routledge, 2018, p. 37.

Companies [producers or service providers], on the other hand, keep the ownership of the product and the responsibility for the materials of which the product is made. Thus, in a material scarcity society and looking at the supply flow, companies that think and act with a long term mindset know that if they produce high quality products, in five, ten or fifteen years high quality materials will flow back in their supply chain. For these companies putting in the market high quality, easy to repair, easy to disassemble products would be a resilience strategy that could ensure them a long life in the long run. Companies with a steady material supply chain would have a great competitive advantage. Such companies could have a predictable supply chain of materials like cobalt or rare-earth elements, for which other companies could soon struggle. Also, stocks of materials represent corporate and national resource security, resilience and independence of global supply chains.

The creation of a system in which companies keep the responsibility and the ownership of their materials and products implies that only the highest quality products, easy to be remanufactured, upgraded or disassembled will be on the market. On the other hand, short-sighted companies that put in the loop low quality materials, products easy to break and difficult to repair, when the resource scarcity hits, will have a bigger chance to be out of business.

Seen from this perspective, focusing on the performance economy and on efficiency should, theoretically, mean that only the best products are being used and reused and are accessible to everyone in the society.

Less relevant for the topic of the present research- even though not less important in general- is that, according to Stahel's work and others, another outcome of the performance economy is the advantages in terms of higher employment and resource-efficiency of a business model mainly based on selling services instead of selling products as the current business models. Performance economy could result in a higher job creation through remanufacture and repair, which would be required as essential part of a product-as-a-service business model. Also logistics would change, with some of the necessary remanufacturing and repairing facilities that would move back in the surroundings of the cities.

For the research it is relevant instead to understand the link between performance economy and people, the users, and what can influence it. Technology, and how it is shaped and delivered to the users, is often seen as playing a fundamental role⁶⁰ in allowing more people to access the service and in increasing or decreasing inequality. However, technology cannot be the only responsible for more or less equality produced by the performance economy and how the services connected to it are offered. A much bigger role is played by the companies and how they position themselves, which business proposition they choose, which users they aim to reach and serve. How companies modify their products to make them fit for the non-ownership model, how they reshape logistics, supply chains and cash flow, how they rethink planned obsolescence represent a huge challenge for their long term survival, but also a great opportunity for the potential impact they can have on society and inclusion.

There are many big corporations like Bosch, Philips, BMW that are experimenting with the performance economy business models in different countries next to startups and small companies like Bundles, Homie, Grover.

The performance economy is not a new concept, especially in the B2B sector. It was actually a car company, the Rolls Royce in 1962, who introduced the product as a service concept proposing the "*power by the hour*" model in the aviation sector. For the last decades, the British company has no longer sold jet engines, but offered airlines "*power by the hour*", an expression created by Rolls Royce itself to indicate its performance-based contracts.

In 1994, Ricoh initiated its 'Comet Circle', built on the concept that all product parts of Ricoh have been re-designed for reuse and recycling. In order to facilitate the processes, Ricoh started a leasing scheme for the copiers and the printers of corporate clients. Also other companies, like Xerox and Kyocera, are working with leasing schemes. They improved the products to reduce waste and push durability and reusability further. Lately, the performance economy also entered the chemical sector with a performance-based business model for sustainable chemicals

⁶⁰ Atkinson, A., B., *Inequality: What Can Be Done?*, Harvard University Press, 2015.

management. Chemical Leasing, supported by UNIDO, aims at a more efficient use of chemicals in the production process by redefining the business relationship between the chemical user and the supplier.

All these examples show that the performance economy is not a new phenomenon. What could be new, in our modern era, in which the *fetish of growth* is- hopefully- put on the side for the wellbeing of the planet and the people, is the use of the performance economy to deliver better environmental performance and social inclusion. It is crucial to grasp and accept the going beyond the growth fetish because the path to accomplish a fully circular, regenerative and inclusive economy is difficult, long and does not give any certainty of constant and endless growth. As Ulgiati et al. wrote: “*Circular economy is not an appropriate tool for growth-oriented economic systems [i.e. cannot be claimed to support further economic growth], where efficiency is not the “winning card” and the rebound effect and market competition are likely to diminish the potential benefits of increased efficiency*”⁶¹.

9. Product-as-a-service and resource efficiency

The shift from selling a product with a one time transaction to selling a service represents a big change for companies. Choosing to offer performance over ownership leads companies to the product-as-a-service [or PaaS] or to the *product service system* [or PSS]. Product Service Systems [PSS], also known as *servitization* or service-dominant logic, makes revenue by the provision of services, which is paid over-time or per use [Van der Merwe and Rada, 1988; Tukker, 2004; Vargo and Lusch, 2004].

A common example for explaining the system is a person that needs to reach location B from location A. Classical business models try to sell this person a means of transport, mostly probably a car, focusing on the sale of an object. Service based business models, like car rental in which the customer might pay on a weekly basis, or public transport in which the customer pays per single use, approaches the issue from

⁶¹ Ghisellini, P., Cialani, C., Ulgiati, S., *A review on circular economy: The expected transition to a balanced interplay of environmental and economic systems*, Journal of Cleaner Production, 2015, p. 37.

a different perspective. Also, the same means of transport, a car or train, can satisfy several temporal transportation needs, being more efficient in use and material [Bocken et al., 2014].

Product/service-systems, selling service and performance instead of products, are often mentioned as means to realise a circular economy, in which the economic growth is decoupled from the resource consumption.

Offering services around an asset rather than selling them has huge impacts on the companies, first of all on their cash flows. Companies also have an ever-growing balance sheet as a result. The high upfront investment for the companies, the purchase of assets and products is followed by small incremental income, the periodic use fees from the users.

In this model, to make economic sense, companies need to keep the products in use for as long as possible through design, use, maintenance, reuse, remanufacture, and recycling. These activities are done in close collaboration with the customers, who become more of a “user” of the service as opposed to a “consumer” of a product.

Research has shown that variations of this business model can, if managed correctly, yield environmental footprint reductions of 20 per cent to 50 percent and, in some cases, upward of 90 per cent.

The PaaS business model, switching from selling a product to offering a performance, can take several forms:

- *Pay for use*: People/companies buy output rather than a product and pay based on use metrics such as miles driven, hours used, pages printed, or data transferred.
- *Leasing*: People/companies buy contractual rights to use a product over a longer period of time, typically with rights to exclusive and individual access.
- *Rental*: People/companies buy the rights to use a product for a short period of time, typically less than 30 days. A rental setup is generally more flexible than a lease agreement and customers might not have guaranteed unlimited access.

- *Performance agreement:* People/companies buy a pre-defined service and quality level and companies commit to guaranteeing a specific result. For example, it could be a “clean and snow-free street,” a “healthy indoor climate,” or a “well-lit city street.”

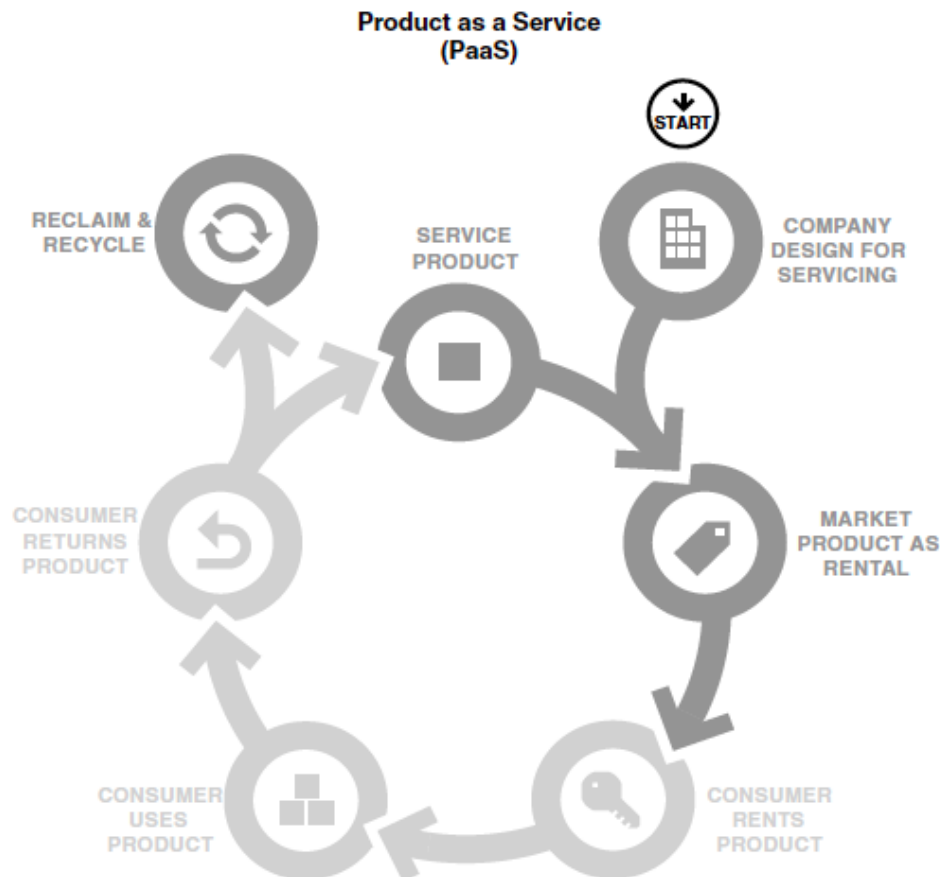


Fig. 6 Product as a Service (PaaS) business model: visualisation of the products flow.

Source: Lacy, P., Rutqvist, J., *Waste to Wealth: The Circular Economy Advantage*, Palgrave Macmillan, 2015, p. 100.

The idea of using “a mix of tangible products and intangible services designed and combined so that they are jointly capable of fulfilling final customer needs”⁶² has been present in the academic literature for some decades. The most preferred way of describing PSS in the literature [Tukker 2015] distinguishes three types of PSS based on the tangibility of the product. All three types of PSS solution satisfy customer needs through a combination of products and services, able to deliver the needed

⁶² Tukker, A., Tischner, U., *Product-services as a research field: past, present and future. Reflections from a decade of research*, Journal of Cleaner Production, 14 [17], p. 1552, 2006.

utility or function.

The three types describes by Tukker are:

- *Product-oriented PSS*: Where products are sold to the user, but additional services are added, such as maintenance or product-related consultancy.

Product-oriented models still have a product component in their value proposition, companies still sell ownership, upgraded with additional services, so it is not totally a circular business model. As the ownership asset in this first case doesn't change, the customer gets the product, this type doesn't totally fit the circular economy and we won't consider it in the present research.

- *Use-oriented PSS*: The business model aims to sell the product function through leasing or renting and the product remains property of the PSS provider. Leasing models are a common form of use-oriented PSS. The product is still important. In such models, the value proposition entails the unburdening of customers from responsibilities, even though the responsibility is not totally kept by the companies.

Also, as customers are not bounded to a single product, they can benefit from new and emerging technologies [Bohnsack et al., 2014]. Furthermore, Tukker and Tischner [2006] state the possibility of PSS to adapt to specific customer needs through the use and adjustment of services. As customisation might lead to increased customer satisfaction, it also influences the customer relationship [Tan, 2010].

The revenue stream becomes more structured and predictable once it no longer relies on one-time transactions with the cash flow depending on a smaller over-time payment [Mont, 2004]. This might result in a monetary gap during the start of such payment structures. This monetary gap, together with additional costs for the repair and maintenance services, makes the cost structure the most critical segment for a PSS [Sundin et al., 2009; Grönroos, 2011].

However, tax benefits and the decrease in demand for storage space, due to on-demand production and to the decreased need for products, might decrease the lifetime cost of products overall [Bohnsack, 2014]. New key partners and key resources might be needed in order to facilitate the offered services [Tan, 2010].

The need for additional human resources, to deliver the services and create

customer awareness for these new initiatives via marketing, is also crucial in this model. Looking at the potential social impacts it is fundamental that such models can serve people who were previously unable to meet the upfront investment linked to product purchase, but who can afford a monthly payment [Orsato & Wells, 2007; Bocken et al., 2014].

Lastly, as companies remain the owner of the products, they have the responsibility to collect them at the end of use, in order to facilitate reuse and recycling. Therefore, the channels segment has to be extended with reversed logistics, and other segments should be likewise equipped with recycling attributes as take back model [Roy, 2000; Nussholz, 2017].

- *Result-oriented PSS*: The business model is based on selling a result. It is the closest model to offering a pure service, where no predetermined product is involved. The consumer does only pay for the result delivered by a product and service combination. Examples of this model are the pay-per-print or pay-per-lux, in which the consumer does not pay for the ownership of the printer or the bulbs, and neither for the ability to print or light. In the use-oriented business model, s/he pays for the result, the printed sheets, the hours of light. Again, companies remain owners of the products and maintain the related responsibility of them.

In this third option the value proposition is even more customised to customer needs and takes away all unnecessary cost for the consumer [Tukker, 2004]. In the use-oriented models, the customer pays a fixed amount of money over a specific period of time, but, in the result-oriented business, the consumer is only obliged to make a monetary transaction the moment the need is fulfilled.

Also, using this system, companies gather a great amount of data during the product use-phase [Barquet et al., 2013]. They monitor when the product is used, because payment is linked to direct usage, so they collect insights about the frequency and intensity of use, can prevent break down by preventive maintenance, guaranteeing product performance [Schuh et al., 2009] and also improve the design and the production of the future products.

The revenue stream, however, is affected by this change as well. Cash flows become less predictable and pay-back-time is extended, as they do not rely on time,

but on product use [Tan & Mcaloone, 2006]. The risk for the cost structure is huge with a delayed return on the relatively larger investment [Tukker, 2004]. Lastly, as result-oriented models do not require an upfront investment or do not tie users to a monthly payment structure, they promote the uptake of such models and reduce the barrier to try out a new product [Tukker, 2004; Barquet et al., 2013].

In terms of environmental potential, this last model is the most promising, but also the one that encounters the biggest challenges [Tukker 2004]. Also for the social impact on inclusion of low-income people, it might have the biggest outcome.

As already underlined, the main differences among these models, also compared with traditional business models, is the ownership, the responsibility and the revenue stream, based on the different payment structure.

Theoretically, if the ownership of the product stays with the service provider instead of being passed on the customer, it is likely that the product is designed to be more durable, that maintenance services are offered in order to increase the product-life, that products are upgraded or reused, that the materials are recycled at the end of life.

Product design focuses much more on the durability of products, as repair costs are now shifted to the service provider, which is often the producer, resulting in increased product durability, longevity and quality [Tukker, 2015]. Moreover, as consumers only make use of the provided product, but never own it, reuse and recycling are more easily fulfilled, as the producers and owners would keep track and ownership of all products and materials.

Ownership of the product in PSSs is supposed to have an impact on sustainability. There are different perspectives on this topic, conflicting opinions on whether the influence of PSSs on sustainability is always positive or if it can also harm the ecological outcome.

In terms of environmental sustainability, Vezzoli et al. argue that PSS has the potential to reduce the amount of material needed by extending the product lifespan and encouraging the intensive service provision.

On the other hand, though, according to Kjaer et al., the PSS has no implicit guarantee for the creation of a circular economy. It does not necessarily lead to decoupling economic growth from resource consumption in absolute terms. Absolute resource decoupling only occurs when the resource use declines, while it is not linked with the growth rate of the economic driver. In their paper, Kjaer et al. propose a two-step framework that aims to support analyses of PSS and their potential to lead to absolute resource decoupling where they present four PSS enablers of relative resource reduction that qualify as CE strategies and three subsequent requirements that need to be met, in order to successfully achieve absolute resource decoupling.

Also, Tukker points out that PSS are not by definition more resource efficient and sustainable than the traditional sale of the products. It is necessary to measure the sustainability of such systems starting from the design phase in order to expect better economic, environmental and social outcomes. PSS that are not developed with these goals in the designing and use phase run the risk that the environmental potential will be offset by rebound effects and less careful behaviour [Kuo, 2011; Tukker, 2004].

The reality is that successful implementation of the eco-efficient PSS is still very limited. Rebound effects in relation to PSS are also a well known issue [Kjaer et al. 2016], because a PSS often causes changes in user behaviour, which might counterbalance the resource reduction potential [Mylan 2015; Goedkoop et al. 1999].

Since the 1990s, Product Service Systems [PSS] have been considered one of the most effective instruments for moving society towards a resource-efficient, circular economy and creating a much-needed 'resource revolution'. PSS have been studied in many research groups during the last decades and embedded in a wider range of science fields [such as manufacturing, ICT, business management, and design sectors].

Also back then, management literature, almost unanimously, suggested to product manufacturers to integrate services into their core product offerings [Bowen et al., 1991; Gadiesh and Gilbert, 1998; Quinn et al., 1990; Wise and Baumgartner, 1999]. The advice is based on three main arguments: first of all revenue can be generated from an installed base of products with a long life cycle [Knecht et al., 1993; Potts, 1988] and services, in general, have higher margins than products [Anderson et al.,

1997; The Economist, 2000] and provide a more stable source of revenue as they resist to the economic cycles that drive investment and equipment purchases [Quinn, 1992]. The second argument supporting the adoption of PSS is that customers are demanding more services. Finally, as a third element, there is the competitive argument. Services, by being less visible and more labor dependent, are much more difficult to imitate, so they become a sustainable source of competitive advantage [Heskett et al., 1997].

Shifting from being a product manufacturer into a service provider represents a very relevant managerial challenge. Services need different organisational principles, structures and processes for the product manufacturer, while, at the same time, they change, or better build, a long term relationship with the customers.

Much more has to be studied on the topic. Actually, despite some encouraging success stories of firms switching from product manufacturers to solution providers, like the transition of IBM [Gerstner, 2004], and extensive research on the topic [Gebauer, Ren, Valtakoski, & Reynoso, 2012; Lightfoot, Baines, & Smart, 2013], the knowledge of PSS is still limited. In particular, even if the literature widely calls for the transition towards services, many companies struggle to reach the above mentioned benefits. There are many examples of servitization failure [Benedettini, Neely, & Swink, 2015; Brax, 2005; Gebauer, Fleisch, & Friedli, 2005] and many others companies that choose the path of de-servitization—reducing or abandoning service elements in their offer [Gebauer & Kowalkowski, 2012; Kowalkowski, Windahl, Kindström, & Gebauer, 2015].

There is definitely an hype surrounding innovation and the adoption of product as a service business models in the business field. Studies on Product Service Systems (PSS) are emerging as a growing body of literature driven by the desire to combine economic prosperity and sustainable resource management. However, knowledge about how companies can adopt and implement PSS has remained limited as well as the proofs that the model works also from an environmental and a social perspective are lacking. Many key elements of the Product Service System, enhanced in the literature, like better quality goods in the rent economy kept in the circle, less planned obsolescence and extended product life, creation of more local jobs are still a theory

and need to be checked against the facts.

All of above considered, this research tries to understand what happens in a product as a service business model on the customers side and on the companies sides. At the beginning of the research some main hypotheses were laid down on both sides. Considering the users, the research speculated that the product as a service model gives to people with a low income access to high quality products that they would not have access to otherwise. Also the research wanted to understand if the access to high quality and efficient appliances changes the sensibility of participants in the project towards sustainability and green choices and if, in the long term, it reduces inequality in society.

On the other side, the companies one, the main hypothesis was that, through giving access to high end appliances, the company makes its machines and products more accessible to all kind of people and, thus, in the long term the product as a service circular business model can reduce inequality. This shift happens because the companies accept their leading role in society and consider very consciously the product as a service as a business model that has a significant and positive impact on the environment and on the society.

Furthermore, even though research in the field of PSS has been growing since 2000, especially focusing on the insights of the design of servitization models and their business and environmental benefits, there is not so much research and evidence around the potential or real social impacts of the PSS. While focusing also on the business side, the research clearly focused on the impact on a social level of the product as a service business model.

That is the reason why, after looking closer at the growing inequality in our society, the meaning of possession and the potential benefit that the product-service-systems can bring to the companies, in the next paragraph we dive deeper into the connection between the PSS and the customers/users.

10. Consumer consumption, barriers and acceptance

According to the academic literature one of the reasons why PSS have not been widely implemented is that consumers still value having control over things and owning material possessions. Product-as-a-service objects are sometimes less accessible, or have less tangible value, than the competing product. This is partly due to the fact that PSSs usually do not give consumers as much freedom or, in some cases, leaves them with the perception that the service provider could decide how they should behave or experience the product.

The acceptance of the customer is crucial for the success of the model though, as PSS is a customer-oriented approach where the relationship between customers and companies changes from a one time transaction to a relationship-based one. People are fundamental actors of the model.

The consumption patterns of consumers might be one of the most important elements in the transition to a circular economy if we overcome some non rational impressions and choices of consumers, in which worse alternatives, monetary and environmentally wise, are preferred.

Consumers tend to base their choices on irrational reasons, relying on emotional and subjective beliefs, habits, knowledge and attitudes towards a product in the decision-making process [Fishbein & Ajzen, 2010].

At the same time, though, consumers have started to indicate a preference for access over ownership [e.g. cars sharing services like Zipcar], and an inclination for purchasing used goods in second-hand markets. These increasing new behaviours appear driven, at least partly, by the desire to save money, protect the environment and engage with community members via sharing platforms.

Looking exactly at the white goods sector, a paper from the beginning of 2022 [Bressanelli, Saccani, Perona, 2022] aims to compare the economic and environmental impacts of pay-per wash and washing machine refurbishment business models, while investigating the degree of users' acceptance and factors

influencing it. The researchers of the University of Brescia collected data on washing machine consumption patterns and preferences from 279 Italian households, developed an evaluation model to assess the economic and environmental impacts of pay-per-wash and refurbishment against the traditional linear economy model, and finally carried out logistic regressions to investigate the influence of different customer, product, and usage factors on the acceptance rates of the two circular business models. Results from the research show that on average, pay-per-wash business models and washing machine refurbishment can guarantee environmental savings. However, only refurbishment generates economic savings for users. Also, while only around half of the users' sample shows a positive degree of acceptance of such alternatives, respondent age has been found as a significant factor influencing the interest towards a refurbishment model. Interesting element coming out of the research is also that the washing machine failures experienced by users and the relevance of the environmental gains achievable influence the acceptance rate of pay-per-wash models.

The changes in behaviours could drive the wider consumer acceptance that is essential to achieve sustainability gains through access-based SPSS by increasing product utilisation and decreasing idle times.

While, previous researches demonstrated that consumers seem to be interested in access-based services to avoid the "burdens of ownership" [Armstrong et al., 2015; Catulli, 2012; Edbring et al., 2016; Goedkoop et al., 1999], there are still some barriers in the adoption and the diffusion of PSS such as uncertainty of consumers regarding the offer and the service provider [Rexfelt and Hiort af Orns, 2009], concern of experience being influenced by actions of previous consumer [Gullstrand Edbring et al., 2016], and the lack of ownership [Tukker, 2015]. Complexity, reliability, contamination, responsibility, lack of trust in the service provider, economic obstacles, and an unfamiliarity with the concept obstacle the consumers' acceptance of access-based services too [Edbring et al., 2016; Hazee et al., 2017, Pinheiro et al., 2018].

If all these reasons are true on one side, on the other side shifting from ownership to usership means that the customers are more dependent on the decisions of the companies about access to goods. Just like today, it happens that the softwares of our

devices stop working because the developers and the companies decide to not update them anymore, in the future companies can decide with products can make available and under which conditions for leasing or renting. Customers become more dependent on companies and lose some freedom in giving up ownership.

The issue is definitely multifaceted. From the customer's side, the access-based service can reduce the financial and performance risks because consumers only pay a fee per usage and are not responsible for maintenance, repair and other running costs. Economic benefits are a relevant motivational factor in engaging in access-based consumption, especially with short-term access.

In order to drive a change in the mind-set of people to and overcome the barriers connected with the lack of ownership in a PSS solution, raising awareness among users towards the topics of sustainability and circular economy might be very useful.

In order to achieve a positive environmental impact, slow consumption or sufficiency would need to become an integrated part of the business model which could potentially be achieved through increased consciousness when paying per use [Tukker, 2004].

Opposite to that, though, literature suggests that user behaviour can even become less responsible when a product is not owned, leading to reduced efficiencies and increasing the deterioration of the product [Cohen and Kietzman, 2014; Benjaafar et al., 2015]. Because people do not own the products in an access-based service, it is unlikely that they develop a strong attachment to these products [Mugge et al., 2005] and, consequently, they may take less care of these products [Bardhi and Eckhardt, 2012].

So again a life-cycle perspective of the PSSs is necessary, particularly including the consumer use phase, considering potential behavioural changes, to avoid rebound effects and decrease the environmental load of new business models [Goedkoop et al., 1999].

With the consumers becoming users, some related issues about ownership, consumer rights, data privacy and intellectual property need also be taken into consideration.

Moreover, an inclusive circular economy has to be as much about changing social practices and behaviour and actively involve people as it is about redesigning products and services. So far citizens have only occasionally been involved in the public conversations and academic discourse on circular economy.

Also, not much has been said and researched in terms of social sustainability. According to Vezzoli et al., PSS could enable the integration of the disfavoured populations into the economic activity because these populations segments would be able to pay for use instead of purchasing goods.

The topic is very complex as it has to manage economic, social and environmental levels. Bocken et al. [2014] emphasised the importance and difficulties of developing sustainable business models that succeed on all the environmental, economic, and social levels. This triple bottom line approach is fundamental to access the overall payoff of a PSS and considering its importance.

Driven by the need of a more effective and sustainable way to use our planetary resources, research on PSS shows high potential for balancing economic, social, and environmental benefits [Sundin and Bras, 2005; Tukker, 2004; Mont, 2002]. To remain in the car sector examples, customers who are not regular users of cars may choose to use car-sharing solutions rather than buying a car, opting for a sustainable and resource efficient solution, as an electric car service provider.

Considering what said until now, the research and the literature around PSS, its pros and cons connected with material resources, society and economy, it becomes clear that the three different types of benefits mentioned above can only be achieved when the companies intentionally design, from the beginning, the business model is a way that is able to deliver the desirable environmental and social impacts.

Companies, together with public policies and governments, are in charge of overcoming the corporate, cultural and regulatory barriers for implementation and diffusion of PSS. Companies and their short or long term thinking and vision are fundamental to allow a broader diffusion of the PSS and a wider inclusion of people in the performance economy. Therefore, after considering the circular and performance

economy, the growing inequality, the role of ownership and usership, the consumers acceptance toward the PSS business model, companies and their short vs long term vision will be the topic of the next chapter as well as the current cases of product as a service business model in general and also in the appliances sector in particular.

Chapter 2

Companies: role and responsibility in the circular economy

1. Moral economy and purpose driven companies

“How selfish soever man may be supposed, there are evidently some principles in his nature, which interest him in the fortune of others, and render their happiness necessary to him.”

–Adam Smith, *Theory of Moral Sentiments*

The first chapter explored what circular economy is, why inequality and environmental crisis are connected, how it is necessary to rethink possession and the meaning of things with new business models that highlight usership against ownership. Shifting to usership changes the behaviour of people, but it might also have influence on the levels of inequality in the present society.

As seen in the first chapter Atkinson and other economists that have focused on rising inequality identified a number of contributing factors to it including globalisation, technological change (information and communications technology), growth of financial services, changing pay norms, reduced role of trade unions, scaling back of the redistributive tax and-transfer policy.

At the same time, Atkinson [2015] suggests that forces that influence the rising inequality are not outside our control:

*"Market incomes are not just driven by exogenous forces over which we have no control. A reduction in market income inequality is possible. We need to explore the determinants of technological change, to see how it can be harnessed to improve the life chances of workers and consumers. In a market economy, supply and demand influence the outcome but leave space for other mechanisms; we need, therefore, to examine the wider social context in which markets operate."*¹

What companies choose as a business model and also what exact model they create favourites is connected with the purpose of the modern companies. The mission of the companies, aside from being in business and generating wealth for stakeholders and shareholders, is relevant in this context. The mission of a company is strongly linked also to the role that the company has in society. The role of company in society leads to the argument of moral economy. In a moral economy, companies that focus also on having a role in the society, according to how they shape their value proposition, might create more equality in society.

According to some of the most popular theorists, we need a moral economy because capitalism does and should embed moral values and solidarities that limit the motives and calculations of self-interested agents. The social theory and the moral economy approach has been at the center of the works of Richard Henry Tawney, Karl Polanyi and Edward Palmer Thompson from the 1920s to the 1960s. They explored the tension between a moral and human society and the economic practices of the markets. As Tim Rogan claims in his book *The Moral Economists* Tawney, Polanyi e

¹ Atkinson, A., *Inequality - What can be done?*, Harvard University Press, 2015, p. 110.

Thompson are the '*theorists of everything that economics left out*' [Rogan, 2018, pp. 7, 186]².

The role of morality in the economy has been studied more recently by Andrew Sayer [2005, 2006, 2007, 2011] who explored the lay morality and the political norms that underpin and inform market economies. Sayer [Sayer 2000, p. 79] argues that "*the moral economy embodies norms and sentiment regarding the responsibilities and rights of individuals and institutions with respect to others*".

The moral economy is at the opposite extreme of what the economy has become lately with the growth of short-termism and value extraction, the pursuit of returns on financial investments in productive activities, the escalation of financial or merely patrimonial accumulation [Barbera et al. 2016].

The need for a new kind of companies was expressed also by Pavan Sukhdev in Corporation 2020 where he outlines the new DNA of business, showing how corporate agents, society and the economy need an "economy of permanence", also known as a green economy or a sustaining economy. Among the major strands of the Corporation 2020 described by Sukhdev there is the fact that the goals of the companies are closely aligned with those of human society such as increased human well-being, increased social equity, improved social and communal harmony, reduced ecological scarcities, and reduced environmental risks.

There is an increasing literature about the purpose economy where profits are not the only drive of the companies. There is a growing request from citizens to have organisations and companies with ethical, social, environmental and economic values. Many are asking companies to have a positive impact on the quality and condition of people's lives and to evaluate their impact and the legacy they will leave for future generations.

Researchers show that a fundamental rethink of the social purpose of business is needed. In 2014 Madsen called them *enlightened corporations* where "*an enlightened*

² Rogan, T. *The Moral Economists: R. H. Tawney, Karl Polanyi, E. P. Thompson, and the Critique of Capitalism*, Princeton University Press, 2018, pp. 7, 186.

corporation is one that takes a bolder view of business, where profits are not their only goal but just one among several... an ideological shift from shareholder to stakeholder primacy – and managing the firm accordingly – is another way to envision this change of attitude about CSR and make the transition from a traditional to an enlightened firm”³.

Actually, in recent years, there has been the rise of businesses that are driven, or at least claim to be driven, by purpose as well as profits. They also follow a market trend. As the Deloitte Millennial Survey 2018 shows 40% of Millennial consumers believe that the goal of businesses should be to improve society. Companies, also considering the very crucial moment for the life of human species on the planet, need to become forces for good. More and more customers- 66% according to the Edelman Trust Barometer 2021⁴- expect CEOs to lead on social change rather than waiting for government intervention.

A purpose-driven company stands for and takes action on something bigger than its products and services. It is not just about doing good: purpose can be an organisational strategy as well as a roadmap to remain competitive in a fast-changing economy. Even though there is not much academic research around purpose-driven branding, in their paper from the beginning of 2021, Hajdas and Kłeczek claim that the brand purpose of such companies empowers consumers and fosters transformations of their practices. According to PwC, 79 percent of business leaders believe that purpose is central to success. Despite this, less than half of employees knows what their organisation stands for and what makes it different⁵.

One example of purpose driven companies are the Certified B Corporations. The B Corporations are companies certified on the basis of social sustainability and environmental performance standards. The B Corp movement started in 2006. Since

³ The Guardian, *Corporates as agents of social change: the academic view*, 15 January 2014, available at <https://www.theguardian.com/sustainable-business/corporates-agents-social-change-academic-view>.

⁴ Edelman Trust Barometer 2021 available at <https://www.edelman.com/sites/g/files/aatuss191/files/2021-01/2021-edelman-trust-barometer.pdf>.

⁵ PwC, *Putting Purpose to Work: A study of purpose in the workplace, 2016* available at <https://www.pwc.com/us/en/about-us/corporate-responsibility/assets/pwc-putting-purpose-to-work-purpose-survey-report.pdf>.

then, around 4500 companies from all over the world have been certified as a new kind of business that balances purpose and profit. They are legally required to consider the impact of their decisions on their workers, customers, suppliers, community, and the environment. In the B Corp Declaration of Interdependence they state *“We envision a global economy that uses business as a force for good. This economy is comprised of a new type of corporation - the B Corporation - Which is purpose-driven and creates benefit for all stakeholders, not just shareholders”*⁶.

Among the B Corps, and in general in the business sector, the Californian Patagonia has gained in the last years a leadership role in being a purpose driven company. The apparel company claims *“We are past the time when any business can legitimately ask its employees to leave their values and humanity at home. And no business can any longer afford to year after year pursue minor incremental efficiencies while foregoing opportunities to help reweave the social fabric and regenerate rather than deplete the health of the natural world”*. Patagonia became a company known worldwide for its strong environmental and social statements as well as for the political ones (next to T-shirts condemning Big Oil, encouraging people to vote with planet Earth in mind and declaring that, when it comes to wilderness, Americans must “defend it or lose it”, for the last election campaign the company put on a limited-edition pair of shorts a tag with the message: “VOTE THE ASSHOLES OUT” to condemn Trump’s environmental policy and mandate).

Following Patagonia and next to it, there are many big and small companies trying to integrate purpose in their business. Just to mention one, Willicroft, a plant-based cheese company, has accounted Mother Nature as its CEO. According to its founder this choice keeps them from taking any decisions that will have a negative impact on the environment.

Also Mazzucato focuses on the concept of purpose and its importance in reshaping our present world and in fighting climate change. In her recent *Mission Economy* (2020), the author identifies four drivers of the dysfunctional form of contemporary capitalism, fuelled by and fuelling the climate crisis: finance sector short-termism; the

6 THE B CORP DECLARATION OF INTERDEPENDENCE, available at <https://bcorporation.net/about-b-corps>.

financialisation of business and value; fossil fuel dependency; and slow or absent governments. Among the six key lessons for tackling complex problems to learn from the Apollo mission and developing them into principles for a new political economy, Mazzucato identifies, first of all, vision and a strong sense of purpose. The other five are: risk taking and innovation, organisational dynamism, cross-sectoral collaboration, outcomes-based budgets and long-term horizons, and dynamic public-private partnerships. Moreover, Mazzucato explores the ways these principles can help in shaping present day net-zero strategies, green city programmes and missions to achieve the sustainable development goals.

It is widely accepted the push to reinvent organisations that are productive, fulfilling and meaningful and to create soulful workplaces. Connected to it, there is the need to create companies that make people and customers thrive while protecting the planet. Companies too are moving towards this direction that is also the only way forward to avoid the ecological collapse, far beyond the climate crisis we are in.

Aside from the discussion if it is green washing or a business strategy, also big companies like Starbucks and CVS have lately recognised that it is in their best interest to focus on a higher purpose. The second largest investment firm in the US, BlackRock Financial, is actively encouraging companies in the private sector to find a purpose that meets people's unmet needs. Larry Fink, chairman and chief executive officer of BlackRock, and others CEOs lately acknowledge the imbalance that exists between what the market is providing and the needs of society.

In this context of rising awareness around the responsibility and the company roles in the society, the circular economy is one of the examples of how purpose-driven companies can lead the charge towards more sustainable systems and solutions.

In particular, circular companies that adopt a product as a service business model and keep the ownership and responsibility of their products, try to adopt a long-termism approach to business. They move the value of their products over time, accepting to be active in the long run and changing their own cash flow system. Circular companies in the product-as-a-service business model decide to go for a small

amount of money every month instead of collecting all the payment in one time at the purchase of the product as it happens in the linear business model.

The value of the materials and products is extended in time as well as the rights of the company toward the specific product. The materials and the products will be taken back when the users will not use them anymore, while the companies have all the interest that the product keeps running at its best performance for the longest time possible. The machines used in the product-as-a-service business model are then not created to be broken after a specific period of time. Considering this different companies' approach in manufacturing high quality products, brings in the picture another crucial element: the companies do not plan the obsolescence of their products.

2. Planned obsolescence and companies responsibility

The obsolescence of products, a classical business strategy, is totally opposite to the idea of reuse, of giving many life cycles to the some products and far from the rent and sharing economy.

In the classical or linear business models, businesses profit mostly from the direct sales. So, in order to maximise revenue, businesses will strive to increase the number of sales. This has led to a decrease in product life span, planned obsolescence and increased resource usage [Guiltinan, 2009].

In a linear business model companies that want to be in business need, of course, financial sustainability, thus it is necessary that they keep making money based on the services or the products that they offer to their clients. In order to keep the full linear system going on- the system of "take-make-dispose"- and thus the companies selling products, during the 20th century *planned obsolescence*, also called built-in obsolescence or premature obsolescence, was created. In economics or in industrial design the term planned obsolescence refers to a product that has been planned or designed artificially with a limited useful life. The product has been designed to become obsolete or to lose its functions after a determined period of time or usage so that it has to be changed with a new product.

The phenomenon of built-in obsolescence took place for the first time on a large scale in the 1920s, in the context of industrialisation and mass production. Before that, high production costs resulted in the production of goods at a small scale to serve the next generations. Along with new technological discoveries, mass production and consumption developed. Manufacturers began to produce their goods at a large scale with greater ease, but people were not interested in buying them. There was therefore an overproduction of goods in relation to the reported demand (London, 1932, p. 3). Bernard London, considered the father of research on planned obsolescence, thought the overproduction led to the Great Depression. According to him, shortening products' life cycles should have been a good remedy for the Depression. He suggested that the governments should control the production of goods so that they would have a certain (shorter) expiration date, known to all consumers, after which date they have to be disposed of. Such a situation should have fuelled the economy by offering people new jobs and resulting in the development of companies (London, 1932).

So, during the Great Depression companies started to put artificial expiry dates on products in order to encourage consumers to buy more or renew their products. The practice became more normal through the years until today where, in technology-driven markets, one often comes across the strategy of reducing products' life cycles by degrading the older and promoting new versions of the same products, such as software programs, computers, and mobile phones. Promoting the new attributes of the products, manufacturers launch new versions of their existing products at regular intervals even if, very often, the improvement and the difference between the old and the new version are very little. Samsung and Apple launch new versions of their mobile phones every year in the spring and late summer, respectively, for example.

As a central marketing strategy, the objective of planned obsolescence is to stimulate replacement buying among consumers [Guiltinan, 2009]. More specifically, planned obsolescence should prompt consumers to buy the newest products by making them incompatible or partially compatible with the old version, and therefore reducing previous versions' value for the consumer [Miao, 2011]. By designing products with short lifespans, companies seek higher revenues and profits in saturated and highly

competitive markets [e.g., Gershoff et al., 2012; Levinthal and Purohit, 1989; Stewart, 1959].

From the designers perspective planned obsolescence refers to designing products with uneconomically short lifespans [Fisher et al., 1962] and the intention to pressurise consumers to repurchase more frequently than is necessary [Ellison and Fudenberg, 2000].

The term planned obsolescence was popularised in 1954 by Brooks Stevens, an American industrial designer, who during a talk at an advertising conference in Minneapolis declared that planned obsolescence meant "*instilling in the buyer the desire to own something a little newer, a little better, a little sooner than is necessary*"⁷. The goal behind this strategy is to generate long-term sales volume by reducing the time between repeat purchases (referred to as "*shortening the replacement cycle*").

After Stevens, many tried to study planned obsolescence like Packard [1964], Bulow [1986], Kreiß [2015] and Pope [2017], but mostly focusing on the business side. From the definitions below emerges the circumscribed focus of their studies:

- "*Planned Obsolescence is the production of goods with uneconomically short useful lives so that customers will have to make repeat purchases*". [Bulow 1986, p. 729]
- "*The objective of planned obsolescence is to stimulate replacement buying by consumers*". [Guiltinan 2009, p. 20]
- "*Among these is the practice of planned obsolescence, the aim of which is to make manufactured products prematurely obsolete*". [Pope 2016, p. 1]

There are many variants of planned obsolescence, from the perceived or psychological one- a typical example of it is in the fashion industry where new items make the previous ones constantly look old while still fully functional- to the systemic and programmed one- as in the case of laptops and smartphones where software are not possible to be updated or to run on older versions- until the legal one where the

⁷ Glenn, A., *Industrial Strength Design How Brooks Stevens Shaped Your World*, Cambridge, Mass.: MIT Press, 2003, p. 129.

product usability is undermined through legislation while facilitating the purchase of a new product by offering benefits (es. electric vehicle vs internal combustion engine).

Pope also studied planned obsolescence based on different types of strategy: planned obsolescence of quality; planned obsolescence of function and planned obsolescence of desirability.

Anyway, aside from the various definitions and types, through the years many researchers have approached the study of planned obsolescence from different perspectives from the design point of view to the company side until the customers' side.

However, besides some exceptions with an interest in a marketing context [Bayus, 1988; Howell, 1962; Utaka, 2000], planned obsolescence research mainly focuses on the company's perspective. Some researches see planned obsolescence connected with planned innovation [Howell, 1962] or with criticism as the rise in planned obsolescence entails many questions and a call for caution [Box, 1983; Pauwels and D'Aveni, 2016; Tischleder and Wasserman, 2015].

The consumer perspective, instead, has been rarely taken into account, but it is crucial in order to understand the fight against planned obsolescence and for the right to repair that is happening in the present years. In March 2021, the European Parliament voted to establish stronger "right to repair" rules to reduce electronic waste in consumer electronics such as refrigerators, washers, hairdryers, or TVs. In the European Union manufacturers will need to ensure those goods can be repaired for up to 10 years. The resolution from the EP stated *"to be sustainable, products must be repairable, so that they can remain on the market for as long as possible. It is time to stamp out practices which prevent or hinder product repairs"*⁸.

With consumerism and consumer empowerment on the rise, companies' initiatives are increasingly analysed and shared, to the extent that they influence consumers' purchase decisions. While some companies continue to develop different versions of new products, many consumers complain about such strategies. New products are

⁸ https://www.europarl.europa.eu/doceo/document/A-9-2020-0209_EN.html#title2.

sometimes developed for aesthetic rather than functional reasons, in order to generate more sales to existing customers [Bodur et al., 2013; Nguyen and Klaus, 2013; Stock and Zacharias, 2013]. From their perspective though some consumers indicated feeling manipulated into accepting offers that oblige them to buy upgrades for which they had not asked, or that left them facing incompatibility issues [e.g., Strausz, 2009].

The customer's perspective on companies' planned obsolescence strategies has been largely unexplored. Building on previous researchers findings [Bulow, 1986; Howell, 1962; Strausz, 2009; Utaka, 2000; Waldman, 1996], Kuppelwieser et al. suggested that planned obsolescence impacts the perception that consumers have of a product and, ultimately, their purchasing behaviour.

Kuppelwieser et al. researched the consumer responses to planned obsolescence. The paper finds that a planned obsolescence strategy harms customers' value perception and ultimately their willingness to pay. Through the consumers' assessment of planned obsolescence done by Kuppelwieser et al., it emerges that designing a new product to become old soon specifically influences the customer-brand relationship, it exploits customers' sense of their products becoming outdated or unusable. The substitution period's length can change the product's perceived value. It has important implications, also risky for the companies, because manufacturers rely on consumers' understanding of added value when they launch new products.

Planned obsolescence has a straight influence on the consumers and their protection toward the companies using this strategy. This was also evident recently in the Italian case of Autorità Garante della Concorrenza e del Mercato which condemned Samsung and Apple on the grounds of the prohibition of unfair commercial practices. While companies apply planned obsolescence trying to increase their revenues, there are norms that can ensure consumer protection in the case of technical or functional planned obsolescence, especially considering the communication dimension, which focuses on the right to information.

Seeing what the consumer's perception of the unfair practice of planned obsolescence is, it is also interesting to realise and understand that this practice has a short-

termism approach that does not benefit companies of the 21st century in the long term- especially if they adopted a circular business model-, nor the planet.

Planning and programming obsolescence in products during a climate emergency, with periods of material scarcity ahead, is not a policy that fits with companies with a long term thinking. Next to it, looking at the circular economy sector, companies with a long term horizon that use the product-as-a-service as business model cannot afford planned obsolescence as they focus on high quality. Actually, the aim to create products with a longer life span means to design and create products that need low maintenance, easy to repair, easy to refurbish.

From an environmental perspective, in addition to the large amount of waste generated by planned and fast obsolescence, there is the problem of natural resources depletion [Rodrigues et al., 2014]. The climate change effects provoke water shortages, among others, compromising society, agriculture and industrial production, all valuable resources that need to compete with the production of other tools and products. Another challenge that makes planned obsolescence a broken strategy is the metal shortage, since extraction and consumption of metals has increased in the industrial economy, and the depletion of some metals is a possibility if extraction is not decreased [Arvidsson and Sanden, 2017; Henckens et al., 2014; Vivanco et al., 2017].

In the middle of a climate crisis, the overproduction and the overexploitation of natural resources is not sustainable anymore.

From a scientific point of view, although much research has been done on ways to provide better conditions of environment and cleaner production, little attention has been paid to the impact of the short lifetime of the current products in sustainability and also to the necessity of providing natural resources to supply goods to a human population with a growth rate never seen before. Recently, some papers have studied planned obsolescence and the necessity of changing the paradigm of planned obsolescence to the one of long-lasting products and to present some ideas found in the literature review on how to keep products updated under the many changes and innovation to which the products are subject in the present period.

Satyro et al. [2018] proposed two mechanisms of planned obsolescence to complement the theory. The first, design for fast consumption, shows how industry designs products to artificially increase consumption of olive oil, perfumes, sunscreens, moisturising creams, shampoos and other related products, and alert how a simple design change in toothpaste tubes with a mouth of internal diameter of 8 mm decreased to 5 mm can reduce consumption by 61% while frequency of brushing and length of toothpaste can be maintained. The second, design for restricted technological update, approaches how industry uses this mechanism to force people to exchange their cellular phones and electronics in general every year; and also to propose solutions to better benefit the consumers and the environment. According to Satyro et al. small changes in the design of products allow a new and less consumerist society to replace the current one. Satyro et al. also underlined the difficulty of finding people who agreed to be interviewed, the visible discomfort of the interviewees in the companies to talk about planned obsolescence and the difficulty to collect data about the subject as one of the reasons for the scarcity of studies in this area.

Partially in the same direction stands the paper by Rivera and Lallmahomed [2016], which explores the implications of planned obsolescence and the associated product lifetime on the environmental impact of products. They found out that one of the main obstacles in understanding planned obsolescence is that companies reject the allegation of deliberately intended premature obsolescence. In the research they carried out, all interviewees assured that when they had to balance cost against lifespan, lifespan always prevailed. The obsolescence according to the interviewees is, instead, caused by the basic conditions of developing and producing: rising complexity, increasing speed of innovation cycles and high cost pressure are the causes of it. These conditions and their constraints leave little space to single actors of the development process and to companies. In this sense, from the paper it emerges that obsolescence is systemic.

Counterbalance planned obsolescence, though, is also crucial to reduce waste [OECD, 2011]. In fact, aside from lowering consumer experience [Lobos, 2014; Wieser, 2016], consuming exaggerated natural resources to produce replacement products, pressing the commodities price, generating economic volatility and supporting inflation

[Echegaray, 2016], the widespread of fast obsolescence generates a lot of waste. It pressures public resources with the increase of garbage collection, it costs more because of the purchase and the maintenance of waste disposal areas, and at the same time, it exposes population to toxic material from non-recycled products and pollutes land, water and air [Echegaray, 2016; Çetiner and Gündođlan, 2014]. In order to attempt to reduce it, governments and society are trying to account the producer as responsible for the entire life cycle of their products- including recycling or eco-friendly waste disposal- through the Extended Producer Responsibility. The EPR is a *“policy approach under which producers are given a significant responsibility – financial and/or physical – for the treatment or disposal of post-consumer products”*⁹.

At the same time, even though there has never been a time with so many products and tools, the push for selling more and more together with the effort to create the idea of scarcity, against the idea of abundance, is at the base of the practises of many companies nowadays. From Amazon to fashion brands, especially the “luxury” ones like Burberry and Nike, many producers prefer to burn unsold goods for market reasons, also to simply keep products away from those who cannot afford to pay the retail price of the items. Lately, France is working to avoid the counter circuit of this system both with a ban for burning the unsold items and with a law that favours the repair of the broken items (“right to repair”).

The problem of surplus products increases also with online shopping, where, again, brands and platforms prefer, simply for cost opportunity, to burn the items that come back to the logistics facilities instead of putting them back on the web shop or finding them a second life.

As we have seen in the first paragraph of this chapter, though, the companies that will strive, hopefully, in the next decades and that are trying to balance business with people and planet are increasing. With particular reference to the circular economy sector, many companies from all over the world are trying to make money while not exploiting the planet. Among them, stands the English company Vivo Barefoot that for Black Friday 2020 launched the platform ReVivo Barefoot in order to sell refurbished shoes of its own brand. Even Apple is selling more refurbished items while, in the appliances market, the Italian company Ri-Generation sells refurbished washing

⁹ <https://www.oecd.org/env/tools-evaluation/extendedproducerresponsibility.htm>.

machines, dishwashers, ovens and fridges.

From a financial point of view a push back to planned obsolescence could arrive from building second hand markets. More companies are starting to see them as new markets and new sources of cash flow. Second hand products and materials start, though, with products of good quality, that are easy to repair and upgrade, through refurbishment or remanufacturing. A plethora of online marketplaces is currently built to keep in use and sell refurbished products or already used items. It is a phenomenon that involves the building sector as well as the electronics sector. Even in the clothing sector it has become more and more normal to keep in use products that retain value. Aside from the charity shops that sell second hand clothes, there are many startups that keep in the loop high end clothes like The Real Real, Vestiaire Collective or The Next Closet. Even from the finance sector there is an awakening moment towards the life cycle extension and against planned obsolescence: since the beginning of 2021 there have been two high-profile IPOs in the clothing reselling space. If the second hand car market is not a new thing, the second hand furniture market with websites like Deesup are on the rise.

While circular practises are becoming more common, from a social point of view the price of these refurbished, remanufacturing, pre-loved items keeps being often high for people with low income. While building more and more companies and systems to keep materials and products in the circle, from a social point of view, it is also crucial to understand how easy it is for low income people to afford these products or if, also in this case, people with low income will be cut out of the system because of some barriers.

As seen in the first chapter, looking at the circular business models, performance economy, and its connected product as a service model, is the most promising for creating a more equal and circular society. Then the next paragraph looks at the companies and pilot projects in the sector, their goals and their users.

3. Current cases of companies using the product-as-a-service model

As seen in the previous chapter, many researches show the product-as-a-service

business model as the one that could potentially lead to more sustainable consumption practises and bring a longer life cycle of products and materials.

At the same time, as other researches suggest, the servitization of assets come with significant coordination challenges, high administrative costs, particular financing needs and increasing complexity in division of ownership [FinanCE working group 2016; Fischer and Achterberg 2016; Achterberg and van Tilburg 2016; van Tilburg, Achterberg, and Boot 2018]. The difference in business model also requires trust and openness among value chain participants. Those obstacles together with some other legal and social barriers are considered as the main reasons why not many companies are adopting the model.

In a circular business model in which assets are no longer sold, but collectively serviced by circular service networks, all stakeholders involved need to have the interest in keeping an asset functioning. According to Circle Economy [2019], this requires unprecedented levels of cooperation and coordination, leading to often prohibitively high administrative costs and the need for trust and transparency in the network. Despite the obstacles and barriers many companies in different sectors have been experimenting with product as a service business models both in the B2B sector and in the B2C sector.

Companies like Xerox and Interface and the car sectors that have been pioneers in the space already for decades offering leasing options and sharing services. In recent years some of the most interesting experiments with Product Service Systems have been happening in the appliances and the consumer electronics sector and in the clothes industry.

Similar to what we have seen in the last decade with Spotify and Netflix in the music and movie space, other companies have proposed the same model, a model that does not contemplate a transfer of ownership. The users have access to the products, while the companies keep the materials and the responsibility. It is a worldwide phenomenon in advanced economies.

Grover¹⁰ is a Berlin-based start-up that offers access to a wide range of electronic gadgets from smartphones to GoPros. It offers a product-as-a-service subscription, which allows users to avoid unnecessary purchases. By signing up to the service, users have access to all the most innovative technology through a pay-as-you-go system. Through its website and partners Grover offers gadgets and technology that customers can use for however long they want, through monthly, quarterly or annual subscriptions.

The Dutch Gerrard Street¹¹ rents design and high quality headphones, that have a market value of around €250, for a 7,50€ a month. The headphones are modular and can be delivered in the mailbox as a kit, they are easy to repair, update, and disassemble. The smartphone company Fairphone¹² has launched, just for companies at the moment, a pilot project to get the *phone as a service*.

It is not just a phenomenon connected with phones and electronic products. Over the last few decades increased affluence, urbanisation and a rise in global temperatures have all led to air conditioning becoming an essential commodity. Kaer¹³, a Singapore based company, has reacted to this trend and pioneered the *air-con as a service* model (ACaaS) where the company joining the models gains access to air conditioning and a cool environment, without having to deal with the problems inherent in ownership.

The system has been applied also in the packaging sector: from ClubZero¹⁴ in UK that helps shops to reduce throwaway packaging creating a traceable system of *cup as a service* to RePack¹⁵ in Finland and in Europe which created for online purchase a *packaging as a service* model where the envelopes, once the delivery is done, go back to the company, ready to be used once again. The list of technology that companies and private users can lease as a service is long: from *solar panels as a service* to clothes.

¹⁰ <https://www.grover.com>

¹¹ <https://gerrardstreet.nl>

¹² <https://www.fairphone.com>

¹³ <https://www.kaer.com>

¹⁴ <https://www.clubzero.co>

¹⁵ <https://www.repack.com>

The clothing industry, so unsustainable in the last decade, has been hit by a great number of new companies trying the model of *clothes as a service*. From the US Le Tote¹⁶ to the Chinese Y Closet¹⁷, from the Dutch Circos¹⁸ to the English Bundlee¹⁹-focused on children's clothes-, the concept of a subscription to temporarily rent the wardrobe or some items of it is becoming more normal. Especially in the case of a baby's wardrobe that can be swapped as children grow.

The Dutch company Mud Jeans²⁰, that proudly defined itself as “the first circular fashion brand in the world,” bases its business model on the *product as a service*. With a monthly membership fee of €7,50, it is possible to rent the favourite pair of jeans (or more than one pair), return it after a year, get a new one and send the used one back with reusable RePack packaging. Adopting this model, Mud Jeans keeps the ownership of the garment and changes the role of the brand, which now has to build a relationship with the consumer and continue to cultivate it after purchase.

Also the furniture sector has been attracted by this new model both in the B2B than in the B2C segment. Schiphol airport in Amsterdam has been running for years now with *lighting-as-a-service*²¹: it means that the airport pays Philips for hours of light, while it does not own the bulbs or LED in the building. In Europe, for a fixed monthly fee, Ahrend Furniture as a Service²² delivers workspaces that can easily be adapted to the changing needs. IKEA in Sweden has a pilot program of leasing its furniture. Feather²³ in San Francisco is a furniture rental service that allows people to live light during more or less temporary periods. It is the easiest, most stress-free way to go

¹⁶ <https://letote.com>

¹⁷ <https://www.ycloset.com>

¹⁸ <https://circos.co>

¹⁹ <https://bundlee.co.uk>

²⁰ <https://mudjeans.eu>

²¹ <https://www.signify.com>

²² <https://www.ahrend.com/en/solutions/furniture-as-a-service/>

²³ <https://www.livefeather.com>

from an empty apartment to a fully furnished home without spending a lot of time and money upfront.

The product as a service business model is often being underlined for its sustainability as the materials and the products have many users and the reduction of idle time as the products are being used instead of getting old in the closet or in the garage. It is evident though that, according to the way the service is run and the products are treated, there is more or less sustainability in such a system. It has to be underlined very clearly that not all product-as-a-service innovation offers a circular outcome. Actually it is also crucial to have a deep understanding of the impact of this system, run a proper assessment that considers all the phases of the material's life-cycle and what happens when the products are taken back from the provider. The ideal option is that the products get cleaned, repaired, refurbished to be ready to flow back in the system for new uses and users. On the other hand, if a product ends up in a landfill rather than being refurbished or deconstructed and cycled back into the value chain, the sustainability and the circularity of the product-as-a-service fails. Company choices have to be considered as well as the way people use products and tools that they do not own.

It has to be underlined as well that many of these companies above mentioned have a target group that are wealthy, well educated, young professionals living in the city. Companies like Grover, Gerrard Street, Feather or Mud Jeans have price points for the service of their products (usage of electronic items, headphones, furniture, jeans) that are not affordable for people with a low income. These are for profit companies that are in business for making money and do not target disadvantaged social categories as customers.

Looking both at the business and the customer side, the Dutch company Bugaboo²⁴ International ran a very interesting pilot project funded by the European Union's Seventh Programme for research, technological development and demonstration. With the ResCoM²⁵ pilot project, Bugaboo explored and trialled a small-scale pilot for its 'Flex plan', which offered a leasing package for new strollers. Customers subscribed

²⁴ <http://www.bugaboo.com>

²⁵ <https://www.rescoms.eu>

to the Bugaboo Flex Plan to lease a stroller by paying a deposit and a monthly fixed fee. The Flex Plan was tested with around 50 customers. Thanks to the pilot it became apparent that people were likely to treat the products with much less care than if they were their own. In the current ownership scenario, products are expected to be used by two to three families and, actually, it is possible to find Bugaboo strollers on second hand platforms ready to be sold. However, in the leasing pilot, the Bugaboo strollers were sometimes damaged after only a few months, despite customers paying a deposit of € 200.

The pilot, even though its aim was to understand how collection, remanufacturing and reuse of products can lead to more profitable, resource-efficient and resilient business practises compared to the current linear manufacturing system, highlighted a number of challenges that need to be addressed in capturing the full value of the leasing model. These included non-technical aspects, including administration tasks such as credit-checks, or dealing with any difficulties collecting the monthly fee. Offering customers the opportunity to change their strollers throughout the lease period requires finding ways to overcome the increased refurbishment and transportation costs.

The project, concluded in October 2017, discovered a number of barriers like setting up effective reverse logistics, tracking and tracing product returns, ensuring regulatory compliance associated with refurbished products, optimising design for leasing and refurbishment, and understanding the financial feasibility of the new business model compared to the existing one.

The example above clearly underlines how it is too simplistic to say that the product-as-a-service business model is more sustainable than the linear ones currently used. There are many elements to be considered in a whole evaluation like the energy use, material use, etc., and the tools currently available to evaluate such complex topics are often considering only a few elements and not the whole picture.

In 2021, also, Finnish researchers²⁶ performed a life cycle assessment (LCA) of a pair of jeans under five ownership and end-of-life scenarios, concluding that the rental option had higher carbon emissions than simply throwing the jeans away. Even

²⁶ Levänen J., *Innovative recycling or extended use? Comparing the global warming potential of different ownership and end-of-life scenarios for textiles*, Environmental Research Letters, Volume 16, Number 5, 2021 <https://doi.org/10.1088/1748-9326/abfac3>.

though research on the sustainability of the product-as-a-service business model is still ongoing, there are some lessons that can be taken from the research. First, the climate impact of transportation and logistics is still significant and should be factored into any sustainable solutions. Second, LCAs are limited by their scope. In the case of the Finnish research, other important sustainability impacts like water and biodiversity were not considered.

This shows once again how complex the topic is and how difficult is to evaluate the overall sustainability and circularity of processes and products.

4. Cases of companies with product-as-a-service business model in the appliances sector

Looking at the appliances sector, that is the sector chosen for the case study object of the present research, there have been in the last years some pilot projects that adopted the product as a service as their business model. The pilot projects were initiated by big manufacturers as well as by two Dutch companies, Bundles and Homie, that based their business model on the product-as-a-service.

Aside from Bosch, whose case will be deeply explored in the next chapter, Electrolux, the domestic appliance manufacturer, has carried out a pilot project in Gotland, Sweden, in 50 households where the ordinary washing machine was replaced by a product service system or pay-per-wash service. The pilot study by Electrolux significantly changed the infrastructure between the company and the consumer and also the company's interaction with the users. The pilot project that measures the number of washing cycles was made possible thanks to an energy efficient digital washing machine, central database and smart energy metres installed. The pilot from a big manufacturer company like Electrolux shows the interest that companies have toward the new business model that could give new sources of income on one side and radically change their cash flow on the other side.

Bundles and Homie are two companies founded and running totally on pay-per-wash business models. They both operate in The Netherlands.

With the household appliances-as-a-service model, Bundles aims to prevent over-consumption and minimise the use of fast-moving consumer goods promoting access over ownership. The Dutch company has offered subscriptions for high-quality appliances since 2003 thanks to a partnership with Miele, the German company producing household appliances. Miele high-end products are home-delivered following a monthly subscription. Within a minimum of three to a maximum of five days, the chosen washing machine, tumble dryer or dishwasher is delivered and installed in the user's house, while still being owned by Bundles. The old machine gets recycled. The customer, benefitting from a service, while not owning the appliance, pays according to the washing cycles and to the package selected on subscription that are measured by Bundles thanks to smart metres. The user receives an endless guarantee together with insights and personalised tips about his/her washing experience. There is also the possibility to choose between a new machine or a refurbished one. Keeping ownership of the appliances means that Bundles is in charge of delivering, installing and maintaining the product while also offering additional services such as automatic restocking of detergents. Leaving ownership and liability of appliances coming into people's homes to Bundles means that the products supplied have to be of a high quality and innovative in order to offer the best possible experience to users while also using less energy, water and detergents.

According to the Bundles model, the users pay a fixed monthly price plus a small price for every wash they run. The more washes users make the more they pay as total amount, while the price for the single wash drops with every extra wash. Charging automatically the user's wallet Bundles has theoretically a soft nudge toward sustainable consumption. There is a nudge to consume and run the least amount of washes possible, but if users run more washes, the price for each cycle decreases. At the same time, having a clear picture of how many cycles are run, Bundle has the chance to give direct feedback about the sustainability of the consumption and to nudge towards specific behaviour such as washing during off-peak hours or small maintenance tasks by introducing discounts. Helping customers to lower energy, water and detergent use while knowing customers' habits creates, of course, some privacy issues that might be addressed in the next few years. Bundles takes the responsibility for maintenance in order to increase the lifetime of the appliances and takes care of upcycling and repairs of broken appliances aiming to capture the value

of the applied materials. The goal is to make sustainable and efficient appliances that last accessible to everyone.

Similarly to Bundles, the start-up HOMIE uses a pay-per-use business model in the household appliances sector. Founded in 2016, HOMIE is a TU Delft spin-off company that aims to significantly reduce the environmental impact associated with domestic appliances, by offering appliances on a pay-per-use basis. The company was founded with the clear purpose of demonstrating that new sustainable business models could contribute to sustainable consumption and circular economy. For this reason the case of HOMIE has been at the centre of different research papers. One of them used two samples of 56 and 21 customers in a longitudinal study to assess whether their consumption patterns of using a washing machine significantly changed after implementing a pay-per-use business model. It was found that pay-per-use business models have the potential to stimulate sustainable consumption. When customers started paying after the first free month, the total number of washes and washing temperature decreased significantly. Temperature reductions were mostly realised by customers who used to wash at higher temperatures.

Both Bundles and Homie focus their effort in reducing the consumption, making the appliance sector more circular and sustainable both with the business model, but also with remanufacturing and other practises that reduce the environmental footprint.

In order to discover more about the connection between circular business models and inequality, it is crucial to understand how this model is used in society and by whom. The risk of this model is that it ends up being used by wealthy people that can already afford premium and high quality products, while once again people with low income are excluded. While, on the environmental perspective, product as a service can contribute to a more circular economy and could be a good step forward reducing the environmental impact of consumption practises, on the social perspective, it does not automatically imply that the economy will be more inclusive.

If social justice is not at the heart of the circular economy, product as a service and other circular systems may not reduce inequality. Thus there is the risk of creating a circular economy that generates opportunities for the big players and the few. Failing

to transform and control the impacts of a more sustainable economy will affect the poorest and most vulnerable in society.

5. XaaS - Everything-as-a-service

In September 2021, conducted by SystemIQ, on behalf of the SUN Institute, the report XaaS Everything-as-a-service was released. The report presents the positive economic, environmental and social case for the PaaS business model with a focus on the manufacturing sector. It also provides comprehensive insights on the design configurations and enabling factors that will drive successful strategies for companies innovating and scaling Everything-as-a-service (XaaS) models. According to the report, XaaS models can simultaneously unleash economic, environmental and social impacts.

One of the three sectors on which the report focuses is the white goods, in particular with the specific example of the washing machines, which are the most resource-intensive domestic appliance consuming 1.4 Mt of materials, 24.2 TWh of electricity, and 1.5 billion litres of water in Western Europe per year (7.8% of household water consumption). According to the report, offering white good-as-a-service can be a critical enabler for optimising associated environmental build and use phase impacts. In particular, the subscription model for the washing machines can enable the widespread installation of high quality washing machines with higher lifetime and higher resource productivity through maintenance, increased efficiency and material recovery. The CO₂ footprint could be decreased by ~24% compared to an average washing machine.

Also according to the report, adopting washing machines as a service can contribute to decreasing housing footprint such as laundry washing emissions by enabling resource efficiency in the build and use phase of the respective household appliance. Mitigating environmental impact through resource efficiency can be achieved by optimising customer usage patterns and smart appliances (e.g. temperature and programmes, weight load, volume of detergents used). Also, measures such as repair, reuse and refurbishment with corresponding upgrades of washing programmes and



Fig. 1 The image shows the scale of the problem and the XAAS impact potential in the European Union applied to the three sectors of cars, equipments and white goods. The adoption of the car-as-a-service (CAAS), equipment-as-a-service (EAAS) and white goods-as-a-service (WGAAS) would result in reduction of carbon dioxide emissions, decreasing of ferrous scrap and potential savings for household.

Source: SYSTEMIQ analysis, ICCT (2021), IEA (2021), Meinrenken et al. (2020), Wasserbaur et al. (2020), and Eurostat (2021).

core components can extend the life cycle of the appliances and impact their environmental performance.

Additionally, the report underlines how technology and sensors installed in the washing machines, and in the white goods in general, can detect the content of the

appliances and set the washing programme accordingly. Based on this, washing cycles, energy and water consumption can be tracked and, through analytics and feedback mechanisms to consumers, provide advice on optimal behaviour via real-time insights into usage patterns.

While it is true that technology and sensors could lead to optimisation, on the other side they create crucial issues concerning the privacy of the users. Potential concerns about data, privacy and monitoring activities of the habits of the customers need to be taken into account while relating them to ownership and responsibility. It is important to explain and create specific rules on how this monitoring processes will run and how information collected will be managed and used.

Looking at the study by Ostrom [2005] on the monitoring processes which are intrinsically linked to information management rules, the issue of data collection and management, privacy rules and monitoring activities has to be carefully treated in order to find a balance between external and internal monitoring. It is important to find a balance among the wishes of the consumers, the needs of the companies and the potential role of external authorities that would potentially assume official responsibility for monitoring. Monitoring norms are a very delicate subject as studies by Fehr and Rockenbach [2003] and Cardenas, Stranlund, and Willis [2000] have confirmed the notion that external rules and monitoring can crowd out cooperative behavior. Thus they might not match well with a rental or leasing system where it is crucial to have users totally on board and voluntarily cooperating with the process. The fine balance between privacy and data collection is very thin as seen in many aspects of modern life from driving a car to accessing online search engines.

Going back to the household appliances sector, small nudges- as in the case of HOMIE described in paragraph 4 of chapter 2- can be beneficial in suggesting the customers the best programme to run or the more convenient load of the machine, but they also create a crucial tension between the necessity to improve the way we take care of clothes and the private experience of people in their washing preferences and habits, mostly in their homes.

Next to the economic and environmental benefits, the report also highlights the social benefits of everything-as-a-service such as the democratisation of consumption as everything-as-a-service can reduce household costs (washing machines-as-a-service,

for example, could save consumers between 43-76€ per year), regional value creation and employment, the environmental potentials interlinked with positive impacts on health.

As Google keeps saying “*Waste is a data problem*”. In order to improve the machine and the system in place, it is important for the producer to understand how the machines they put in the market are treated during their use. As also one of the BSH representatives underlined during the interview, they have no insights about what happens after the selling point, in the use phase of their products. But, again, the privacy element comes back and policy and rules need to take care of this tension.

Even though product-as-a-service could represent a democratising element as people with low income can access high quality and high efficient machines and tools, at the same time, if not well managed, the adoption of white goods as a service could risk creating new inequalities in society. New inequality can increase among wealthy people that can decide to run their washing cycle at whatever degree they prefer, how often they prefer, how empty they like and people with low income or living in poverty that are sort of forced to accept intrusion in their privacy having somebody- a smart system- that suggests them what exactly to do. With the result that poor people will keep being not the biggest polluter in the fight against climate change (see paragraph 5 of chapter 1), but they will just get less privacy and less freedom.

Next to it, there are logistics issues in the development and diffusion of appliances-as-a-service linked to simply geographic manners. The diffusion of as a service systems is strictly connected to the proximity to big cities. The full service that includes maintenance, delivery and pick up at the end of life is strictly connected to living next to many other people using the system.

Making the system work for the marginalised and the poorest has to be intentionally and thoughtfully managed. If shaped properly, product-as-a service holds the possibility for people with low income to lead sustainable lives without being constrained by any financial limits. But, in order to accomplish that, fighting energy poverty and transitioning to a just and inclusive circular economy need to be the goals of policies and purpose driven companies. The movement of purpose driven

companies will increase. Call them regenerative businesses, call them *net positive companies* as Paul Polman, former CEO of Unilever, in his recent book *Net Positive*²⁷, refers to the pioneering companies that will profit by fixing the world's problems instead of creating them, while giving more to the world than they take. According to the authors of the book, the net positive model allows companies to thrive because of their efforts to serve the world.

Also, from the current research and looking at how things are moving in the circular economy and servitization space, the concept 'as a service' will grow in the coming years. Just to give an example in this direction, in September 2021 pilot projects of 'Green neighbourhoods as a service' are planned in Milan and Zagreb²⁸. Thinking about 'as a service' business model, the key element for policy makers and city leaders- if not for companies- to keep in mind next to the environment and the economy, though, has to be the social element. Otherwise inequality, marginalisation of the poorest and gentrification in our cities will increase.

Additionally, other key points need to be tackled and improved from the business side. The delivery and the picking up service included in the product-as-a-service system can work smoothly if the logistic system is run properly. The refurbishment and the remanufacturing of the products at the end of the life are crucial because in the long term they imply for Europe, for example, to be less dependent on other countries. It could also imply more local jobs, more skills development and, thus, retraining of workers. As stated by EU President Ursula von der Leyen "*The best investment in our future is the investment in our people. Skill and education drive Europe's competitiveness and innovation*"²⁹.

Product-as-a service with its loops can imply more production and refurbishment activities close to urban and peri-urban areas in developed countries. How many jobs and what can be the impact of such shift from production to repair, refurbish and

²⁷ Polman, P., Winston, A., *Net Positive: How courageous companies thrive by giving more than they take*, Harvard Business Review Press, 2021.

²⁸ <https://www.climate-kic.org/opinion/green-neighbourhoods-as-a-service>.

²⁹ European Commission, *European Skills Agenda for sustainable competitiveness, social fairness and resilience*, 2020, p. 2
<https://ec.europa.eu/social/main.jsp?langId=en&catId=89&newsId=9723>.

remanufacturing is not clear at all. As David Fitzsimons, the director of the European Remanufacturing Council, stated “Around the job creation in the sector in the coming years I have seen so much speculation and do not believe any of it. The starting point is flawed: we should not be led by the possibility of new jobs, but be driven primarily by the possibility of investments. Investments generate jobs, many of which we are not even aware of. We could build large factories, with loads of machines and very little staff, but the supply chains around them will be transformed and maybe there will be a lot of work created in and around them. This is work that we simply have not been able to measure. I do not believe that it is possible to make concrete predictions in this sense”.

In order to scale the system, then, it is crucial to have investments in the sector. The new funding of programme Horizon Europe 2021-2027 supports the development of circular services and pilot projects that aim to reach the SDGs goals 10 - Reduced Inequalities- and 12 - Responsible Consumption and Production.

Product-as-a-service theoretically extends the useful life of products. If the life cycle assessment of product-as-a service business models shows to be more ecologically sustainable compared to the products used in a linear way of consumption- and

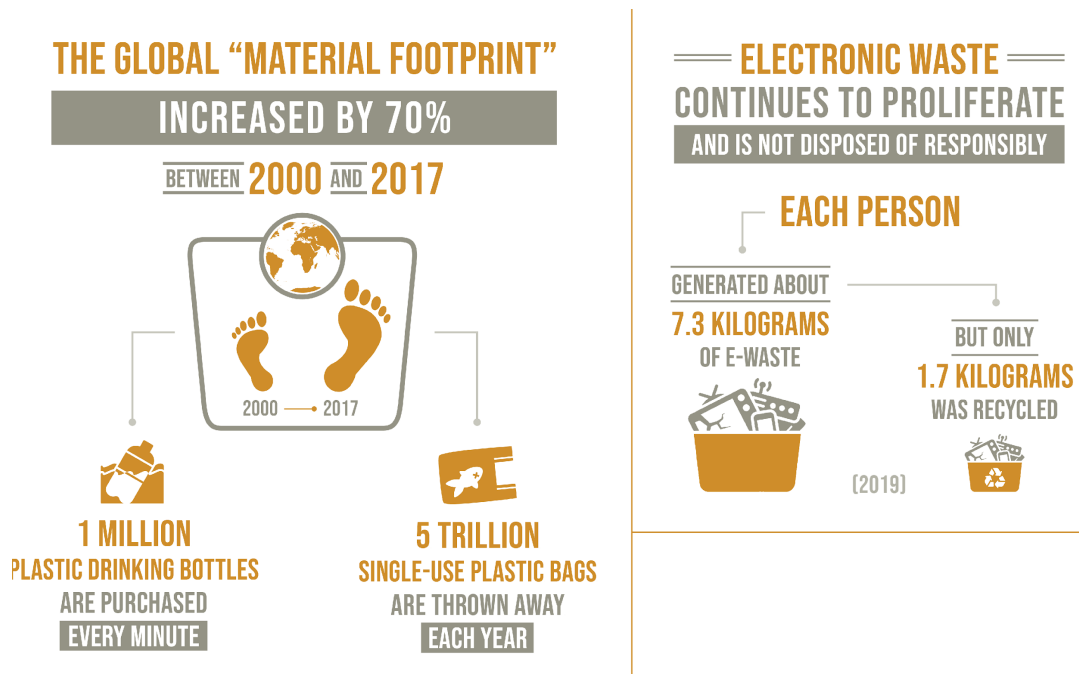


Fig. 2 Despite the efforts and the claims, the global material footprint between 2000 and 2017 increased by 70%. The footprint is especially related to purchase of plastic drinking bottles, the thrown away of single-use plastic bags and the electronic waste that keeps increased and is not disposed of responsibly.

Source: The Sustainable Development Goals Report 2021.

avoiding any rebound effects-, this circular business model can also help reverse the global material footprint that, aside from all the efforts, the claims, the campaigns-often greenwashing campaigns-, keeps growing according to the The Sustainable Development Goals Report 2021 by the UN³⁰ (see Fig. 2).

6. Data about diffusion of rental and leasing practices

In order to understand how the rental and leasing options are a common practice in our economy it is important to have a look at the statistics available on an international level. There is not a lot of data about the product as-a-service or pay per use models, but data is available in the wider sector of the sharing economy. In particular, Eurostat presents an overview of statistics for the rental and leasing activities sector in the European Union (EU), as covered by NACE Rev. 2 Division 77³¹. According to the data available by Eurostat, there were 194 thousand enterprises operating with rental and leasing activities (Division 77) as their principal activity in the EU-28 in 2018. In 2015 the sector of “Rental and leasing activities” employed 646 thousand persons, equivalent to 0.5 % of the non-financial business economy (Sections B to J and L to N and Division 95) workforce or 4.8 % of those employed in administrative and support service activities (Section N).

³⁰ The Sustainable Development Goals Report 2021 <https://unstats.un.org/sdgs/report/2021>.

³¹ The activities covered within this sector include the renting and leasing of motor vehicles, which involves renting and operational leasing of passenger cars, light vehicles, trucks, heavy motor vehicles and recreational vehicles. The renting and leasing of personal and household goods includes the renting of recreational and sports equipment, video tapes, CDs, DVDs and so on, and all kinds of household or personal goods including jewellery, musical instruments, costumes, household machinery and equipment (for example, tools for home repairs). The renting and leasing of other machinery, equipment and tangible goods (without an operator) includes machinery and equipment for agricultural, forestry, industrial, construction, transport and office-based activities. Finally, the leasing of intellectual property and similar products (except copyrighted works) includes activities allowing others to use non-financial assets for which a royalty payment or licensing fee is paid to the asset holder. The use of these assets can take various forms, such as permission for reproduction, use in subsequent processes or products, operating businesses under a franchise and so on the current owners may or may not have created those assets.

This NACE division “Rental and leasing activities” is composed of four groups:

- renting and leasing of motor vehicles (Group 77.1);
- renting and leasing of personal and household goods (Group 77.2);
- renting and leasing of other machinery, equipment and tangible goods (Group 77.3);
- leasing of intellectual property and similar products, except copyrighted works (Group 77.4).

The rental and leasing activities sector generated EUR 129 billion of value added, which was a considerably higher share of both the non-financial business economy total and of the administrative and support services total than the shares recorded for employment. These differences of share can, partially, be explained by the specific character of rental and leasing activities, such as their capital-intensive nature. Indeed, these activities have very different cost structures and revenue streams and care, according to Eurostat, should be taken when making comparisons with other sectors and sub-sectors in the non-financial business economy. Enterprises that engage in rental and leasing activities own the goods that they rent or lease, with financial costs and depreciation charges often constituting the main element of their total costs: these costs and charges are not considered when calculating gross value added and so productivity and profitability measures based on value added are often very high.

The most relevant activities in the sector according to Eurostat data are the rent and leasing of motor vehicles, the rent and leasing of personal and household goods and other machinery, equipment and tangible goods. A small part of the rent and leasing activities is about the leasing of intellectual property and similar products, except copyrighted works. The largest and most specialised EU Member States in rental and leasing activities are Germany, Spain, France, Italy and the United Kingdom (when it was still part of the EU). The great majority of the enterprises involved in the sector are micro SMEs. The leasing and rental model becomes less and less relevant when the companies are getting bigger, while proportionally the number of people employed through the different types of enterprises is more balanced.

Data from Eurostat, though, considers only the business side of the sharing economy and rental and leasing activities, while there is not much data about the adoption of the business model that considers the users side. Often the renting and leasing model are B2B services. Considering that this research wants to understand more about the models and the structure in which the end user is a private person and not a company, data is very little.

Some private research companies have looked at the product as a service business model. In the report “The Subscription Economy Index” by Zuora from March 2021,

there is an analysis about the growth of digital service models for which many companies have embraced subscription models. It considers different sectors from telecommunication to manufacturing, from healthcare to education. This research found out that in the last nine years the Subscription Economy has grown 6x (more than 435%). Once again, also the Zuora report, done in collaboration with the Subscribed Institute, considered the company side and not the customer experience.

Often the research looking at the users side available explores the orientation of the users to accept a subscription model instead of owning a specific product.

The End of Ownership Report, another research by Zuora and Subscribed Institute, explored the changing consumer preferences in the subscription economy through an international survey involving twelve countries (US, UK, Australia, China, France, Germany, Italy, Japan, The Netherlands, New Zealand, Singapore, Spain). According to this survey 78% of international adults currently have subscription services (higher than the 71% in 2018). An increasing number of people have subscriptions, which can relieve them of the burden of ownership and give them more flexibility and access to the experiences they want. The End of Ownership report found out that convenience (42%), cost savings (35%), and more variety (35%) are the top subscription benefits. Together with entertainment with music services and TV & Movie on demand adults that use subscription service models are interested in grocery delivery services. China is on the leading edge of subscription adoption, as the number of subscribers in China, as well as the average number of subscriptions among current subscribers, significantly increased from 2018 to 2020. For adults in Spain (42%), New Zealand and China (both 40%), having access to the latest and greatest is more likely to be seen as a benefit of subscribing compared to adults in the U.K. (29%), U.S. (31%), Australia (32%), France (23%), Germany (24%), Japan (22%), Italy (28%) and the Netherlands (25%).

Among the data available in the subscription economy, market research firms explore the attitude of the new generations toward rental options. According to one of them from Lab42, most renters are Gen Zers and millennials that choose to rent or lease while looking to make practical choices. The research looks deeper at the consumer goods rental economy and at the potential long-term impact of this shift in buyer behaviour. Although the current market for rentals is still in its early stages, the sheer

momentum that the industry has gained in the last year is enough to catch the attention of even the largest retailers—forcing them to reconsider their own business models. According to the research by Lab42 the consumers rent mostly furniture (45%), followed by gaming systems (37%), clothing and tools (35%), technology (33%), jewellery, accessories and home appliances (29%). The majority of them are 18-38 years (64%) and unmarried (65%). The main reasons why consumers rent go from testing things before purchasing to temporary solutions and need for a short time, from being less expensive and more convenient to less maintenance and responsibility. 32% of the people in the research declared that they rent because they get higher quality products compared to the ones they can afford to buy.

Considering the clothing sector, formal and professional events are the main reasons why people rent followed by seasonal and vacation items. Living in temporary housing (45%), purchasing is too expensive (43%) and testing out new items before purchasing (41%) all motivate people to rent furniture.

While the first chapter explored the limits of the modern economy and the rise of the circular and performance economy together with the increasing inequality, the meaning and the burdens of ownership, the present chapter focused on the companies side. In particular, it explored how companies can reshape themselves in the current years of climate crisis and think long term. Starting from purpose driven companies and the role played by planned obsolescence in the last century and at the present days, it highlighted the many companies, in different sectors, that are, instead, experimenting and adopting the product-as-a-service business model. Taking on themselves the responsibility of products and materials is a company strategy that can be seen under different points of view and has many different consequences. Finally, it tried to understand how widespread rental and leasing practises are.

The next chapter, instead, will focus on the core research of the current work, presenting the hypotheses behind the research, the cases that have been studied, the interviews that were conducted and more.

Chapter 3

Besparen in Huis met Goede Apparaten and Papillon project

1. Research and hypotheses

Understanding more about the link between *disownership* and inequality and how the performance economy is connected with the rising inequalities in our society is the goal of the current research. In particular, the research aims to understand if product as a service (PaaS) is a model that can lead to socially and environmentally responsible companies and to an inclusive circular economy for all people, no matter what their income is.

In order to understand more the research looked at two case studies. The first is a pilot project run in the city of Amsterdam and its surroundings, in The Netherlands,

from 2013 to 2020, while the second one started in 2018 and is currently running in the Flanders region, in Belgium. Both the pilot projects, called respectively “Besparen in Huis, met Goede Apparaten” (tr. “Save at home, with good appliances”) and “Papillon Project - 10 years without worries”, are based on the circular business model of product as a service and have a target group of people with low income in the first case and living in poverty in the second case.

With the goal to find out more about the link between *disownership* and inequality, the research aimed to dive deep into the different points of view of the users and the companies involved in these two projects.

The main hypotheses laid down at the beginning of the research on the customers side were:

1. The product as a service model gives to people with a low income access to high quality products that they would not have access to otherwise;
2. The access to high quality and efficient appliances changes the sensibility of participants in the project towards sustainability and green choices and in the long term it reduces inequality in society.

On the companies side, the main hypothesis was that, through giving access to high end appliances, the company makes its machines and products more accessible to all kind of people and, thus, in the long term the product as a service circular business model can reduce inequality; that happens because the companies accept their leading role in society and consider very consciously the product as a service as a business model that has a significant and positive impact on the environment and on the society.

2. Project Besparen in Huis, met Goede Apparaten

After considering the general frame of the research, this paragraph explains more about the background of “Besparen in Huis” project that is one of the case studies at the core of the research. In 2012 Turntoo, a Dutch consultancy company, decided to experiment a circular business model based on an alternative system in which products are not sold by the producer to the consumer, but remain property of the producer throughout their life cycles. Turntoo is a well known actor in the circular

economy space. It is a visionary company as it is the inventor of *lighting as a service*, the *pay per lux* system, that first in the world started at Schiphol airport with the Dutch airport paying Philips for the hours of light and not owning the bulbs in the airport, and other cutting edge ideas aiming to keep materials in use for as long as possible. Back in 2012, the idea of Turntoo of using the product as a service business fitted into the broader trends of product service systems or extended producer responsibility which integrate services into a product offering. For companies, according to Turntoo *“ultimately a recurring business model is more interesting”* as it will smooth out the peaks and troughs of demand cycles and make companies more stable.

In particular, Turntoo's guess was that, through product as a service business model, the producer or the provider of the service, retaining ownership of a product and deriving their profits from its use rather than its sale, have an incentive to make the product as durable and efficient as possible, so that it can be used as many times as possible before it has to be replaced. Producer or provider keeping the ownership means that once a product reaches the end of its life, the producer or the provider of the service collect it and reuse it and, thus, this prevents products from becoming waste. In this system, products can be disassembled and re-enter the production loop, reducing the demand for virgin raw materials.

Turntoo conceded that the lessee receiving the service embodied in the washing machine might have less of an incentive to maintain the washing machine and use it responsibly than would be the case if they owned it. However this can be dealt with through the contract between the washing machine provider and, in this case, the housing association. Clauses can require responsible use.

The project “Besparen in huis” was born with the idea to pilot a circular business model. The pilot's objective was to find a more sustainable, environmentally friendly and socially affordable system in which high quality products were used by people with low income that could not have afford to pay the full price of the same level of household appliance. With the goal to prove this system practically, Turntoo signed, in June 2012, an agreement with German giant Bosch, more specifically with BSH, its home appliances branch, and Eigen Haard, an Amsterdam social housing association for running the project “Besparen in huis met goede apparaten” (t. Saving at home with good appliances). The participants in the projects, the tenants of Eigen Haard,

received for seven years top-end Bosch washing machines, fridges and tumble dryers with the highest energy efficiency ratings back then (energy label A+++).

The pilot ran for seven years and was conducted in the metropolitan area of Amsterdam, in The Netherlands. The pilot was advertised through Eigen Haard channels. Forty-nine households participated in the pilot for a total amount of sixty appliances. Some of the participants got one appliance, some others two appliances. Customers did not pay any initial deposit. At the end of the pilot, in the beginning of 2021 household appliances were collected by BSH and sent to their remanufacturing and recycling facility in Tiel, in The Netherlands.

In the designing phase of the project many meetings involved different partners and some banks with the goal to create a model where the financial risk for the appliances was, at least, shared among different actors. In the end, as neither the banks nor the other partners- Eigen Haard and Bosch- accepted to take any financial responsibility, Turntoo bought from the German manufacturer the appliances. The company then became the service provider of the project as well as the one that took the full financial risk of the initiative. While Turntoo rented the appliances to the tenants, BSH was responsible for the logistics (i.e. delivery and pick up) and in charge of providing the maintenance service and executing all the repairs when and if necessary. Based also on a Dutch law, that sets the maximum duration of the lease contract for such kind of appliances in seven years, Turntoo provided for 7 years household appliances to some Eigen Haard tenants, who, for the service, paid around €10 per month , with small differences based on the different appliances the tenants had access t, no matter how big the use of the appliances was. The monthly payment was performed by the tenants to Eigen Haard in conjunction with the payment of their rent. Then Turntoo, once a year, invoiced the cost of the appliances to Eigen Haard that, instead, collected the service payments month by month.

Also, while taking the financial risk of the project buying the appliances from BOSCH, Turntoo made a risk analysis, looking at the different risks to the financial model. In the financial model the following risks were included:

a) the risk of not receiving the money back (which decreases through the years, becoming smaller year by year);

- b) the risk that people would move and the costs for moving the appliance (there was a percentage of people moving on average per year; obviously this risk increases over time);
- c) the risk of maintenance and repair (also this risk increased over time);
- d) the risk that a tenant could die and the contract would end earlier;
- e) the risk that a machine would get lost.

2.1 Background of the partners of Besparen in huis: Eigen Haard and BSH

At present Eigen Haard owns 8% of the houses in Amsterdam. It manages about 62.000 rental units in 13 municipalities in the Amsterdam Metropolitan Area. Their housing portfolio consists of 56.000 units, of which about 95% regulated social housing, around 51.000, and 5% commercial rents. The remaining portfolio consists of small business units, shops, garages and parking places. Eigen Haard's main business goals are: to provide affordable, good quality housing for low-income households, to enhance a good living climate in our neighbourhoods (encouraging social ownership, community building, socio-economic measures in cooperation with partners and inhabitants) and to ensure good quality of our real estate that matches people's needs of today and tomorrow (including energy efficiency/sustainable concepts, and concepts for people with special needs).

Eigen Haard joined the project, with the hope to face fewer tenants who could not pay their rents because of the rising energy costs. One of the fears of Eigen Haard was that, at some point, tenants could not pay rents due to unaffordable energy costs that risked to be even higher of the subsidised rental that Eigen Haard tenants have access to. Just to give example to understand how the rental market in Amsterdam works and what is the price of subsidised rents for the Eigen Haard tenants compared to rents available to normal expats or tenants: a three room apartment of 75 sqm, in a new edifice built in 2000 by Eigen Haard, in Amsterdam East, would cost today around 550€, bills and other costs excluded, while the price for the same kind of apartment in the private sector would be around 1800€.

In 2012, Eigen Haard joined the project also being totally aware of the *poverty premium* that weighs on the people with low income, especially for their energy costs. Eigen Haard declared that *"very few tenants in the social sector use appliances with an energy rating of A or higher. It is assumed that the average tenant cannot afford the*

higher purchase costs. However, assuming continued use of conventional appliances, they will be the first to notice rising energy prices”.

The other partner of the project, Bosch, is a steward owned company and 92% is owned by a foundation, the Robert Bosch Stiftung. Steward-ownership means that companies belong to themselves and that the increase in wealth is not privately owned. Bosch's founder, Rober Bosch, before his death in 1942, decided to created a trust-foundation model as the best solution to ensure the long-term success of the company and fulfil his wishes stated in his words *“It is my intention, apart from the alleviation of all kinds of hardship, to promote the moral, physical and intellectual development of the people”*. The trust-foundation structure created separates voting and economic rights into two share classes: 92 percent of the economic rights of the Bosch Group (B-Shares) lie in a charitable organisation, the Robert Bosch Foundation. The Bosch family received 8% of the company's dividend shares, which they still hold today. All the shares they previously held beyond the 8 percent threshold were bought by the Bosch Foundation at their market rate. 93 percent of the shares with voting rights (A-Shares) are held by ten steward-owners. These shares cannot be sold or inherited. Instead they are passed from one generation of stewards to the next. 7 percent of the voting rights remain with the family¹.

¹ Purpose Foundation, *Steward-Ownership Rethinking ownership in 21st century*, available at [Steward Ownership - Purpose Economyhttps://purpose-economy.org](https://purpose-economy.org) > file

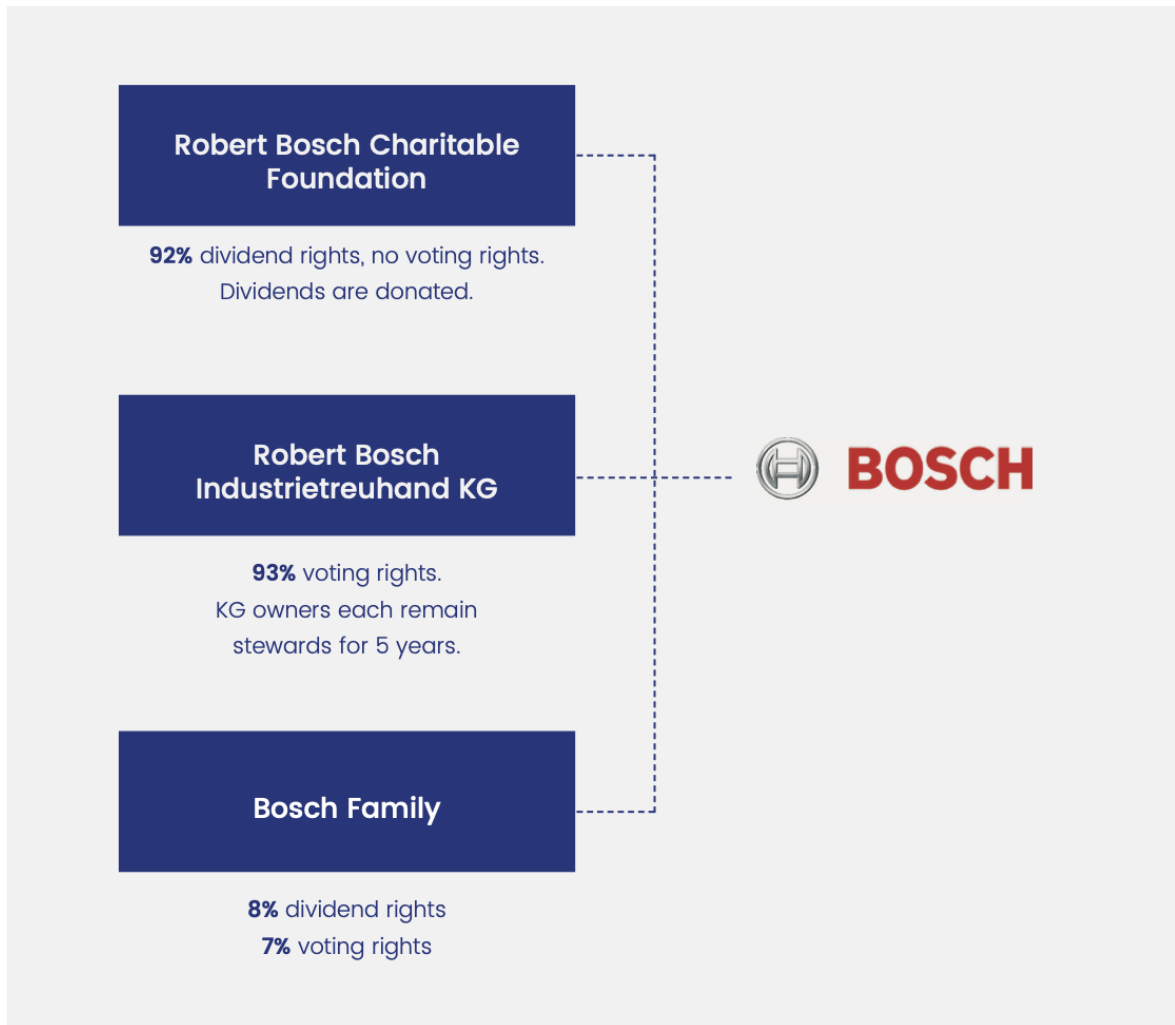


Fig. 1 Bosh Trust-foundation structure based on long-term steward-ownership. The structure ensures that the company is stewarded by the people who feel most connected and committed to the company's mission and culture. The structure separates voting and dividend rights, removing any incentive to maximise profit over the company's long-term success, employee conditions, or environmental impact.

Bosch's core operating areas are spread across four business sectors: mobility, consumer goods (including household appliances and power tools), industrial technology and energy and building technology. The household appliances sector of Bosch is managed by BSH Home Appliances, the largest manufacturer of home appliances in Europe and one of the leading companies in the sector worldwide. BSH, a wholly-owned subsidiary of Robert Bosch GmbH, acronym for Bosch und Siemens Hausgeräte, originated from a joint venture set up in May 1967 between Robert Bosch GmbH and Siemens AG. BSH annual sales in 2020 were 13.9 billion euros.

From BSH' point of view, through the project, the company could benefit from valuable insights and acquire precious knowledge about the usage of the appliances.

Bosch also joined to understand more about the product as a service business model without becoming the service provider of the appliances, without creating an entire new department to manage the experiment and without allocating new resources to run the pilot project.

2.2 Further information: resource banks and the Blue Movement

Turntoo, from its side, decides to take the lead in the project also to prove the company's philosophy, namely that products should no longer be regarded as commodities to be bought and sold, but, instead, they should be considered “*resource banks*” with the resources that they contain being constantly reused. “*The idea that goods are owned by consumers is outdated*”, one of the founders of Turntoo, Thomas Rau, states. “*As a consumer I am only interested in the performance of a product, not owning it. Sufficient light, comfortable seating, good audio and vision, that's what counts*”. Actually, Turntoo, through the years, explored the “*resource bank*” concept with a small number of early-stage projects that connect with Rau's architectural practice. Turntoo focuses its work especially on circular buildings. As mentioned above Turntoo has also been the promoter of the *lighting as a service system* run by Philips at Schiphol airport and later on developed by Philips in the the company Signify². According to Sabine Oberhuber, co-founder of Turntoo, “*Material banks are much more complex than business as usual, but there is really a big potential*”. Following this philosophy, Turntoo and Rau Architecten are the creators of the Madaster, the cadaster for building materials and one of the promoters of the materials passport. Turntoo also launched the Universal Declaration of Material Rights initiative³. According to Rau and Oberhuber “*When we look at a building we don't see what it really is: a source of materials (sewage, construction material, waste, discarded products – carpet, windows, etc.) and an opportunity to reduce energy consumption and cut emissions*”.

With these expertise and background, next to a social goal aiming to positively impact the life of people with low incomes, the project “Besparen in huis” had also a resource energy efficiency target during the usage of the appliances and at the end of the pilot project. Indeed, it was clear already in the first draft of the project that the appliances,

² <https://www.signify.com/en-gb/lighting-services>.

³ <https://theuniversaldeclarationofmaterialrights.org>.



The three images above refer to the refurbishment and the resale of the appliances used during the *Besparen in huis met goede apparaten* project.

their spare parts and the embodied raw materials would have been reused or remanufactured by BSH at the end of initiative.

Actually, at the end of the seven years pilot phase, in the last months of 2020 and in the beginning of 2021, the appliances have been collected by BSH, through Vonk, a transport company specialised in storage and distribution of white goods, and sent to

the company's refurbishment facility in Tiel, in The Netherlands. Here after operations of checking, repairing and cleaning, 17 appliances were found suitable for re-use and ready to be sold again. The seventeen appliances have then been sent to the Kringloper, a second hand shop, in the town of Roosendaal in the Netherlands. All 17 appliances have now been sold by the Kringloper and put back into use as well a sticker has been applied to every device to make sure that the appliances are picked up after use by De Kringloper for recycling via Wecycle, a non-profit organisation that works in the waste recycling on behalf of six product foundations for 2,000 producers and importers.

Parallel to the end of *Besparen in huis met goede apparaten*, BSH Netherlands launched the Blue Movement⁴, a new initiative of Bosch based on product as a service. The Blue Movement is the prosecution of the “*Besparen in huis*” project with BSH becoming the service provider and leasing the appliances directly to the users. It is possible to subscribe to the Blue Movement to access high quality and energy efficient fridges and freezers, dryers, washing machines, dishwashers, vacuum cleaners, kitchen machines and gardening systems starting from 7,99 per month including delivery, installation, repairs and service. The subscription period ranges from 3 months up to a maximum of 6 years. While the Blue Movement model has a potential higher reach as it is designed for the whole population and for a larger audience, it definitely misses the focus on social disadvantaged categories, which was one of the core elements of the “*Besparen in huis met goede apparaten*” project. Because of the Dutch legislation, machines can stay at people's homes for a maximum number of years. In the Blue Movement case, then, appliances are taken back by BSH, refurbished, and go back into the model for another period of six years. The intention is actually to have those machines for three times six years on the market before recycling them. If the Blue Movement initiative would actually work in this way the usage time of a washing machine, for example, would increase from the current average of around 12, 12 years and a half up to 18 years.

3. The Papillon Project

While “*Besparen in huis met goede apparaten*” has been a pioneer project dating back in 2012, the more recent Papillon Project aims specifically to tackle the problem of

⁴ <https://www.bluemovement.com>.

energy-poor households. People living in poverty often use domestic appliances with a high energy consumption which are outdated, unreliable and expensive to run, and often lead to energy debts in low income households. The Papillon project was born from an idea of Samenlevingsopbouw West-Vlaanderen, a community building organisation in West-Flanders, in Belgium. Samenlevingsopbouw West-Vlaanderen aimed to provide an appliance rental model for low income households that do not have the funds to purchase new, high efficiency appliances and that, because of their bad consumer credits, cannot get a loan.

In the Flanders region, one third of households in energy poverty, around 120.000 families, uses old energy-wasting household appliances. As the families are in a difficult financial situation, they lack a budget to buy energy-efficient appliances, while the old ones are electricity intensive. This plus recent energy taxes and extra costs lead to high energy bills and thus even more financial problems.

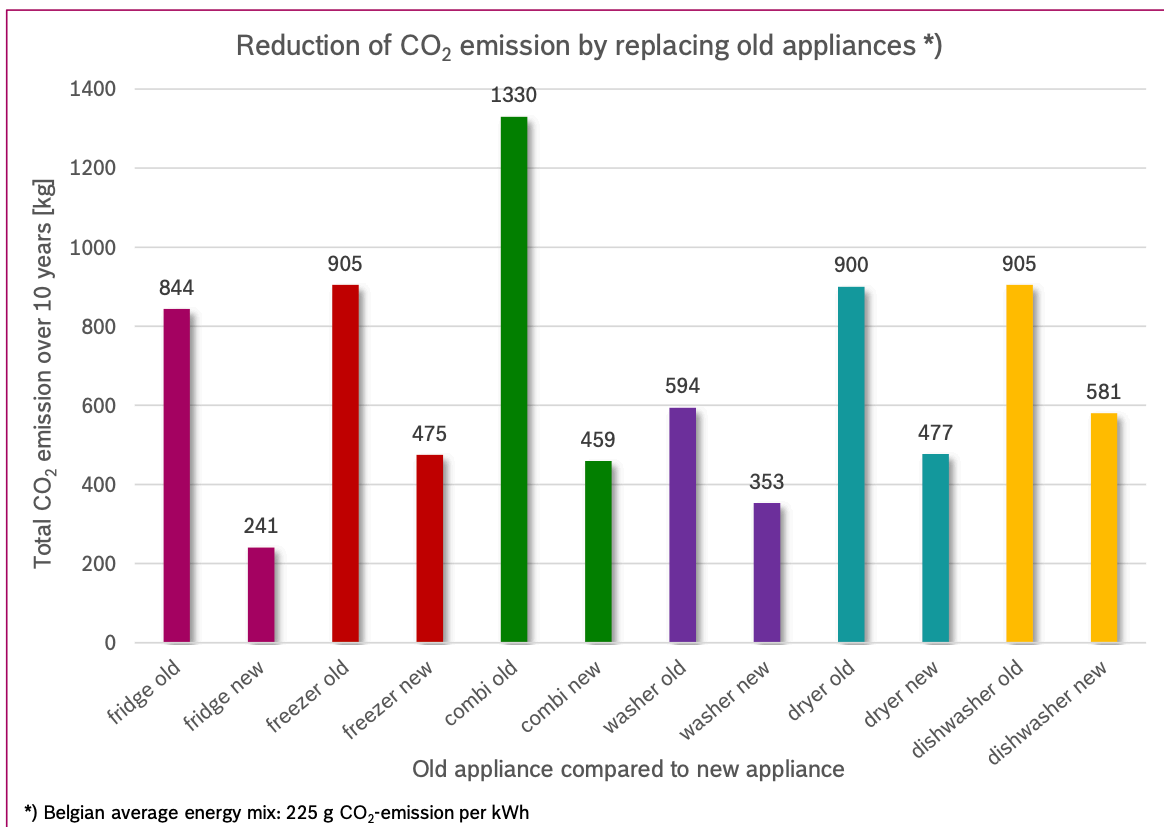


Fig. 2 Potential reduction of CO₂ emission over 10 years based on the replacement of old appliances (fridge, freezer, combi freezer-fridge, washer, dryer and dishwasher) based on Belgium energy use. Source: BSH Home Appliances.

Old freezers can consume 1250 kWh/year while efficient options use 250 kWh/year, resulting in electricity bills in the region of €300 higher per appliance per year.

Considering the whole the lifetime of an appliance, this can result in additional electricity bills of €3,000⁵.

Several appliances in low income households can result in debt and contribute to significantly worsening health and social outcomes. The energy bills are, actually, one of the main elements contributing to the so-called *poverty premium* as seen in chapter 1. For the environment, this would mean lower greenhouse gas emissions. Not only energy, but also water: according to Bosch washing machines with the automatic washing system i-DOS save up to 7,062 litres of water and 33% detergent per year.

Voorbeeld koelkast met diepvries – klant bij Eandis (met of zonder budgetmeter)		
	oude koelkast 15 jaar oud bij start	nieuwe koelkast met Pappillon
Papillon		
Energieverbruik per jaar	591 kWh	204 kWh
Energiekost (10 jaar)	2128 €	735 €
Reparatie	300 €	Inbegrepen
Huurgeld	-	694 €
Totale kost	2428 €	1429 €
=> Besparing van 999 € in 10 jaar tijd		

Fig. 3 Comparison of the cost of an old fridge with freezer (with Eandis as electricity company) already used for 15 years and a new fridge with freezer offered through the Papillon project. The figure compares the energy consumption of the appliances per year ("energieverbruik per jaar"), the energy costs in energy bills in 10 years ("energiekost 10 jaar"), reparation ("reparatie") and leasing fee ("huurgeld") of the two options. The 15 years old fridge ("oude koelkast 15 jaar oud bij start") costs in total in 10 years 2428€, while the new fridge with the Papillon project "nieuwe koelkast met Papillon" costs 1429€. In 10 years the customers of the Papillon project save ("besparing") 999€. Source: Papillon project.

Through the Papillon project Samenlevingsopbouw West-Vlaanderen is experimenting with a rental model for appliances. The main objective of the project is to reduce overall energy consumption and the energy bill of the families concerned, while improving their comfort. The subtitle of the project is '10 years without worries'. Indeed, with a 10-year contract, people in energy poverty rent energy-efficient appliances, including service, warranty and pick-up at the end of the life of the appliance. Samenlevingsopbouw partnered with Bosch Belgium, once again with BSH, the household appliances branch of the company, which delivers the appliances

⁵ Bouzarovski, S., Thomson, H., *Addressing Energy Poverty in the European Union: State of Play and Action*, EU Energy Poverty Observatory, 2019.

and takes care of the service and warranty. The choice of BSH was quite obvious for Samenlevingsopbouw based on the history and the structure of Bosch itself as the company is not on the stock market exchange and if they have money left, it goes to the foundation, which has to goal to reinvest their funds in the society.

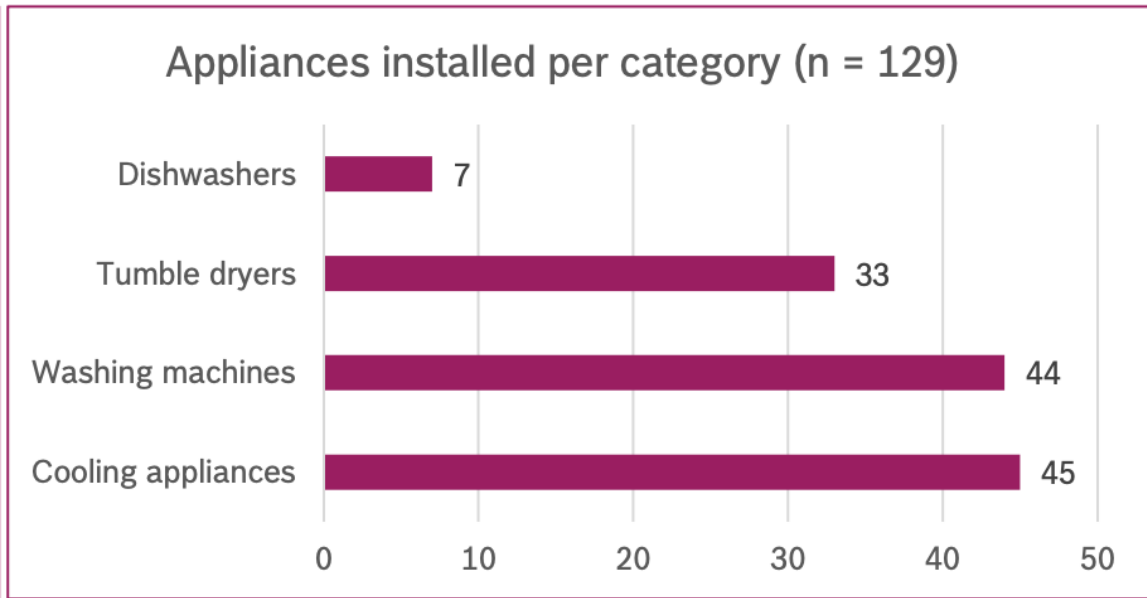


Fig. 4 Type of appliances installed per category in the Papillon project.
Source: BSH Home Appliances.

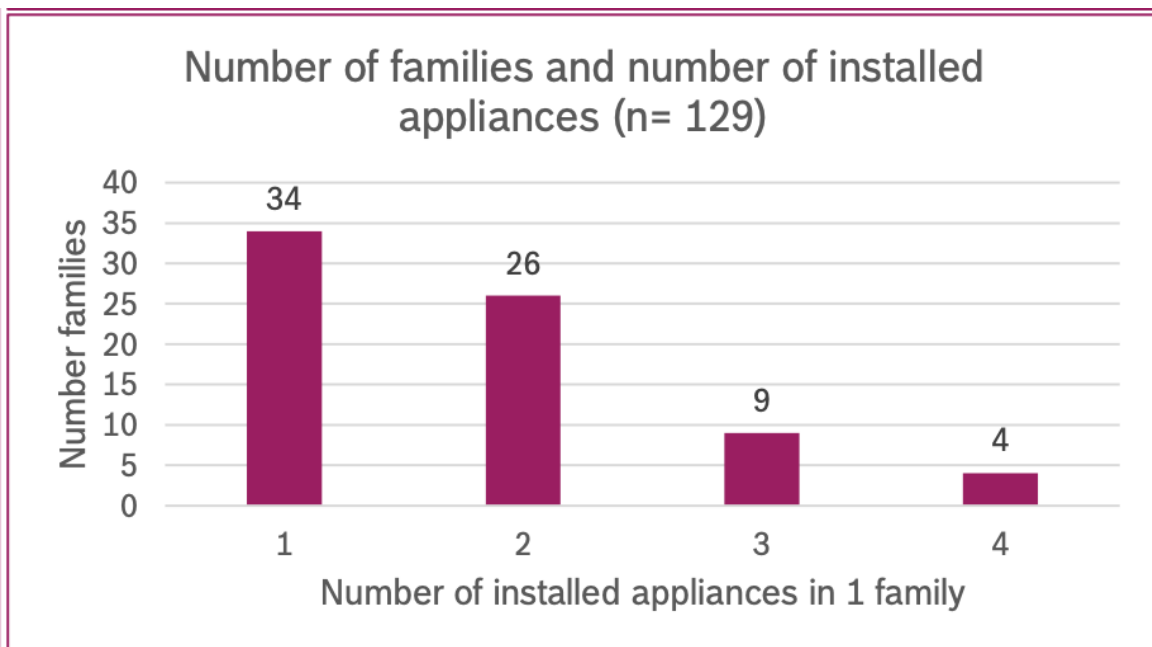


Fig. 5 Number of families and related number of installed appliances in the Papillon project. Source: BSH Home Appliances.

The pilot started in September 2018 and the first 129 appliances (refrigerators, freezers, fridge-freezers, washing machines, dryers and dishwashers) of which 10

refurbished were installed in 73 homes. In the pilot, supported by the Flemish government, people pay around €7 a month for each appliance (without the subsidy from the Flemish government it would have been 9€ a month). The users have no upfront investment and from day one they save considerably on energy and water. They do not have to worry about any extra costs for repair and during the first two years they receive empowering guidance from Samenlevingsopbouw that helps them with their overall energy situation.

At all moments BSH is the owner of the appliances so debt collectors cannot confiscate the appliances, while Samenlevingsopbouw West-Vlaanderen is in charge of collecting the monthly payments and performing the payment to BSH one a year. Samenlevingsopbouw is looking into scaling the Papillon model up to the Flemish and Belgian level. There are discussions to experiment with the model in other European countries too.

The collaborative effort between BSH Home Appliances and the Samenlevingsopbouw West-Vlaanderen aims to replace outdated household appliances with new, efficient equipment and, at the same time, to analyse the potential of a sustainable appliance rental model. The Papillon project stands as a very interesting and recent pilot to understand how the leasing and rental concepts for household appliances can give low-income families access to resource-efficient household equipment and fight energy poverty in Belgium.

Besparen in huis and the Papillon project are the second and the third projects that BSH runs with a product as a service business model. The first one implemented is the so-called WeWash project, which started back in 2016 and is currently a spinoff of BSH. It is a separate company, which is fully owned by BSH. WeWash is active in three countries: Germany, Austria and Belgium. The concept behind WeWash is actually a pay per use model, where washing machines and tumble dryers are installed in hostels, in hotels, in student dorms, in flats, in buildings with several flats where different people use the same washing machine and the same tumble dryer, and they pay for the usage of the machine. The machine stays in the ownership of WeWash company, so in the ownership of BSH. It works through an app: thanks to it, it is possible to reserve the machine. After booking the appliances, it is possible to run laundry. At the end of the washing or the drying cycle the machine warns the user with a push message on the app that the laundry is ready to be picked up.

4. Methodology

4.1 Case Study Research

The case study research on the project was performed on a single case on the development of a lease system for household appliances like fridges, washing machines and tumble dryers with a specific social focus for people with low income. The two specific pilot projects were chosen for their specific combination of economic, environmental and social elements. The different types of partners involved in the projects and the relatively small number of partners and users were useful in order to dive deep and obtain insight in the details of the case. According to Dyer and Wilkins (1991) studying a single case in depth helps uncover details that are rooted within the context of the case. Given the emerging nature of product as a service business model in the business to customers sector, such qualitative research on case studies are especially relevant at this stage. Furthermore, household appliances have received interest in the literature (Bressanelli, Perona, Saccani, 2019) and from companies especially for their strong connection with energy consumption. The design of an access model for household appliances requires the creation of an attractive value proposition, as well as a product that can be refurbished efficiently at the end of the lease. At the same time the social element, the focus on people with low income, allowed us to understand more about how this model can be used wider and which elements need to be stressed or improved to increase the acceptance of the model.

4.2 Data Collection

The interviews on which the research is based aimed to understand the point of view of the partners involved in the project, BSH Huishoudapparaten with its Dutch and Belgian branch, Eigen Haard, Turntoo and Samenlevingsopbouw West-Vlaanderen, as well as the point of view of the tenants that received the appliances in their houses.

Data collection was done through desk research (online project documents), informal talks and semi-structured interviews. Using the project documents, a timeline of the pilot was reconstructed, including the involved parties, for the Beparen in huis project that reached the end. Next to it, an interview guide was developed to

understand how the project developed on the tenants side for the seven years the appliances were located in Eigen Haard apartments.

For the Besharen in huis project the qualitative research involved the three partners BSH Home Appliances, Eigen Haard, Turntoo plus twenty-one tenants for a total of twenty-four interviews.

Interviewees	Role	Date of the interview
Ronald Wassenaar	CEO of BSH Home Appliances	May 1st 2020
Ilse van Andel and Ester van der Sterre	Project managers of Eigen Haard	May 15th 2020
Sabine Oberhuber	Co-founder of Turntoo, circular economy expert and innovator	July 7th 2021
Twenty-one tenants of Eigen Haard	Participants in the Besharen in huis project	May 2021 (except for mr. Mellouki Cadat-Lampe interviewed in May 2020)

Table 1 shows the interviews carried out, the date, the role and the type of person interviewed for Besharen in Huis project.

For the Papillon project, after various attempts, considering the delicate situation of the participants in the pilot project, due to COVID19 pandemic, and because of technological and linguistic issues, it was not possible to run interviews with the users of the appliances neither online nor offline.

Thanks to two interviews with the project managers of BSH Home Appliances Belgium and Samenlevingsopbouw West-Vlaanderen it was, instead, possible to evaluate the partners' involvement and approach in the Papillon project.

Interviewees	Role	Date of the interview
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Bruno Vermoesen	Manager at BSH Home Appliances Belgium and Senior Expert EU Governmental Affairs for Circular Economy	May 4th 2020
Stefan Goemaere	Project manager at Samenlevingsopbouw West-Vlaanderen	May 11th 2020

Table 2 shows the interviews carried out, the date, the role and the type of person interviewed for the Papillon project.

The interviews with the five partners- three for the Dutch project and two for the Belgian one- were conducted in May 2020 through online video calls except for the interview with one of the co-founders of Turntoo, Sabine Oberhuber, that was performed in person in July 2021.

The interviews with the tenants of Besparen in huis project were, due to Covid19 crisis, postponed multiple times. In the end, it was possible to accomplish twenty semi-structured interviews that were conducted between April and June 2021 over the phone. Due to Covid19 limitations and technology gap and difficulties from the tenants side, it was impossible to have in person or online conversations.

The only tenant that was possible to reach out through an online video call, in May 2020, was the first tenant that joined the project, mr. Mellouki Cadat-Lampe. He represents an exception for his history, his leading role in the project and his changing social status through the years. He, actually, started the project while he was a tenant of Eigen Haard but, then, because his financial situation improved, he no longer had the qualifications to receive a social housing apartment. He had to move to a new apartment in the commercial market.



Image of mr. Mellouki Cadat-Lampe with the first Bosch fridge delivered through Beparen in huis met goede apparaten project.

Except for the interview with mr. Cadat-Lampe, which was in English, all the other interviews with the tenants were conducted in Dutch, recorded, transcribed and translated to written English during the analysis. The interviews with the five partners of the two projects, BSH Home Appliances Netherlands and Belgium, Eigen Haard, Turntoo, Samenlevingsopbouw West-Vlaanderen, were conducted in English, recorded and transcribed.

While paragraph 4.4 of this chapter analyses the companies' perspective on the project Beparen in huis in The Netherlands as well as the one in the ongoing Papillon project in Belgium, paragraph 4.3 focuses on the tenants' participation and experience in the project.

Table 3 and 4 give an overview of the topics addressed in the interviews with the tenants and the representatives of the companies.

Table 3 shows the main questions asked in the interviews with the tenants divided among three main topics: Experience in the project, Connection between product as a service and inequality, Further developments. Considering the users side, the first set of questions (questions 1 and 2 of Table 3)- Experience in the project- was useful to

understand the expectation of the participants in the beginning of the project and their overall experience through the seven years the project run.

The second group of questions (questions 3, 4 and 5 of Table 3)- Connection between product as a service and inequality-, that was the core of the interviews, aimed to answer the hypotheses on which the research is based.

Questions like “Did you get access to a product that you would have not bought otherwise?”, “Did your spending habits change after joining the project toward more green consumption, organic products, sustainable products, etc?”, “Based on your experience in the project, do you think that the non ownership of appliances can reduce energy poverty and inequality in society?” wanted to understand if the product as a service model gives people with a low income access to high quality products that they would not have access to otherwise as well as if the access to high quality and efficient appliances changed the sensibility of participants in the project towards sustainability and green choices and if, in the long term, it reduces inequality in society.

	Topics	Sample questions
1	Experience in the project	What was the main reason for which you joined the project in the first place?
2	Experience in the project	How was your experience as participants in the project?
3	Connection between product as a service and inequality	Did you get access to a product that you would have not bought otherwise?
4	Connection between product as a service and inequality	Did your spending habits change after joining the project toward more green consumption, organic products, sustainable products, etc?
5	Connection between product as a service and inequality	Based on your experience in the project, do you think that the non ownership of appliances can reduce energy poverty and inequality in society?
6	Further developments - Challenges	Are there, for example, financial, social, political or legal barriers that limit more users to join this type of model?
7	Further developments - Learnings	What would you change or add to make this monthly rent model better, easier to access for you and maybe also for your friends/family?

Table 3 Topics and sample questions of the interview with the tenants of the Beparen in huis met goede apparaten project.

The last group of questions (questions 6 and 7 of Table 3)- Further developments- aimed to understand what the participants in the project thought about possible challenges and learnings it was possible to get from the project . Also, the questions wanted to discover if changing some legal or financial elements of the project or of the proposed model would make more people with low income or living in poverty more interested in adopting the model. This last set of the questions wanted to understand if the people thought that something of the proposed product as a service business model could be changed to help people with a low income access to high quality products.

Table 4 focuses, instead, on the interviews with the companies partners in the Dutch and the Belgian projects and the questions had four focuses: experience in the project, connection between product as a service and inequality, further developments, values and responsibilities of the company.

On the companies side the first set of questions (questions 1 and 2 of Table 4)- Experience in the project- was useful to understand the expectation of the companies in the beginning of the project, which were the business or social reasons for which they set up or decided to join the project in the first place and their overall experience during the whole length of the project.

The second group of questions (questions 3 and 4 of Table 4)- Connection between product as a service and inequality-, that was the core of the interviews, aimed to answer the hypotheses on which the research is based.

The questions of this second set like “Do you think the PaaS could be a model to include more low-income people in society by offering them access to higher quality appliances?” and “Which could be the social outcome of a PaaS model in connection with equality?” were directly linked to the main hypotheses on the companies side that aimed to understand if, through giving access to high end appliances, the company- producer or service provider- makes its machines and products more accessible to all kind of people and, thus, in the long term the product as a service circular business model can reduce inequality.

While the third group of questions (question 5 of Table 4)- Further developments-

aimed to understand if the companies found some barriers that made them rethink about the model and how to develop it further, the fourth and last set of questions (question 6 and 7 of Table 4)- Values and responsibilities of the company- aimed to verify the other hypothesis of the research on the company side.

Questions like “Do you see a connection between your company joining the project and the mission of the company?” and “As a company do you think you have the responsibility to reduce inequality? If yes, based on your experience in this project, do you think that PaaS has the potential to reduce inequality?” explored the hypothesis that the shift of companies towards giving access to high end appliances to people with low income or living in poverty through product as a service happens because the companies accept their leading role in society and consider very consciously the product as a service as a business model that has a significant and positive impact on the environment and on the society.

	Topics	Sample questions
1	Experience in the project	What was/ were the main reason(s) for which you set up the project in the first place?
2	Experience in the project	How was your experience as company partner in the project?
3	Connection between product as a service and inequality	Do you think the PaaS could be a model to include more low-income people in society by offering them access to higher quality appliances?
4	Connection between product as a service and inequality	Which could be the social outcome of a PaaS model in connection with equality?
5	Further developments - Challenges	Are there, for example, financial, social, political or legal barriers that limit companies to adopt this model more?
6	Values and responsibilities of the company	Do you see a connection between your company joining the project and the mission of the company?
7	Values and responsibilities of the company	As a company do you think you have the responsibility to reduce inequality? If yes, based on your experience in this project, do you think that PaaS has the potential to reduce inequality?

Table 4 Topics and sample questions of the interview with the representatives of the companies partners of the *Besparen in huis met goede apparaten* project.

4.3 Data Analysis - Interviews with the users

At the end of the seven years pilot Beparen in huis, forty-eight appliances were still used by thirty-eight households. Ten of the households had two different appliances in use: together with the washing machine ten of them decided to also have a fridge or a tumble dryer. Twenty-one participants in the project agreed to answer the questions of the interview. The others were unreachable by phone or declined the offer of participating in the survey.

The average age of the people participating in the interview in May 2021 was 63 years old (56 years old at the beginning of the pilot project). Half of the tenants responding to the interview were retired. The youngest was 38 years old, the oldest 89 years old. Of the twenty-one respondents to the survey 8 were men and 13 were women. The education degree was mostly secondary school. At the questions about if they joined the Blue Movement, the new initiative of Bosch based on product as a service, eleven tenants answered 'yes' and ten 'no'.

Looking at the original hypotheses and at the answers of the tenants, it is clear that the social element of the project and its connection with inequality was almost never considered by the participants in the project. Only two participants made the connection of energy efficiency and high quality appliances and improving their social condition in society.

At the questions "Based on your experience with this project, do you think that not owning (renting) appliances can reduce energy poverty and inequality in society?" participants did not have a strong opinion about it or, more precisely, they did not have one at all. It looked like they saw the project through the lens of energy poverty and inequality for the first time.

Many participants clearly underlined their current or previous economic situation as the key reason why they decided to join the project. Many confirmed that renting an appliance instead of owning it is convenient as they did not have expenses upfront and the service was included. This was for many of them, without any other further consideration, the key reason in joining the pilot project. The more thoughtful and comprehensive answer was *"Since the project started 7 years ago, I didn't consider the social implications of the project. I just needed a fridge so this project came in handy. For some levels of incomes, even renting for e.g. an appliance for 10 per month is not*

feasible. For a middle class income, instead, it is an opportunity to be able to use high-energy appliances”.

Mr. Cadat-Lampe, answered more broadly to the questions if the PaaS can reduce energy poverty and inequality in society: *“Yes, the program started from the issue of poverty, and especially with energy poverty. In the metropolitan areas of the Netherlands, there are many social groups that are just above the poverty limit. Those groups will spend quite an important part of the income to pay for energy. So the least the appliance is sustainable, the more people need to pay. The project brought down their energy costs”.* Mr. Cadat-Lampe and the other respondent above mentioned were the only two that had a clear opinion about the hypotheses at the base of this research. Furthermore mr. Cadat-Lampe, as political scientist as he is research manager of the Nederland Institute for Social Work, was totally aware of the goal of the project from the beginning *“I found it interesting to participate in this experiment. On one hand it has everything to do with my wish to have an active participation as a citizen in my neighbourhood. It was a new and innovative project, and also an interesting opportunity to connect my housing with big corporations like Bosch and the intermediate Turntoo. Also the project addressed a social economic problem and an environmental issue linking the situation of citizens with a low income with the need of sustainability. I found it a very strong way to connect local and global problems”.*

Aside from these two answers the other tenants considered the project financially attractive as it gave them *“a good device without a big investment, with the added guarantee of a device that always works, a guarantee that people don't get when buying a device, and unexpected costs”.* The economic reason was the most relevant one for which the participants decided to join the project. Many of the participants underlined the fact that back in 2013 they had no financial capacity to buy a new machine putting the needed capital upfront in one transfer. Financial considerations were expressed in every single conversation from *“I didn't have the money at the time”* to *“I'm already 71 years old, I'm very happy that there were no unexpected costs and a good service”* until *“I had become unemployed so renting was a good idea”.* Next to the economical reasons, a great appreciation for the service and the maintenance included in the monthly fee together with the energy efficiency of the appliances were highlighted. One respondent specifically mentioned that the service was the plus of the project as there is no need for *“one of those machines that once you get it over the*

threshold, it already depreciates in value. I always had the warranty and it also gets recycled again”.

The great majority of the considerations from the tenants were economical. If all of them were happy about the energy-efficient appliance that was used during the project, almost everybody affirmed that they could have not bought a similar level of appliance if it was in a traditional linear business model as they could not afford it back in 2013. Many of the participants, before joining Beparen in huis pilot project, had old and high energy consuming appliances, like *“a very energy intensive Miele”* or *“a very old Zanussi”*.

In order to understand if in practice the participation in the project changed the point of view of the tenants on their consumption habits, the survey asked the tenants if participating in the project changed their buying decisions toward more sustainable ways of consumption. Some affirmed that the project did not change their spending habits, which keep being influenced mostly by the price. As one of the participants answered saying *“Yes, I pay attention to sustainable choice, but I am not an environmental freak. The project did not encourage me to make any other choice, organic products have to become cheaper first”*. Also another tenant, considering the impact of her consumer decisions on the future generations, said *“It’s a shame for the kids, but I’m not so concerned. If it’s convenient, yes, I buy more sustainably, otherwise I don’t make any green choice”*. A good number of the tenants, though, not only because of the project, adopted more sustainable choices like buying organic food and having solar panels on their roofs (also thanks to an initiative by Eigen Haard). The project Beparen in huis made many of them conscious about energy consumption. One respondent said *“I already had green electricity, and when I buy new appliances, now I pay much more attention to how energy-efficient it is”*. One of the respondents was 80 years old and said *“I do have 10 solar panels, I just bought a new hybrid car”*.

As for the disadvantages of the project, the economic element comes up again as one tenant considered the model *“a bit expensive”* and another affirmed that the model has the limit that *“after 7 years of monthly fee payments the appliance is not for yourself”*. Considering the cost of the appliances, one tenant said *“the price has to be calculated better, because otherwise renting the dryer and paying it for 7 years does not make sense”*. Another participant affirmed that *“The short rental period may be a bit pricey. I think that the length of the rental period for the appliances is perhaps too long*

for people, as I don't know where I will be in 7 years. Now the Blue Movement project lasts 6 years, but you don't know what will happen in 6 years. Maybe it can be done with a slider so that people can choose more easily". Finally another tenant, while thinking that "leasing is the future and it will become more and more common, people are leasing cars and boilers, etc", decided to not join the Blue Movement "because I want to buy a house and after all it's a loan".

Even if some tenants claimed that the price was high, the general satisfaction about the ratio price/quality scored an average of 4.3 on a scale from 1 to 5.

As one of the respondents stated more broadly "I have a very positive opinion of the model. It has adequately tackled the question of sustainability, it gives to new social groups the opportunity of what is sustainability through direct economic interest. Everything went quite fluently. They installed the fridge, I was very satisfied with the quality". Many tenants, also some that complained about the price, were very satisfied with the model saying "It is perfect, never broken, I have no tips for you to make it better. I do tell other people, and I have done so from the start".

Another tenant was of a similar opinion: "I am very satisfied, the service is well offered. If something is wrong, they come. The appliance works immediately, and if the appliance has to go, you get another appliance. You are never without it. Why should you make it difficult as a consumer, that if something goes wrong you have to pay call-out charges and so on? You can make it as expensive as you want. Now you can take a recycled appliance or a new one. The boys of Bosch at the end of the project came to pick the appliance up and then they said it still looked very good. It also works very well, I see. So if you don't have the means to lease a new one, take a recycled one. I am very satisfied with it, I started 7 years ago and I am still very satisfied".

Also a woman considered it a good model as the appliances today break easily and "there are no people left to fix appliances, no wisdom. I would like the world to be a little better again, first we learn how to perform and then you can live up to it. Our world is now controlled by people with big mouths and not educated."

While almost nobody noticed if they saved money or increased their income by renting the device, many participants underlined some good elements of the project like combining the payment of the price of the appliance with the rent. According to a tenant it was *"a good trick to do it through the housing association, because it's deducted directly from your rent and you don't have to arrange anything extra".*

Another tenant linked the model with the lack of ownership saying *“I like the project and it has completely changed my understanding of ownership. I can understand though that, perhaps, some do not dare to enter into the long-term agreement due to uncertain financial condition”*.

Next to the price, participants had suggestions on how to improve the model and make it more widely spread through advertisement and giving it more visibility as one of them said *“I think there should be more advertising. In the Corona period there are more people with financial problems who can participate more easily”*. Also considering emergency situations, another participants suggested to build a way out option or a different procedure is something happens as *“From a social point of view, something else should be arranged, so when you get sick- I have multiple sclerosis- then something should be built in so that you can get out of the contract”*.

Considering the potential barriers that block the unleash of the non-ownership model in society, Cadat-Lampe affirmed *“There is a kind of interaction between the political and legislative issue. It was very difficult for the partners to get a contract that could be accepted in the political and legal Dutch system. It is fundamental to give low income and low educated people an easy way to access these systems. There is also a cultural barrier connected to the ownership. When you live in social housing, it is very important to own something in your house. The appliances can give people with low income a sense of property. So renting a fridge could be felt as a lack of ownership, while buying is an attempt, maybe with a negative impact, to own something. It is not easy to shift from owning to renting just for sustainability reasons. There is a role for education. Social interventions are needed in these groups especially focusing on explanation and communication in order to make some mind shift possible. It is crucial to develop special methodologies to be able to convince people that it is in their interest and in society's interest”*.

4.4 Data Analysis - Interviews with the companies

In order to understand the point of view of the companies and associations that decided, in the first place, to run the pilot projects “Besparen in huis met goede apparaten” in Amsterdam and “Papillon project” in Flanders we interviewed all the partners involved in the two projects. For the first project we interviewed Ilse van Andel and Ester van der Sterre, project managers for the housing association Eigen

Haard, Ronald Wassenaar, CEO of BSH Home Appliances, and Sabine Oberhuber, co-founder of Turntoo. For the second project, instead, Bruno Vermoesen of BSH Belgium and Stefan Goemaere of the Samenlevingsopbouw association agreed to answer the interview.

REDUCING INEQUALITY

Looking at the specific hypotheses at the base of the present research, we asked the partners if, in their opinion and experience, product as a service is a model that can reduce inequality. In general, all of them agreed. Each of them gave a specific answer looking at different elements of the model.

For Bruno Vermoesen of BSH Belgium, the Papillon project, giving people access to good appliances, gives people with low income *“peace of mind”* as they don’t need to be worried if something breaks and save money. According to Vermoesen, a product as a service business model can reduce inequality *“because people get access to, first, qualitatively good machines and, second, to energy and water efficient machines. The main problem that we see with people living in poverty is that they use outdated machines that use too much energy and too much water. The savings potential that those people can make is really big while spending a small amount of money a month”*.

Stefan Goemaere of Samenlevingsopbouw, who is, on a daily basis, working with people in poverty brings the considerations even further. For Goemaere *“Yes, PaaS reduces inequality as 6 out of 10 people in energy poverty can’t get loans because they have bad consumer credits. The problem with technology very often is that it creates an even bigger divide between people that can afford something and people that cannot. For example, with solar panels, the people that at the moment make profits are the ones that can pay for it, while the costs of the infrastructure are spread by the distributor among all the other payers”*.

Goemaere also shared some first hand experience of the project as he was the one that delivered in person, together with BSH workers, the appliances to the houses of the participants in the Papillon project. As he stated in the interview *“Circular economy is about sustainability, but it has to be about people in poverty. Circular business models should be inclusive. After the BSH delivered the fridge to one of the participants of the Papillon project, the guy that received it was crying. It was the first*

time in his life that he had a quality product, a AAA+ fridge. He will be able to use it when his children come to visit him, while he used to have a small fridge like truck drivers have”.

Inequality according to Goemaere passes by also through giving people “10 years without worries” as the subtitle of the Papillon project states. It takes away stress for the payment of the people coming to fix the appliance. To prove the point Goemaere shares again some cases of the participants in the project: *“We also rent appliances to people that didn’t have at all such kind of appliances before, people that didn’t have a washing machine and used to go to the laundromat, that used to pay 30 euro a month to have their laundry done. A woman had to travel through the whole Flanders province, sleep at her daughter’s house in order to be sure that the laundry was dry and go back home the day after. Now she has a high quality washing machine in her house”.* Goemaere continues: *“It is not just sustainability, there is also a crucial social aspect. A couple in the project did not have a big freezer. As they use food aid that they can pick up every two weeks, they had to use all the veggies in the first 4 or 5 days, and be without veggies for 9 days waiting for the next time that they could pick up food. Now they can store food much longer and eat veggies throughout the two weeks”.*

Sabine Oberhuber of Turntoo, also after the Beparen in huis project came to an end, agrees on the fact that product as a service can reduce inequality: *“You can call it subscription economy, service economy, performance economy, but I see that the discussion around product as a service is maturing, getting new and more serious awareness. We need to absolutely take care of the social element of it. People with low income are considered a big financial risk in the default group, but I’m not sure about that. I would love to see research about it. If they are in a social environment where they are connected with the organisation and other people, I’m sure that there is also a sort of social control. I think the as a service model is absolutely fitted with people with low income”.* There is another key step that the companies need to make though according to Oberhuber: *“In our experience, on the side of the producer a big step toward transparency has to happen, very often the company doesn’t know the cost of the model. Producers need to make a fair model based on the true cost of the appliances”.* Based on Turntoo’s experience, Oberhuber thinks that *“People very often don’t consider the cost of ownership like the maintenance costs that sometimes happen. People in social housing, maybe, sometimes are also not aware of their expenses. At the moment people*

choose non-ownership, appliances as a service because it is economically convenient. Nobody chooses it because of the environment. So to make it more accepted and widespread it has to be made economically convenient”.

Among the lessons learned from Turntoo to make the product as a service more suited for people with low income, Oberhuber also shares that *“an organisation that is advocating and makes the model transparent is crucial to push people to embark in the model. But probably companies are not there yet. It is a different type of communication that big corporations are not ready to have. Big corporations are addressing people more interested in the features of the products like young and affluent people that are moving a lot and need things for a limited amount of time. People with low income have other needs and, indeed, they need to be approached with other elements or selling points”.*

The representatives from the housing association Eigen Haard were more sceptical about the reduction of inequality through the product as a service. In an ideal situation people with low income would be able to use expensive appliances. When you look at the model and how it works, products as a service are often available only for people with higher income which are more likely to join a model based on the performance.

Ester van der Sterre agreed that *“In an ideal world the model helps to fight inequality”* but *“in reality it doesn’t happen yet. Car is a sort of status symbol, and probably it is more a status symbol for people with a low income”.* *“For people with lower income”* according to van der Sterre *“it is still more convenient to buy a second hand appliance or a bike or a car. The first thing they think is the price, not if a product is sustainable or not. It gets easier to be sustainable and go for circular products with a high income”.*

REASONS FOR JOINING THE PROJECT

After considering if the partners consider product as a service a business model that can reduce inequality, the research tried to understand if the adoption of the above mentioned business model by the partners was linked to the significant impact that PaaS could have on the environment and on the society.

The sustainability element, even more than the social one, was at the core of all the answers from the respondents. Sustainability that is strongly linked with the marketing strategy. The partners used it as a learning journey in the circular space.

For BSH Belgium the initial goal in starting the project was *“to make our company more circular”* as Vermoesen said. *“If you extend the lifetime, you use less material, you have less environmental impact. Of course, we aim to close the material loops. This is the basic concept. And this is actually what we want to do. The main problem that we see is the difficulty to get back our old appliances or to influence the appliance during their life cycle”*.

The business reason for BSH to join the project is also to learn more about their appliances as *“Today, we do not have appliances that are already developed, conceived for a circular economy model. We want to learn, based on the experience of the appliances being out there, at everybody's home. What happens with our appliances? When do they break down? Where do they break down? What are the difficulties that we have when repairing our appliances? As long as it is in the conceptual, in the production or in the logistics phase, we have everything in our hands. But, due to the business model that we have, which is a sales business model, we lose our appliances when we sell them. We sell them to the retail, the retail sells them to the end user, and we don't know where the appliances are. Now, if we are lucky, when an appliance breaks down, the customer calls us and we do the maintenance service on the appliance. Actually, though, we do not have a in depth influence over the lifetime of the appliance and we only have a very limited impact at the end of life of the appliances. In the best case, at the end of life, the appliances are given back to the take back systems that have been set up by the producers”*. Keeping the ownership of the products for the producer is becoming a business strategy as Vermoesen claims: *“I came to the quite evident conclusion that if you can stay owner of your appliances as a manufacturer, you have the possibility to intervene in every stage of the life of your appliance and you can ensure that, at the end of the day, the resources can flow back to you as a manufacturer”*.

A strong combination of environmental and economic reasons for BSH is clear as Vermoesen affirmed *“BSH is a company. We are not a nonprofit organisation, we have to make turnover and we could combine it with a social dimension, doing something good for people living in poverty, contributing to the reduction of their energy poverty and, in the meantime, also contributing to the reduction of the indirect CO₂ emissions*

and environmental impact of those products. That's the way the project was created with two partners having different interests who found each other and who created this project with multiple advantages for both of them." At the same time, though, participating in a project with a social dimension, like the Papillon project, means for Vermoesen that *"you should limit your margin. I'm not saying that we are losing money while doing the Papillon project. The margin, though, is calculated on a very low level because of the target group. It would be inappropriate for us to calculate it as a real commercial project"*.

The other reason why BSH decided to embark on such projects was to have a lifetime contact with the customers. As Ronald Wassenaar of BSH claimed *"It is getting more normal to have people paying for the use in other markets with Uber or Spotify. We wanted to develop a relationship with our clients, while becoming more circular. It was also part of our marketing strategy in order to be a sustainable company. We saw the potential and the need to change in this direction. With Besparen in huis, we explored the potential of circularity and the special target group, that usually does not buy Bosch appliances, made it even more interesting. While we learned that it is a difficult target group and we need some intermediaries in this kind of project, we decided to be part of the project because improving the quality of life of people is part of Bosch mission"*.

The idea that product as a service could be a way to end planned obsolescence as the company keeps the responsibility of the product was not a key element according to Wassenaar as he declared that *"I don't recognise planned obsolescence in our company. We want to have quality products. People buy Bosch products because they last longer. Our products Bosch and Siemens are already made for long life, quality and reliability. Keeping the ownership of the product, in the long term, definitely means that we could also reuse some components of our products that can last forever and we can use materials again"*.

Turntoo created the project Besparen in huis because after creating *light as a service*, they wanted to prove that it was possible also with household appliances for energy efficiency and sustainability reasons. The project was useful to understand that the role of the producer is crucial in the spread of the system: as Oberhuber shares *"even though the project made me believe even more in product as a service, I think that you can't have a middle man making this system work. The companies need to make the change, Turntoo can help, but the companies have to do the work"*.

While Eigen Haard uses product as a service in the B2B sector with the boilers as heating the apartments is one of their tasks, the social housing association is legally not allowed to supply any appliances to the tenants. Eigen Haard's reason for joining the project was *"to give to our tenants the possibility to use the equipment like washing machines in a circular and sustainable model. Cheap appliances are usually not sustainable. We wanted a circular business model that was affordable for our tenants, also because back in 2011 we were afraid that with energy intensive and old appliances, the energy bills would have been higher than the rent. There was the risk, then, that people would have not paid the rent because of the high electricity bills"*.

The risk of high electricity consumption was another key element behind the creation of the Papillon project. The two partners of the Flemish pilot, Bosch and Samenlevingsopbouw, ran an analysis of the energy consumption of the appliances and estimated the huge saving potential.

Once again the social and the environmental elements were combined with the chance to acquire knowledge and materials as Vermoesen of BSH claimed *"we see the threats and we see the scarcity of raw materials coming, the impact on the climate, the political and societal pressure, the need to invest in that direction. And, of course, one of those elements is to change the concept of your appliance now with the focus to prolong the lifetime and to close material loops. This is something that can be done on the level of the machines and a part that can be done with your business model. This will not be a drastic change in one shot, these will be small steps that will take us forward because for a company like BSH, with so many different product categories, it's very difficult to switch from one day to another to a completely new concept of appliances. If you think that the development period for a totally new appliance platform takes us between five and eight years, you see that it is impossible to do something immediately tomorrow. Small changes can be introduced on a regular basis and that will make us evolve."*

THE FINANCIAL RISK OF THE TWO PILOT PROJECTS

In order to have a clear picture of involvement and the risks taken by all the participants it is important to say that in Besparen in huis and the Papillon project the financial risk was taken respectively by Turntoo and Samenlevingsopbouw. Bosch and Eigen Haard agreed to participate in the project, while their effort in joining was mostly some maintenance in the first case and some administrative extra work

connected to the creation of the invoices in the second case.

Important to mention, also, both pilot projects received some financial support. Stichting DOEN, a big Dutch foundation and one of the most active in the sustainability sector, supported the kick-off of Besparen in huis with a grant, while the Flemish government helped with some fundings to lower the monthly fee required to the participants of the Papillon project.

In the first case, Turntoo tried to push the ownership of the appliances to Bosch who was hesitant while Eigen Haard was not and is not legally allowed to own the appliances, as by law they need to focus on the apartments and not on providing appliances. As Sabine Oberhuber recalls *“we talked with banks like Rabobank, with investors, but none of them agreed. Banks thought it was too risky. They didn’t want to be exposed with the target group of the project, assuming that the default risk with people with low income is too big. Also, they didn’t want to be seen as the people going into low income houses taking out the washing machines because the monthly payments weren’t performed. In the end, we became the middle man in the financing of the project”*.

“Business has to pay off” is the simple explanation of Bosch not taking the risk of Besparen in huis project. For Ronald Wassenaar of BSH *“In such a company it is much easier to start something like this pilot projects compared to a stock owned company. In general, though, the social aspect is coming later, much more in the end. We split the two elements. In the business itself we don’t have a special focus on the social impact, while next to it we do a lot of work with charities and social projects through the Foundation”*.

Also in the Papillon project the financial risk was not taken by BSH, but by the social enterprise Samenlevingsopbouw. BSH rents the machines to Samenlevingsopbouw, which rents the machines to the end users. The end users pay the social enterprise on a monthly basis and the social enterprise pays BSH once a year.

All the financial risk is with the social enterprise as suggested by the association because, as claimed by Vermoesen of BSH, *“Samenlevingsopbouw knows how the social economy works and how to handle payments and deal with the specific target group of people living in poverty. The payment of the rental fees to BSH is guaranteed. Whenever there are payment difficulties with the end users, Samenlevingsopbouw solves them”*. Samenlevingsopbouw, from its side, installed a risk fund, so if some users are not able

to pay the monthly fee or one of the machines disappears- no appliance disappeared so far-, the social enterprise is still able to pay BSH.

5. Comparing Besparen in huis and The Papillon Project

Before sharing more about the results and the interpretation of the results in Chapter 4, it is crucial to understand and explain a bit more about the two projects through digging deeper on the similarities and the differences about the two projects, the Dutch one, Besparen in huis met goede apparaten, and the Flemish one, the Papillon project.

Both projects came to life because of a strong driver of one of the partners, Turntoo in the first case and Samenlevingsopbouw West-Vlaanderen in the second case. Both projects are the results of long months of conversations and negotiations among the ones that became in the end partners of the projects and potential partners that, after all, decided to not join the partnership. The resulting projects are the outcomes of compromises and negotiations among the partners, especially on the number of appliances that were installed in the houses and on which partner was taking the financial risk of these experimental projects. Also, both projects were trying to show how a renting model that plans a monthly fee is feasible and affordable for tenants living in poverty or having a low income.

While there are many common aspects- both projects used or are using the product as a service business model to provide people with low income or living in poverty some household appliances in a specific geographical region, Amsterdam in the first case and Flanders region in the second case,- there are, at the same time, many distinctions between the two projects.

First of all, there is a timeframe difference between “Besparen in huis met goede apparaten” that dates back to 2012, while the Papillon was officially established more recently, on April 25th 2018, with a co-creative and socially innovative partnership through the signature of a 10-year cooperation agreement between Samenlevingsopbouw West-Vlaanderen and BSH Home Appliances. While “Besparen in huis met goede apparaten” was welcomed by the European Commission as a pioneering project in the circular economy space and very much linked with eco-

efficiency⁶, in the six years difference between the starting of the two projects, the whole concepts of circular economy and performance economy exploded. So the economic landscapes and beyond in which the two projects found birth were totally different. The first project in a way opened the road for the second one to happen, even just in BSH company.

While the first project was mostly focusing on proving the feasibility of product as a service as concept, the second one aimed and aims to help people living in poverty to get access to a kind of appliance that, in some cases, was not previously owned by the participants, not even of low quality. The Dutch *Besparen in huis met goede apparaten* project had a target group of people with low income and living in social housing, but not per se people in poverty.

Also, looking at the numbers, the Papillon project is broader than the first one. In the Papillon project one hundred and twenty-nine appliances among dishwashers, washing machines, tumble dryers and cooling appliances were offered to seventy-three families. With *Besparen in huis met goede apparaten*, forty-nine households participated in the pilot project for a total amount of sixty BOSCH appliances.

Looking at the company's side, *Besparen in huis* was possible thanks to the agreement of three partners, Turntoo, Eigen Haard and BSH, while the Papillon project runs today with the presence of only two partners BSH and Samenlevingsopbouw without the partnership of the social housing corporation.

The commitment of the partners is very different. In the first project, the three partners are for profit companies that came together with the project while trying to get business going through it. They made sure the service was run smoothly, the appliances were working and the payments were outperformed. Bosch was involved only in the first phase in which the appliances were bought by Turntoo and installed in the social housing apartments owned by Eigen Haard. For the other seven years Turntoo and Eigen Haard managed the whole system, with Bosch providing occasional maintenance and, in the last phase, picking up the appliances to send them

⁶ https://ec.europa.eu/environment/ecoap/about-eco-innovation/good-practices/netherlands/201211126-turnto-final_en

to their refurbishing facility in The Netherlands. The tenants would reach out to the companies in case something was not working properly.

In the Papillon project, the status of Samenlevingsopbouw, its role in tackling social exclusion with innovative project work and committed neighbourhood work, means that the association has a constant connection with the participants in the project living in poverty, also during a complicated period such as COVID19 outbreak. The participants in the Papillon project are taken care of by Samenlevingsopbouw. While the role and commitment of BSH is similar in the Papillon project compared to the Dutch experience- they sold the appliances to Samenlevingsopbouw without taking any financial risk, the company made this project as core element of their sustainability strategy, social commitment and marketing and communication campaign⁷. As mentioned before the many years that passed though the different pilot projects were also useful to brand and market better the partnership in such experimental project with a social aim.

Starting from the empirical materials collected through the different phases of the research, the next chapter and the conclusions will outline the main results connected to the hypotheses state previously while trying as well to identify the limits of the present research and the possible developments for further research.

Chapter 4 also contains some policy considerations, some ideas around the phenomenon of the product as a service as well as some suggestions of what can be done to improve the European law with the goal to make the circular business model of product as a service more inclusive, environmentally friendly and energy efficient and consumers more aware of what sustainable really means.

⁷ <https://www.bosch.com/stories/papillon-project/?source=intranet>

Chapter 4 Beyond the research

1. Results

After sharing the methodology behind the research, the data collection and analysing the answers of the participants and the partners in the Dutch and the Belgian projects with the main reasons that brought them to participate in the pilot projects, this section aims to highlight the main findings of the case studies object of the research. The outcome of the research could be used for the future developments of the value proposition of circular business models that, specifically, aim to reduce energy poverty and inequality as well as to increase the adoption of the product as a service business model.

In the creation of the two projects, the partners for business reasons, for marketing strategy and based on the vision of the companies and the association wanted to create a circular model that was useful to learn more about the sector and show their commitment toward more sustainable practises. For the two promoters of the

projects- Turntoo and Samenlevingsopbouw- creating an inclusive model, helping people with a low income and living in energy poverty, was crucial.

Turntoo and Samenlevingsopbouw were moved by the goal to prove that product as a service business model makes economic, social and environmental sense for the companies and for the tenants, also thanks to foundations and governments which, with their financial support, can make the model more viable in difficult economic situations. The two initiators of the pilot projects, Turntoo and Samenlevingsopbouw, are also the two partners that took the full financial risk of running the projects through buying, in the first case, and renting, in the second case, the appliances from BSH. Also, after seeing the project come to an end or in the running phase, the representatives of Turntoo and Samenlevingsopbouw, Sabine Oberhuber and Stefan Goemaere, are still convinced that renting an appliances is the way to go in order to allow people with a low income and living in poverty, thus not able to buy the same energy efficient kind of machines, to access high quality appliances and reduce inequality.

The other partners in the project, BSH Home Appliances Belgium and Netherlands and Eigen Haard had a more opportunistic and commercially driven point of view. BSH took advantage in participating in the project as they learned more about the usage phase of their machines that they were previously unaware of. Eigen Haard offered something new to their tenants that legally wise they were and are not able to offer themselves. While they both consider product as a service as a nice business model for their circular strategy, though, BSH Home Appliances Belgium and Netherlands and Eigen Haard are more sceptical about the social dimension of the product as a service business model in fighting inequality. They see the model as an opportunity to improve their cash flow- understandably they are companies that want to be still in business for a long time-. Learning more about circular business model and participating in a project that aims to be socially inclusive and sustainable is for them a marketing strategy and a competitive advantage, while the impact of the model on inequality is not of their interest as it is simply not part of their core business.

In theory, reducing inequality through giving access to people with low income to high quality and energy efficient appliances is ideal, but, in reality, at the moment, as one of the Eigen Haard representatives shared, it does not work in this way: the

product as a service business model almost always has wealthy people as target group.

If the goal of bringing to life an inclusive and sustainable project was clear on the side of the partners, the tenants did not have a deep understanding and/or a clear perception about the connection between the non-ownership of the appliances and the potential influence on inequality. After the seven years that project run, only two participants out of twenty-one interviewed in the project Beparen in huis stated that the *usership* of the appliances is a way to help people with a low income, that it gives them more financial freedom and, thus, it can help to reduce inequality. The *poverty premium* as seen in paragraph 3 of chapter 1 concerned, in the interviews, only two people out of twenty-one. The other nineteen did not have any thoughts about it.

Opposite to what the companies partners shared, looking at the collected data, it is clear that the social aim of the project was not so clearly perceived by the tenants of the Beparen in huis. It would definitely be interesting to understand if the same perception is shared by the participants in the Papillon project that, as said in the previous paragraph, was not possible to reach during the current research.

While the product as a service business model definitely gave them access to high quality machines that very often the participants in the Beparen in huis would not have had access to otherwise, the economic attractiveness was by far the main reason, if not the only one, for which the tenants decided to join the project. None of the tenants joined for sustainability reasons or for having more energy efficient products. The fear of Eigen Haard that high energy intensive appliances would skyrocket the energy bills of the tenants was not a concern shared by the tenants themselves.

Also, connected to it, very few participants declared that the project changed their spending habits. Some of them did change their purchasing habits, but also for other reasons not connected to the project because they became more aware of climate change issues. Anyway, consumption choices of the target group in the project are still very strongly connected to economic convenience. Some of the tenants claimed to be more aware of the sustainability issues especially connected with energy consumption and energy intensive household appliances, but the same awareness is not often influencing other shopping decisions like grocery or clothing.

2. Interpretation of the results

As we have seen at the beginning of the present work, in chapter 1, the current economic model with its overexploitation of resources is not sustainable both for social and for ecological reasons. Since the last century the model based on endless growth is running our societies. In order to keep the system going, products are built to be broken very soon, to become old earlier than later, to be out of fashion in a couple of months.

Considering that economies and companies might soon face material scarcity, and that COVID19 crisis has greatly highlighted the limits of our globalised system, it is desirable to organise our economy in a completely different way.

As scientific literature suggested that the product-as-a-service (PaaS) business model as the most disruptive, impactful in the transition to the circular economy and beneficial for users, materials, energy and companies, the research explored if there is any social impact and, in case, which one if the product-as-a-service model is offered to specific target groups like people living in energy poverty and people living in social housing facilities.

Before diving deep in the interpretation of the results on the side of the companies and on the side of the participants there is a content aspect that requires to be highlighted *a priori*: the points of contrast between companies' and consumers' orientations. It is staggering to realise how the reasons in joining the projects and the expectations were totally different for the two parts involved. While the potential environmental and social benefits were not essential reasons for the tenants, they were among the main reasons for the promoters of the two projects, Turntoo and Samenlevingsopbouw.

The reasons for joining were partially different also among the partners. While for Bosch one of the main reasons was gaining business and marketing knowledge and competitive advantage on a potential interesting development for the company, at the same time, the representative of the company denied to apply any planned obsolescence strategy nor to have really any responsibility towards society as for the scientific literature shared in paragraph 2 of chapter 2.

Looking at the reasons for joining the project, on the opposite side, all the participants mentioned the economic aspects and needs as crucial in joining the project. None of them expressed any other barriers in the adoption of the model, just suggestions on advertising and promoting the model more widely in order to make it more used. Convenience looked like it was the main, and almost the only, element for the participants of *Besparen in huis* to join- and presumably the same, if not more evident, would be for the participants in the *Papillon* project which suffer of an even worse economic situation and of energy poverty-.

Considering that, while in the great majority of cases, both partners and participants embraced the model enthusiastically, in reality the reasons for the two sides, companies and users, were completely misaligned. There was a total disconnection in the Dutch project between the motivations and the expectations of the partners and of the ones of the participants. The last ones, actually, in some cases, after having paid a monthly fee for seven years, did even expect to keep the machines in their house at the end of the project. The misunderstanding, due probably to miscommunication, shows anyway how strong the concept of ownership still is in the appliance sector and how difficult it is, for the target group, to shift from possession to performance.

At the same time, the take back phase at the end of the Dutch project, thanks to which BOSCH took back most of the appliances made possible to close the loop, allowing material preservation and the reuse of some of the appliances that were sold through second-hand shops.

2.1 Companies

From the interviews performed with the representatives of the partners between 2020 and 2021, a few key elements emerged.

In the Dutch project the company BSH Household Appliances, the housing corporation *Eigen Haard* and the service company *Turntoo* worked out three goals: the preservation of materials from the appliances for reuse, the decrease of the fixed expenses for people living in social housing and a reduction of CO₂ emission. *Turntoo* developed the underlying model that implied usage instead of possession and a

financial risk model to support the whole project. Subsequently, the conditions for the project were elaborated and tested in a pilot project in association with BSH and Eigen Haard.

The Flemish project, instead, set up by Samenlevingsopbouw, a local NGO in partnership with Bosch, enabled vulnerable households to rent- instead of buying- high-performance household appliances, thus limiting their energy expenditures while pursuing a circular economy strategy.

The corporation that is a partner in both the projects, Bosch- through its white goods branch BSH-, became in 2020 the first multinational company to reach carbon neutrality thanks to a structured activities program linked to the energy efficiency of their more than 400 locations worldwide. Even though Bosch did not take any financial risk and earned important insights into the possibility for reuse, remanufacturing and recycling management, BSH Home Appliances was anyway available in joining both the pilot projects. According to the representatives of the company, Ronald Wassenaar and Bruno Vermoesen, this can also be linked to the special legal entity that BOSCH represents as an exception in the corporations world, being a steward owned company, owned for the 92% by a foundation, the Robert Bosch Stiftung (as seen in paragraph 2.1 of chapter 3).

After analysing what has been shared in the interviews and the broader research on companies' vision and evolution, directly referring to the hypotheses underlying the research laid out at paragraph 9 of chapter 1 and at paragraph 1 of chapter 3, it is possible to say that the companies involved in the two projects, even if for various reasons and at different levels of risk, accept their leading role in society and consider very consciously the product as a service as a business model that can have a significant and positive impact on the environment and on the society as well as on their balance sheet. Through giving access to high end appliances to people in energy poverty or with a low income, the partnerships and the projects made the machines more accessible. In the long term the product as a service circular business model can reduce energy poverty and inequality as long as the whole model is built from the design phase with a specific target of people and a well thought *pricing* strategy. This is the unanimous outcome if we look at what the representatives of the companies stated during the interviews recorded in May 2020 and July 2021.

At the same time representatives of BSH and Eigen Haard affirmed that reducing inequality in society is not their core business as they are for profit companies and their main goal is to preserve their balance sheet. The difference that passes through the words said by the representatives of the companies- speaking also at the level of their own personal beliefs at same point- and the reality of the being in business for the growth of the company is evident once again in the fact that none of the biggest companies involved in the two pilot projects, BSH and Eigen Haard, decided to assume the financial risk of the project.

The financial risk has been loaded on the smallest players of the projects, Turntoo and Samenlevingsopbouw West-Vlaanderen, the two originators and real drivers of the pilot. This element explains itself the opportunistic position of BSH and Eigen Haard, which took knowledge and experience from the realisation of the projects without really risking anything in their cashflow. If for Eigen Haard providing appliances to tenants is not part of its services, BSH Home Appliances through the partnership in the projects definitely gained knowledge on new business models and appliances' use and important insights into the possibilities of the circular economy from a business and marketing perspective. It is important to highlight this element especially in view of the fact that BOSCH has lately launched, based on product as a service business model, the new initiative Blue Movement (see paragraph 2.2 of chapter 3) which aims to a target group of "traditional" customers without any focus on low income households.

The presence of an intermediary organisation or company taking the financial risk in this context was essential for them. For what was possible to understand about the projects from the interviews, there has been a very strong leading role of two partners, Turntoo and Samenlevingsopbouw. They aimed with their activity to fight energy poverty and took the financial risk of the projects. In the first case, Turntoo built a financial risk model to prove the financial viability of the PaaS business model, while, in the second project, Samenlevingsopbouw built a risk fund in order to cover the costs of unpaid monthly fees or lost appliances.

2.2 Users

Going back to the hypotheses on the users' side underlying the research as stated in paragraph 9 of chapter 1 and then again in paragraph 1 of chapter 3, the research clearly found out that the product as a service model gives people with a low income access to high quality products that they would not have access otherwise because of lack of money and other needs. None of the people interviewed in the survey had access before to such high quality appliances, nor were they able to afford it outside the project without the option of paying a monthly fee. The interviewees were not in the economic conditions to pay the full price of the appliances back at the beginning of the project in 2012.

Even though it was not possible to outperform the interviews with the participants of the Papillon project, in Flanders, it is save to say that they, as well, would have not been in the position of buying the appliance. Some of them, actually, did not have any kind of fridges or washing machines at all before joining the project. So new leasing and rental concepts for household appliances can give low-income families access to resource-efficient household equipment.

While the project gave the participants access to high quality appliances that could be paid through a monthly fee, none of them was able to share any financial outcome due to the lower bills and to the reduction of the *poverty premium* as expressed in paragraph 3 of chapter 1.

Considering the other hypothesis- shared in in paragraph 9 of chapter 1 and then again in paragraph 1 of chapter 3- related to the customers and to how the participation in the pilot project changed their sensibility towards sustainability and green choices, it can be said that the influence on the Besparen in huis 7 years project of customers' expenditure decisions was negligible also because of their unchanged financial situation.

Only two participants out of 21 claimed that there was a light influence of the project in their spending decisions and their sensitivity towards more sustainable purchasing choices.

The research shows clearly that a person or a family's environmental awareness is based on their personal finances. All the conversations with the users came back to

the economic element of the project and how convenient and handy the model was for them, especially because they did not need to put money upfront in buying the appliances. Following that and looking at the tenants' interviews, the key element to keep in mind with more sustainable and circular products that address people with low income as the target group is, in general, affordability. If prices are too high for consumers, the acceptance of sustainable and circular products and services from them will be more difficult to gain.

The development of rental and leasing business models that aim at people with low income need to tackle the price issue first. This is the crucial element to consider together with a risk analysis that allows the system to keep running and the company making money even though some payments are cancelled or delayed. Parallel to that, it is important to create a relationship with the customers and make sure that they are totally onboard with the new model based on *usership* in order to avoid any discussion about becoming the owner of the appliance after a certain amount of years.

As in the projects object of the current research, no big statements can be made connected with the theory shared in paragraph 8 of chapter 1 related to access barriers and acceptance from the customers. Because the appliances were in the apartments of the tenants and were not shared with other households, none of the participants had the feeling of missing ownership or control until the last phase of the project when the appliances had to be collected by Bosch.

Also, no interesting outcomes can be related to data monitoring and usage as in the white goods appliances installed in the households there were no tools or devices to track the users' consumption (e.g. number of wash cycles). For the same reason there were also no concerns about the trust in the company, nor issue on privacy, nor reluctance or scepticism of the consumers around hygiene and risk of infection, as well as health and safety issues as elements that could support or oppose the theory on consumers' acceptance stated in chapter 1.

A key aspect that runs through all the research and that is crucial in the development, dissemination and adoption of the product-as-a-service models, for customer

acceptance of *usership* and for the company, is the strong link between ownership and responsibility. Shifting to a model in which producers and companies keep the responsibility of materials gives them a lot of power also simply in deciding what to offer to users and what to not offer. Companies should, on the other hand, have the responsibility to not waste very precious raw materials, to make sure that they keep circulating in our economic system.

In a similar way of what happens with the *EPR (Extended Producer Responsibility)*, the producer or the provider of the service in the two pilot projects object of the present research keeps to be always responsible for the products and materials. Seen in this way, materials and products are investments in the future for the companies. Products can become materials banks for the producers or the providers.

Making sure that companies take the full responsibility for the products and materials and making them accountable for it would mean that they have every interest in preventing any amount of such material from being lost. Companies would avoid any destruction of capital and consider the appliances being temporarily put on the market under a material asset management lens. Also, the approach to raw materials has to be reconsidered.

For the home appliances as well as for the electronic products or the medical equipment sector investing in a proper take back system, with all the logistics challenges connected to it, it would allow very precious materials to be kept in the system.

These considerations were central in the interview with Sabine Oberhuber of Turntoo as they go to the core of a circular economy that aims to have a light footprint on the planet as all the materials stay perpetually in use.

The tension between ownership and responsibility of materials is strictly connected with the materials identity and all the work in progress that is nowadays happening in the building sector, and beyond it, with the material passport and the platform Madaster¹, the digital library of materials, linked to the resources banks mentioned in paragraph 2.2 of chapter 3. Even if the construction sector has been the first to show the way to keep materials in use, many other sectors could follow, especially if policy and rules would push in this direction. For the companies in the appliance sector as well as the mobility or the electronic ones, tracking and taking back all the precious

¹ Madaster Website <https://madaster.com>

materials they use like iron, aluminium, cobalt, lithium, gold could be a strategic asset management activities. Registering all the different materials and keeping track of it through the different lifecycle phases is another crucial step in the transition to a more circular economy.

3. Policies to scale a more inclusive circular economy

Circular business models challenge the current economic system while bringing change in the ownership structure, in the production phase and in the consumption patterns.

While these new business models are spreading widely in the different sectors of the economy, one of the challenges to face concerns how to expand their reach far beyond the people that can already afford the full price of new products. Including people with low income or living in poverty in the transition to sustainability is still a difficult and unavoidable challenge. Giving people access to high quality and energy efficient products and services needs to become part of a very thoughtful policy strategy, otherwise marginalised communities and people living in difficult economic situations and disadvantaged areas will keep being underprivileged and not enjoying the same standard of living or rights as the majority of people in the society.

After exploring how product-as-a-service can target specific groups, it is possible to lay down some policy considerations and suggestions that could help people to access better service and tools and allow a more circular and sustainable system to scale.

- INVESTMENTS AND REGULATIONS

Financing rental services or tools libraries can be a way to experiment ways that allow especially disadvantaged populations or people with low income to access high quality products without ownership. Policy makers can foster experimentation with access- and result-oriented business models particularly targeting businesses.

Rental services and tools libraries create a sense of community. They can be good ways to counterbalance planned obsolescence and reduce waste, avoiding rebound effects. Sharing community tools and instruments at a neighbourhood level can become the new normal. Accessing furniture and appliances as a service, built with circularity in mind since the design and the manufacturing phase, in many contexts,

could become an opt out rather than an opt in. Pilot projects can be used to understand how some measures in this direction can help planned climate policies, rules and regulations together while reducing inequality in society.

Regulatory instruments and standards should connect products to producers to facilitate a lifecycle perspective and increase producer responsibility. In order to strengthen ownership of producers and their responsibility towards materials they put on the market, policymakers can apply demand- side instruments. Regulation can be powerful to accelerate and provide incentives, but also plays a central role to adjust for systemic rebound effects. Overall, policymakers could create strong fiscal incentives, such as carbon pricing, to encourage resource efficiency or discourage consumption patterns with negative footprints. Economic instruments should incentivise producers or providers of services to retain value of products by taking responsibility over the product lifetime and keeping ownership.

Considering that every year, over 250 000 public authorities in the EU spend around 14% of GDP (around €2 trillion per year) on the purchase of services, works and supplies², procurement rules could be evaluated towards applying guidelines for Green Public Procurement. Public procurement is also fundamental for behavioural change as shown by the EU-funded Circular PP Project³. Thanks to this project, the city of Malmö has pioneered behavioural change towards public procurement for circular economy for furniture focusing on repair, reuse and refurbishment. Malmö created a circular framework contract for office and conference furniture that could be used by buyers, who have second-hand, used or refurbished furniture as their first options. Alongside the creation of the new framework contract, Malmö developed a 'Priority List' (see the figure below, courtesy of City of Malmö) with the aim to guide circular procurement decision-making whenever a need for furniture arises.

² https://ec.europa.eu/growth/single-market/public-procurement_en.

³ <http://circularpp.eu>

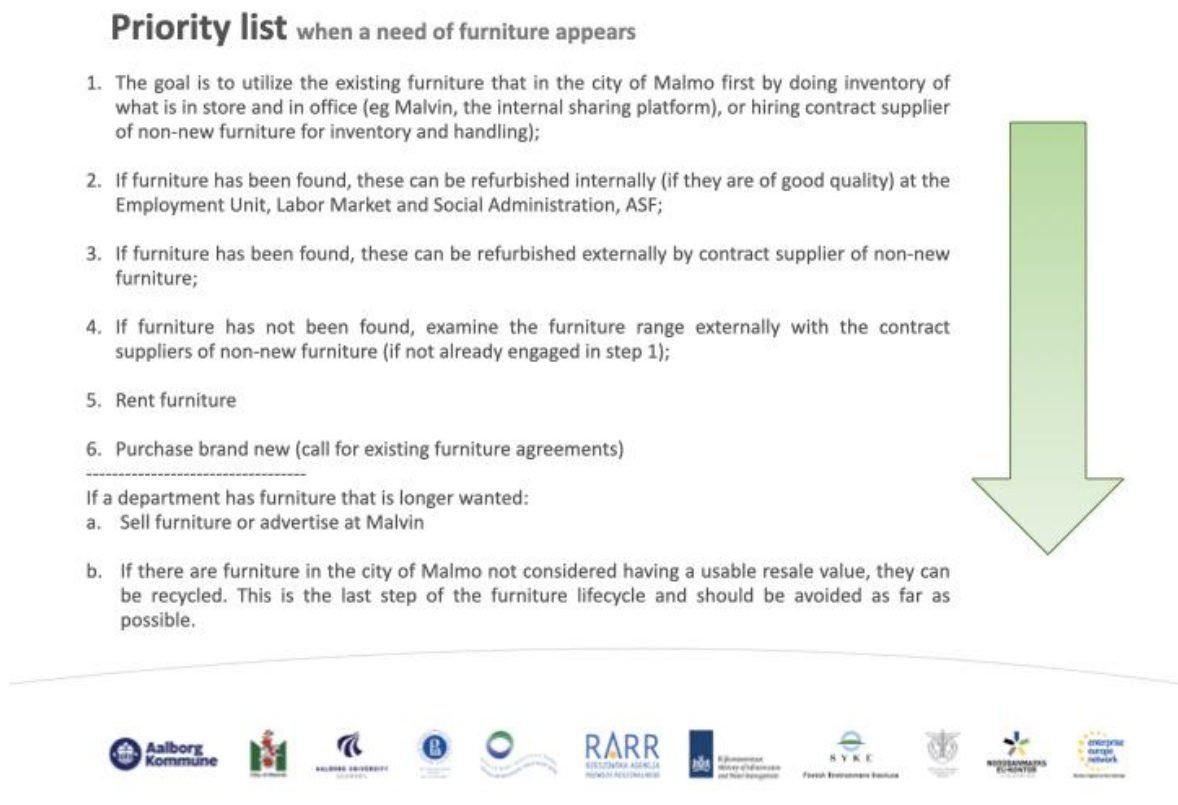


Fig. 7 Priority List of City of Malmö for furniture needs developed during the EU-funded Circular PP Project.

Source: Courtesy of the City of Malmö.

After the first year of the implementation of the contract for circular/non-new furniture about 10% of the office furniture bought by the City of Malmö was non-new furniture and after the second year it was 15% of total. Thanks to it the City of Malmö saved about 170.000 kg of CO₂ equivalents each year. It is just an example, but public procurement buying performance or adopting circular practises helps to promote radical innovation in the Performance Economy.

As mentioned above, investments and grant-giving can make service business models work. Investments in logistics systems and in the enablers of the circular economy are key. Logistics and enablers are crucial engines in the transition to a more circular system. Investing in the digital platforms and in technology companies that can facilitate and enable the circular flows of materials and products, the take back systems, the refurbishment and the remanufacturing should be in the agendas of governments, foundations and businesses.

In the broader ecosystem of the circular economy, policy can also plan for fiscal incentives that aim to extend products and materials longevity with better maintenance, repair, reuse and remanufacturing, while recycling- on which European and national rules and effort focused so much until now- is left as the last option. Infrastructure and legal rules need to be built and organised in order to allow local or national or European circular models to work. These could include deposit and collection schemes for resource recovery next to effective reverse logistics, tracking and tracing product returns, ensuring regulatory compliance associated with refurbished products, optimising design for leasing and refurbishment.

The financial feasibility of the new circular business models in these contexts compared to the ones existing in a linear economy needs to be explored further and proved. Reuse, repair and refurbish models require investments in the training of people and in the creation of education paths for manual skills in many countries.

- INFORMATION, EDUCATION AND AWARENESS

Sharing information and data is required for the development of circular and sustainable knowledge as often customers are not aware of what “sustainable” really means and rely on producer information. Companies' campaigns, as seen in the last months with the plastic issue and the product made partly with recycled plastic, are often misleading. Fortunately, on the other side, there are also campaigns that work⁴. Anyway labels must be designed in a way that provides clearer guidance on how to compare different products, for example with the implementation of product circularity scores.

The lifecycle footprint information of a product can be shown in labels or scores. The same labels could provide information on the environmental condition of products and services and specifically address resource-efficiency and obsolescence of products. These labels could declare the ease of a product to be repaired, taken apart, recycled or upgraded. The C2C global standard⁵ rooted in the Cradle to Cradle design principles defined by William McDonough and Michael Braungart, with its five categories is a good example in this direction and not only from an environmental point of view.

⁴ [Reducing Plastic Pollution: Campaigns That Work - Stockholm Environment Institute \(SEI\).](#)

⁵ [Cradle to Cradle Products Innovation Institute.](#)

Sharing information and making the consumers aware of the sustainability issues is also strictly linked to raising awareness towards the topics of sustainability and circular economy among the population as well as raising awareness on the implications and on the benefits of resource efficiency and material flows in organisations and among clients.

Empowering public and private institutions as well as consumers will be crucial. Education has a big role to play. Policy-makers could plan and set up a range of education, information and awareness-raising tools aimed at public and private institutions as well as consumers.

- CONSUMERS BEHAVIOURS AND LIFESTYLE CHANGES

In order to drive change in people's mindset and overcome some cultural barriers-like the perceived lack of ownership in a product as a service solution or the perception that refurbished items are not as good as new or not safe enough- raising awareness among users might be very useful. Raising consumers' awareness can also be done by providing access to reliable information on products to promote circular behaviour. Raising awareness is crucial also to involve in the circular business models people with low income that could benefit the most from having high quality and energy efficient instruments.

An inclusive circular economy has to be as much about changing social practises and behaviour and actively involve people as it is about redesigning products and services. So far citizens have only occasionally been involved in the public conversations and academic discourse on circular economy.

There is urgency of drastic lifestyle carbon footprint reductions in high-income countries. Adopting radical policies to limit the impact of luxury and wealthy lifestyles on global warming is a delicate topic that world's major economies and governments need to face. Banning private jets and yachts is a simple example. Also looking at the flying habits of wealthy people, customer loyalty programmes from airlines companies are inappropriate from an environmental point of view as they encourage frequent flying. On a more simple level, all the promotions that support the gifting of extra products not required by the customers- like getting a Beats headphones while buying a Mac laptop- are exacerbating the overconsumption of resources as well as the exploitation of workers in manufacturing countries. Unsustainable practises of

citizens and companies can be stopped. The same consideration applies to the appliances, to the food or the fashion sector. The Environmental full-cost accounting as well as the True Price⁶ calculating the hidden impacts of our lifestyle on people and planet are important initiatives in this direction underlining the unsustainability of nowadays behaviours.

Brave governments with strong leadership, even at the risk of being unpopular, must begin putting in place measures to target lifestyle options that are unhealthy for the planet and unfair for the rest of the population. Other policies that aim to reduce lifestyles with a high environmental footprint can be limiting the size of homes, supporting co-housing and tools sharing, limiting the use of public space for roads and car parks, and setting higher minimum efficiency standards for appliances. Policies and different habits need to aim to lower the carbon intensity of lifestyle options, on one hand, and to decrease the volume of consumption on the other hand. Systems change and behaviour change should be the ultimate goals of policy-makers and courageous business leaders in the transition to a more circular economy.

⁶ <https://trueprice.org>

Chapter 5

Conclusions

Exclusive, exploitative and extractive: three adjectives describe our economic system today. Benefiting the minority in power, abusing labour and human rights and chasing in natural resources for short-term enrichment are three very serious problems we need to face. There is not a lot of time to do so before the balance between humans and nature crashes.

The challenge of the current period is clear and impressive at the same time: how do we redesign our economic and business systems to be inclusive, empowering and restorative?

Considering the climate emergency period we live in today and the daily extreme events we witness, this research tried to understand how the advent of a new and more socially and environmentally sustainable economy could help in the coming decades the human presence on Earth to be in balance with the natural system. In particular, starting from the clear fact that inequality is increasing in societies

worldwide and that many people in different countries pay a *poverty premium* and suffer from energy poverty, the research wanted to understand if changing the business model of the companies supplying services instead of products could positively impact the inclusion and the happiness of people in society.

The research tried to shed some light taking as case studies one pilot project that ran in The Netherlands for seven years until the beginning of 2021 and another project currently running in the Flanders region in Belgium. Interviews were performed on the companies side with the partners involved in both projects as well as on the customer's side with the participants in the Dutch pilot project.

After everything said some crucial points can be made on the consumers and on companies side. The scientific theory outlined in chapter 1 and the recent XaaS - Everything as a service report mentioned in paragraph 5 of chapter 2 claim that shifting from products to service leads to a democratisation of the consumption and to a reduction of the household costs, regional value creation and employment, environmental potentials interlinked with positive impacts on health. While with the adoption of white goods as a service in the Dutch project, Eigen Haard avoided the increase of bills and insolvent tenants, the impact on employment and regional value creation stayed limited, clearly also due to the small numbers of the participants in the project.

Also, if product as a service gives access to high quality products and might bring a kind of democratisation in theory, the reality is that, as seen in paragraph 3 and 4 of chapter 2, companies in the sector, at the moment, have as customers a target group of wealthy and young people living in urban areas that can potentially afford to full upfront price of the products. The projects object of this research that have as target group people with low income and living in poverty remain definitely an exception in the current period. So the democratisation stays mainly on a theoretical level, the practical results look different.

Still on the social aspect, considering the bigger picture around inequality, poverty and energy poverty outlined in chapter 1 and combining it with the outcome of the research linking access to high quality appliances and personal sensitivity of the participants in the Dutch project towards more sustainable choices, it is also possible to affirm that the influence on inequality is fragile. Inequality in society does not

decrease because of the adoption of the circular business model per se. The very conscious, long term decision of fighting energy poverty through policy and investments in the first place might help doing that.

Especially considering the energy prices skyrocketing in these months, it is crucial once again to look at the bigger picture as already suggested in paragraph 4 and 5 of chapter 1. As there is a hype towards offering everything as a service- see paragraph 5 of chapter 2-, in order to avoid any other kind of inequality, the final goal of such a system has to become fighting poverty and energy poverty. Switching from products to service might be a way to achieve energy security, but it is important to make sure that people do not lose freedom and privacy over it.

Looking at the participants involved in the projects analysed by this research and how they got access to high quality and energy efficient appliances while containing the bills costs, it is clear that- opposite to young and affluent groups that are moving a lot and need things for a limited amount of time- people with a low income at the moment choose non-ownership as a service because it is economically convenient. Nobody chooses it because of the environment or for sustainability reasons.

Considering how important the economic aspect is in adopting the renting and leasing model for people with low income and/or living in energy poverty, it is possible to affirm that the lower the price, the more people would prefer usership over ownership. The same thing can not be said for wealthy people which as seen in paragraph 6 of chapter 2 also consider product as a service model because it can give them more variety of choice and flexibility as well as they can test out items before purchasing. Convenience for this last group, while it is important, it is definitely not the only element to evaluate.

While the financial element is key, it is also relevant to give people the perception to have some kind of power in the non-ownership era. So, in order to push people to embark in the model and give people the feeling of being more in charge of appliances and things while not owning them, the research discovered the essential role to be played by an organisation advocating for transparency and making the model transparent. Big corporations are very often looking just at the cash flow and at their

targets, while people with low income have other needs and points of view. An in-between entity can help mediate the different points of view and expectations.

To conclude on the customers side, coming back to the hypotheses laid down at the beginning of the research on the customers side, it is possible to affirm that, with all the nuances and considerations, the product as a service model gives to people with a low income access to high quality products that they would not have access to otherwise. On the other side, though, the access to high quality and efficient appliances in the great majority did not change the sensibility of participants in the project towards sustainability and green choices and in the long term it reduces inequality in society.

Switching now to the company side, many businesses, big and small, are using products as a service business models including BOSCH itself with the ongoing Blue Movement. In order to get involved, though, with a different target group as in the case studies object of this research, that usually does not buy BOSCH appliances, the research found out that for the corporation and producer of the appliances was fundamental that the financial risk was taken by someone else.

On the company side, indeed, an interesting outcome has been found in the dynamics among the different partners in the two projects. In particular, it is important to underline how the financial risk of the two pilot projects was not taken by the biggest companies involved, but by Turntoo, a consultancy company in the field of circular economy, and by Samenlevingsopbouw, a social advocacy organisation fighting energy poverty among other issues. Very important was as well for the corporations involved the presence of an intermediary who manages the relationship and the payments with the target group.

As outcome on the business side, it is possible to affirm that for profit companies are keen to experiment with product as a service, leasing and renting models with people with a low income if and only if the financial risk is covered by somebody else. At the same time, the pilot projects in this sector give them knowledge and improve their sustainability efforts as part of their marketing strategy, while contributing to the companies' reputation and positive image.

European funds that are going in the direction of pushing the *performance economy* (see paragraph 8 of chapter 1) are, then, more than welcomed by the corporations because they offer money to play with new business models without the company taking any major risks. Grants from foundations or work for social organisations are also interesting for such companies that are eager to acquire skills and competencies also in the customer relationship segment without putting too much skin in the game. It has to be underlined once again, as mentioned in paragraph 4.4 of chapter 3, that both pilot projects used as case studies of this research got some fundings: Bsparen in huis from Stichting DOEN and the Papillon project from the Flemish government.

As already mentioned in chapter 4, driving factors and relevant elements for embarking in product as a service experiments that have a social aim- *target people with low income and living in poverty* in the analysed case studies- are totally different according to the diverse actors involved.

Actors involved	Main factors to join product as a service models that aim at people with low income and living in poverty	Factors with light or no influence in joining the PaaS model	Other key elements for participating in a PaaS model that aims people with low income and living in poverty
Customers/ users	Economic convenience	Sustainability concerns Energy efficiency	
For profit corporations	Knowledge on the usage of the appliances Improvement of company reputation in sustainability and social efforts	Responsibility toward society Reduction of inequality	Financial risk taken by somebody else Intermediaries to manage the relationship and the payments with the different target group
Social organisations	Improve lifestyle and economic situation of the users	Assuming the financial risk of the model	

Table 1 The different actors (users, for profit corporations, social organisations) involved in PaaS projects with a social aim linked with the main factor for which they would join product as a service models that aim at people with low income and living in poverty, the factors that, have light or no influence and other key elements.

Table 1 tries to summarise the conditions and the factors under which the different players accept the participation in such projects that especially for the for profit corporations are not their *business as usual*.

As Table 1 somehow implies by showing the different perspectives between for profit corporations and social organisations and also came up in the interviews with the representative of BOSCH and Turntoo, making for profit companies responsible for inequality in society means asking too much from them.

While the age of Corporation 2020 as outlined by Pavan Sukhdev is still yet to come- despite the positive examples of B Corporations mentioned in paragraph 1 of chapter 2, the State has once again a pivotal role to play in reducing inequality and foster inclusion, then.

Combining circular economy with just transition and social equity can be reached through policy and practice, but they need to be in the priority list- if not of long term thinking companies- at least of policymakers. For example, in the process of rethinking the concept of ownership, businesses, governments and policies can decide to focus on inclusion and wealth of groups of people with low income. An important tool is the evaluation of the different aspects of the circular business models through a life cycle assessment or even through better tools that considers the multitude of relevant elements, some of which are not considered nowadays in a LCA.

As the original hypothesis of companies accepting their leading role in society and making efforts for a positive impact on the environment and on the society has been partially proven wrong- as seen above in this paragraph for profit companies are keen to experiment with product as a service, leasing and renting models with people with a low income if and only if the financial risk is covered by somebody else, and also making for profit companies responsible for inequality in society means asking too much from them-, the responsibility of social outcomes- and partially of environmental impact- goes once again back to the society and the State.

Thanks to rules like extended producer responsibility and the right to repair, the governments can call companies out to their responsibility.

Another way to make companies accountable for their environmental, if not social, impact is to realise the tax shift from labour to natural resources and pollution. It is

the right moment for this shift to happen as also the UN Secretary-General António Guterres agreed on¹. As for more than 10 years now the Ex'tax Project² has proposed, the revenues from the taxes on natural resources and pollution can be used to lower the tax burden on labour and increase social spending, while enabling job creation and supporting those who need it most.

Taxing resources and pollution is directly linked to the fact that the pollution, the overconsumption and the overexploitation of resources are by-products of the lifestyle of wealthy and rich people, while by far poor and marginalised people pay the biggest price of unsustainable ways of living. This is an undeniable truth and a huge issue that needs to be tackled in the coming years.

This also bring us to the environmental outcomes of the pilot project that came to an end in 2021 and about which, then, it was possible to collect some data. Looking at the environmental impact of the product as a service business model, indeed, the benefits resulting from the Dutch pilot project are important as, at the end of seven years cycle, seventeen appliances have been collected, refurbished and repurposed.

While it is worth noticing that seventeen appliances found a new life, however, it is also interesting to highlight the gap between this number- 17- and the initial sixty appliances put in place at the beginning of the project back in 2012. The other appliances that was not convenient to refurbish or that was not possible to collect, with only- hypothetically- 7 years usage had a relatively short life compared to the potential many life cycles and users that an ideal product as a service business model would reach. Also, the design of the appliances have not been changed in these two projects by BSH, while the ideal case of a circular business model would be to adapt the design of products to make them more easy to repair, refurbish and upgrade.

This leads to an interesting outcome on the environmental perspective. The claimed environmental benefits of the product as a service, as expressed in paragraph 7 of chapter 1, while are definitely potential, are not proven by this research.

¹ *"My message is clear. Solutions exist. First, let's shift taxes from salaries to carbon. We should tax pollution, not people. Second, stop subsidizing fossil fuels. Taxpayers' money should not be used to boost hurricanes, spread drought and heat waves, and melt glaciers".* Secretary-General's remarks to Climate Summit Preparatory Meeting Abu Dhabi (June 30, 2019)

² <https://ex-tax.com>

After all, it is important to underline the limits of the research. First of all, the number of the participants that used the appliances throughout the duration of the project is quite small. Twenty-one participants out of the thirty-one contacts it was possible to get from the partner Turntoo accepted to respond to the interview. The others were unreachable, declined the offer or had health issues so that they were not able to join. The small number of participants taking part in the interviews was also due to the impossibility to reach the participants of the Papillon project. Even though the project is up and running in the Flanders region, Stefan Goemaere, project manager of the Papillon project for Samenlevingsopbouw West-Vlaanderen, thought that the beginning of 2020 nor 2021 with the COVID19 pandemic outbreak were not ideal moments to interview in person people in energy poverty.

Interviewing the participants in the Papillon project in the next months or years is a natural prosecution of the present work.

Also, following Samenlevingsopbouw in the management of the whole project will be relevant to understand more how the product-as-a-service business model works in reality with people in energy poverty. Samenlevingsopbouw set up an emergency fund to cover the costs of the tenants not able to afford the monthly fees. It would be interesting to understand if they ever used or will use the fund and/or if the default risk associated with people with a low income, mentioned also by Sabine Oberhuber of Turntoo during our conversation, is backed by the behaviours of the participants in the project.

Following the ongoing Papillon project and others and building on top of their experience, it is also relevant because there is still very little empirical evidence of how companies' roles and responsibilities and tenants' behaviours are changing as a result of the increasing business adoption and diffusion of sustainable and circular models. Having a robust overview of these product-as-a-service pilot projects with a social focus evolving in practice is of foundational importance for the development of circular projects and methods, and for the potential creation of new and different partnerships in different countries, regions or cities.

For what concerns the Besparen in huis met goede apparaten project, next to the relatively small number of people answering to the interview, another limit to highlight has to be found in the end of life of the appliance. Still due to COVID19 crisis,

it was not possible to follow closely the picking up of the appliances, their refurbishment and repair in the Bosch facility in Tiel, in The Netherlands. While it is known the number of appliances- seventeen- that was possible to put back into use through a Dutch second-hand shop, it was not possible to get the right number of appliances that were picked up and what exactly happened to the appliances that was not possible to reuse (possibly the materials have been recycled). Even though this element is not so relevant for the social perspective of the present research, it is very useful to have a better picture of it from an environmental point of view. Considering the life cycle assessment and the declared sustainability of the product-as-a-service circular model, the refurbishment and the reuse of the appliances are crucial to improve the environmental footprint of the model also looking at the scientific theory shown in chapter 1 and 2.

Further research should focus on analysing cases in which companies piloted or adopted business models in the context of a circular economy. They will help to further uncover the elements and the circumstances that increase the consumer acceptance of product-as-a-service as well as the rebound effects.

Also, the research did not explore a very crucial element in the transition to a more circular economy and sustainable products that is the design phase. Even though in the product-as-a-service business model, how products are designed can improve the repairability and accelerate the maintenance operations, in the two pilot projects Bosch did not change the design of the appliances. In the interviews, the two BSH representatives underlined the importance to make the machines more performing for the different model, but, in the end, as changes in design are very slow in a big company as BSH and need a strong drive, the appliances put in the houses of the tenants were the same that can be found on the market. Thus, the design phase of the appliances has not been explored any further.

Furthermore, it was not possible to verify if there has been any rebound effects from the people joining the pilot projects. Considering the results of the Bugaboo project mentioned in paragraph 3 of chapter 2 or the rebound effects found in some mobility as a service cases, it would have been interesting to understand if similar behaviours apply also in the case of white goods as a service. From the interviews with the tenants it was not possible to understand much about it as it was unclear the previous

status quo and seven years had passed by since the start of the project in Amsterdam and its surroundings. Understanding the different- maybe less careful- user behaviour can be useful also for the companies to redesign the appliances to be cost-effective over multiple use cycles and multiple users. The absence of data about it also makes it difficult to estimate the environmental impact on a system level over multiple lifecycles. This blind spot of the research could definitely be explored further.

Looking at the statistics and at the companies adopting product-as-a-service business models, a potential path of research could explore who are the people that use car-as-a-service, electronics-as-a-service, etc. The bias and the few statistics around the model suggest that companies in this sector, that are not participating in any project with a social aim, have wealthy and young people living in cities as customers. It would be an ideal research path to perform, once found the companies keen to share their data and/or the customers open to participate in a demographic research. Company transparency is crucial to keep working and researching in this direction also on key issues such as *planned obsolescence*.

Circular economy is a challenge and an opportunity to reshape our societies. Starting from the access to products and materials of people and companies, the transition to a more circular, regenerative and sustainable economy needs to be carefully managed as the risk of increasing inequality or, simply, of keeping the *status quo* is definitely there.

Social and intergenerational justice has to be integrated in our policy also thinking about the rights and the needs of the present and the next generations. Even though the research did not prove all the claimed social and environmental benefits of product-as-a-service, this business model in its aim of making the finite resources of planet Earth available for the infinite and future purposes is definitely an interesting and promising step forward. The conditions around it need to be defined though in order to have a fair and inclusive system of servitization. If not, the risk we run as humans is having rich people that can access better products, better materials, better services and pollute as much as they want- even through going to Mars for leisure- while the greatest majority of the population is left behind with little resources, less ownership and less privacy. And an increasing inequality as researches by Oxfam show.

There is a big role to be played by education, by system and behavioural change, by forward-thinking companies and by governments setting up bold boundaries in building a new social and fair system.

As Butera stated³: *“Even fairness, which would seem to be an exclusively human value, in reality faithfully reflects an ecological value, diversity, indeed it is its counterpart. [...] Nor, on the other hand, a social system in which a super-rich elite exploits all the others, the poor, is healthy and stable. The optimum lies somewhere in between, and where depends on the type of social system and its environment. It is precisely in these non-material areas that the possibility of building a new economic model and implementing the ecological transition is at stake”.*

³ Butera, F.M., *Affrontare la complessità Per governare la transizione ecologica*, Edizioni Ambiente, 2021, p. 287.

T. from Italian *“anche l’equità, che sembrerebbe essere un valore esclusivamente umano, in realtà rispecchia fedelmente un valore ecologico, la diversità, anzi ne è il corrispondente. [...] Né, d’altra parte, è sano e stabile un sistema sociale in cui una élite di super ricchi sfrutta tutti gli altri, poveri. L’ottimo sta da qualche parte in mezzo, e il dove dipende dal tipo di sistema sociale e dal suo ambiente. È proprio in questi ambiti non materiali che si gioca la possibilità di costruire un nuovo modello economico e di mettere in atto la transizione ecologica”.*

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Introduction

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Chapter 1

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