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# Clunkers for Mobility?

## A critical environmental justice perspective on the EU's exports of used cars to the Global South

Degree of Master of Science (Two Years) in Human Ecology: Culture, Power and Sustainability
30 ECTS

CPS: International Master's Programme in Human Ecology
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Term: Spring Term 2021

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| Title and Subtitle: | Clunkers for Mobility? A critical environmental justice perspective on the EU's exports of used cars to the Global South |
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| Examination: | Master's thesis (two year) |

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Abstract:

In the face of climate change, governments in the Global North have decided on various decarbonisation plans. With the transport sector causing more than a quarter of the global greenhouse gas emissions, its decarbonisation has become a central debate. Yet, plans for a sustainable mobility system are largely focused on local and regional scales, neglecting the global entanglements of the supply chains that provide for local transportation, especially in the automotive industry. Examining the international trade with used cars, this thesis shines light on global connections at the end of these supply chains and their implications. Taking the European Union as an example, this thesis shows how used vehicles are displaced from the Global North to the Global South in the world-system; resulting in significant environmental and health-related consequences. Based on a political ecology framework from a critical realist perspective, this thesis examines the global dynamics of the EU's used car trade, its significance for concerns about climate change and environmental pollution, and the conditions creating an enabling environment for the trade. It shows how the legally and socially flexible understanding of the traded objects themselves reinforces those conditions and blurs the answer to the question of who is responsible for the vehicle's impacts. Consequently, it critically discusses to what extent debates about environmental justice and the 'polluter pays principle' are applicable and contested. This case illustrates how complex interactions make (the for environmental justice claims) necessary categorization of 'polluters' and 'burden bearers' uncertain and complicate debates about responsibility for environmental problems.



*Keywords:* environmental justice, second-hand cars, world-system theory, environmental load displacement, used car trade

# Acknowledgements

My deepest gratitude goes to everyone that supported me and this project during these difficult times. I want to thank the wonderful busy fairies for being such incredible and supportive friends, for being patient with my insecurities and never-ending self-questioning. I want to thank all my classmates; it was a privilege and an extraordinary experience sharing these two years with you, introducing me to a whole new way of looking at the world and inspiring me to always stay humble, to keep on challenging myself and to never stop questioning what is happening right in front of me. Thank you for sharing your invaluable thoughts and honest emotions and your commitment to keep on going even if the issues we are dealing with feel overwhelming.

I want to thank my supervisor Alf for his enthusiasm and encouragement and all the inspiring conversations we had. I want to dedicate as special thanks so Vasna who continuously inspired me with her tireless passion for justice and self-reflection. I am very grateful for having been able to learn from both of you and for your support to disentangle my thoughts and feelings. I could have not done it without your careful advice and the time you have taken to not only support me academically, but personally.

I owe many thanks to the people I interviewed and that supported me with the analysis. Without your support, knowledge and perspectives, this thesis would not have been possible. I am humbled by your openness to share your time and insights with me, helping me to navigate around an issue that still feels overwhelming to me. I am grateful for being surrounded by people that inspire me every day with their relentless fight to make this world a better place.

Finally, I want to thank my best friend and my family for listening to all the ups and downs, for standing by me and being a safety net that allows me to dare all the balance acts.

# List of Acronyms

| | |
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| ACEA | European Automobile Manufacturers Association |
| EC | European Commission |
| EEA | European Environment Agency |
| EJ | Environmental Justice |
| ELD | Environmental Load Displacement |
| ELV | End-of-life vehicle (vehicles designated for recycling and disposal) |
| HDV | Heavy-duty vehicle (transport vehicles > 5t) |
| IMF | International Monetary Fund |
| LDV | Light-duty vehicle (transport vehicles < 5t) |
| OICA | International Organization of Motor Vehicle Manufacturers |
| UNECE | United Nations Economic Commission for Europe |
| UNEP | United Nations Environment Programme |
| UNFCCC | United Nations Framework Convention on Climate Change |
| UNRSF | United Nations Road Safety Fund |
| VDA | Verband der Automobilindustrie (Association of the German Automotive Industry) |
| WHO | World Health Organisation |
| WSR | Waste Shipment Regulation |
| WTO | World Trade Organisation |

# Table of Contents

# List of Figures



# List of Tables

## 1. Introduction

*To achieve the goals of the Paris Agreement, a significant reduction in transport emissions is needed by 2050 beyond the EU as well. It is therefore crucial that the European Green Deal and this strategy are well reflected in our external actions, that global action towards sustainable and smart mobility is widely promoted to achieve the Sustainable Development Goals, and that policy coherence is ensured when projecting internal EU policies outside the EU* [emphasis added]. (EC, 2020b, p. 166)

In 2020, the European Commission (EC) declared in its *Smart and Sustainable Mobility Strategy* its intention to take global action in the collective efforts to achieve the commitments of the Paris Agreement in the transport sector (EC, 2020b). That year, transportation caused more than a quarter of the EU's $CO_2$ emissions of which 70% originated from road transport, especially passenger cars (EEA, 2020), contributing significantly to climate change. Hence, transport decarbonisation has become a central element of the European Commission's goal to reach climate net neutrality by 2050 (EC, 2020b), so that most of the currently 242 million passenger cars (ACEA, 2021) should be electrified by 2050.

Today, our way of moving is dominated by the system of automobility, enabling and reinforcing the act of driving a car as the globally predominant form of mobility. The car as the central element of this system is deeply entangled in the global capitalist system and a fundamental aspects of global development strategies (Paterson, 2007; Urry, 2004). Urry (2004) noted that "the car is rarely discussed in the 'globalization literature', although its specific character of domination is more systemic and awesome in its consequences than what are normally viewed as constitutive technologies of the global" (p. 25). So, what are the global connections within the automobility system? The automotive supply chains are not limited to the substantial consumption of resources in production, but processes also extend this network towards the end of the supply chains.

While one can undeniably question the nature of the EU's plan to create a "sustainable" mobility system through the electrification of its fleet itself, my attention was drawn to the vehicles, which would no longer be considered "sustainable" in the future. Every year, between 14 and 15 million cars are de-registered from the EU's fleet (Mehlhart et al., 2017). The EU's commitment to climate mitigation would raise the expectation that these cars are taken out of circulation to prevent further contributions to the global greenhouse gas emissions. However, a report by UNEP showed that a significant share of used cars is exported, often to the Global South, resulting in significant local and global environmental consequences. The EU is one of the largest producers of cars worldwide and is one of the critical used vehicle exporters (UNEP, 2020b). In this light, the EU's commitment to global actions towards sustainable (and carbon-free) mobility seems questionable. The central question is: is this a case of "one man's trash is another man's treasure" or a "wolf in sheep's clothing" – or perhaps something in between.

## 1.1. Research Aim

This thesis aims to show that focusing on collective global efforts to reduce carbon emissions and environmental and health-related impacts from the transport and mobility sector is fundamental for avoiding the shift of those impacts between regions. Hence, the purpose of this research project is to first, open up a conversation about the role of the used car trade in the global efforts for the development of a sustainable mobility system and second, to explore the tensions in the discussion about environmental and climate concerns as a matter of different perspectives on just mobility. For one thing, I want to contribute to the existing literature showing how actors in the Global North continuously displace the unintended effects of overconsumption as waste or used goods to the Global South. In addition, I will also explore why the trade with used vehicles has not yet been discussed as a matter of environmental justice. In contrast to "classic" cases of environmental justice (e.g., displacement of plastic waste, e-waste, shipbreaking), the trade with used cars appears to be more complex due to an unclear question of who is responsible for the problems. I aim to evaluate these differences and which consequences they might have.

In this thesis, I focus on the EU, understanding it as a political, geographical, and economic entity. Although it is one of the major used vehicle exporters, it has so far barely been discussed in this context. I chose to not focus on a specific EU member state as the dynamic internal EU market would distort such an analysis and the EU borders seem to be the significant legal and physical site of the exports. Due to the complex and informal nature of the used car trade and the lack of comprehensive data, it is not my objective to explain a specific case in detail but to outline the general tendencies and structures that characterise the EU's international used car exports. I do not disregard the dynamics of the used vehicle market and its impacts within the EU, nor in specific destination countries, but I aim to contribute to a shift of the debate about sustainable mobility from a solely regional or local focus to global dynamics.

## 1.2. Research Questions & Structure of the Thesis

The overarching question guiding my reasoning is: who benefits and who loses from the used car trade and how is the trade rationalized by some and contested by others? This thesis is structured in four parts, each one of them dedicated to explore a specific research question. First, I introduce the general trade pattern of the global used car trade and the EU's role in it.

*1) How is the global used car trade organized and what is the EU's position within it?*

In the second part, I outline environmental and health-related impacts of the EU's used car trade drawing on exemplary indications of consequences in the importing countries identified earlier.

*2) What are environmental and health-related impacts of the EU's international used car trade in the destination countries?*

In the third part, I seek to describe factors that create the conditions enabling the trade to take place the way it does. I focus on EU policies and regulations to assess the EU's role and positioning in the trade, while shortly outlining reactions in the importing countries.

*3.1) To what extent/how do EU policies consider the environmental impacts of used cars in its trade with non-EU countries? Are there contradictions between policies at different scales?*

*3.2) How do the different interests of stakeholders in the exporting and importing regions maintain or contest the trade practice?*

Finally, I draw on the previous section's results to discuss how matters of environmental justice and transport equity clash in the observed phenomenon and open up a debate about responsibility.

*4) To what extent can the EU's used car trade be understood as a contested practice of environmental load displacement and a matter of environmental justice?*

## 2. Methodology and Methods

The phenomenon of the used car trade is complex and touches upon matters of different disciplines, such as economics, geography, sociology, law, ecology, chemistry, and health, therefore intertwining social and natural sciences. It consequently calls for an interdisciplinary approach that is both natural and social. For this reason, I draw on a mixed-methods approach to answer my research questions.

### 2.1. Critical Realism

In this section, I briefly outline the methodological basis of this analysis, necessary to explain my understanding of the world that shapes this work. Generally, my thesis is built on the philosophical approach of critical realism.

A critical realist perspective does not claim privileged access to truth, rejecting naive objectivism. It is based on ontological realism and epistemological constructivism, representing a third way between empiricism and relativism in philosophy of science. It distinguishes a tangible intransitive world existing independently from our transitive beliefs about it or attempts to understand it. Critical realists seek to understand and to know how reality is socially situated and provisional in nature. In fact, from a critical realist perspective this dynamic relationship between an intransitive reality and transitive models for understanding reality is what enables science at all (Bhaskar, 2010), but also makes it impossible to know the ultimate truth impossible. Critical realism attempts to combine the extreme positions of realism and constructivism into an understanding of reality and knowledge that allows us understand how phenomena and constructions coexist and interact (Sayer, 2000). A critical realist work is based on the assumption that generative and causal mechanisms can be identified to establish an explanatory and consequential pattern out of the chaos through so-called retroductive reasoning (Bryman, 2012).

A critical realist perspective on the displacement of used vehicles offers the possibility to explain the phenomenon in a multi-sided way, exploring complex and interacting causal mechanisms. This is undeniably important in such complex cases characterized by competing perspectives on the material object itself. First, the traded car is both waste and a resource. Second, it is a source of toxic substances that contaminate the environment and endanger public health, but also represents the basis of many people's livelihoods involved in processes towards the end of the supply chain. Thirdly, it gives countries in the Global North the opportunity to export their waste treatment processes, but at the same time is considered a vital source of access to cheap mobility and life opportunities.

## 2.2. Theoretical Framework

The theoretical framework outlined in this section presents theories and concepts that I believe offer a valuable lens for the analysis of the EU's trade with used cars. I draw on conceptual insights from political ecology and political economy applying a world-system perspective, which will help discuss the observed phenomenon as case of environmental load displacement and environmental justice.

### 2.2.1. Political Ecology

Political ecology is a field of environmental studies with roots in various theoretical traditions like critical social theory, historical materialism and social and environmental justice approaches. Coupling two seemingly unrelated research fields – the *political* and *ecology* – it attempts to challenge the apolitical nature of technocratic approaches of expert environmental management. Political ecology is understood more as a practice directed towards social change, than a theory (Bridge et al., 2015), "combi[ning] the concerns of ecology and a broadly defined political economy" (Blaikie & Brookfield, 2015, p. 17). Consequently, methodological insights from political economy help to understand how and why certain phenomena exist, investigating the benefits and losses of different actors, as well as the power relations between them.

Political ecologists question positivist causal reasoning and widen the perspective to explain observable phenomena within broader contexts. "Neutral facts" are seen as results of political-economic processes, not situated in a social vacuum. Therefore, it is essential not to restrict one's analysis on the local but to consider global structures and processes. Newell and Bumpus (2012) argue that

> political ecology enables an understanding of (1) the "local" social and environmental consequences of global (environmental) governance–the ideologies, discourses, structures, and interests that it embodies, reflects and projects; and (2) the ways in which "regimes" that govern resources at different levels engage and transform one another through global circuits of capital, production, and consumption. (p. 51)

Similarly, Lawhon and Patel (2013) suggest

> that calling attention to the local scale has focused the gaze of politics and activism away from contradictions, injustices, and responsibility at the global scale and towards achieving sustainability at the local scale. Importantly, in doing so, questions of responsibility and justice, particularly at the global scale, become secondary to reorienting local economies. (p. 1059)

So far, much research on just and sustainable transport have focused on the local, despite its extensive global entanglements (Paterson, 2007; Sheller, 2018). Even though the discipline has been criticised for its lack of *ecology*, others emphasized the usefulness of taking political changes and debates prior to ecological changes (Walker, 2005). In doing so, I aim to evaluate the *ecology in politics*.

Political ecology aims to overcome the divide between social and natural science, considering the connection of different disciplines an essential practice to gain a deeper understanding of a phenomenon. Hornborg (2009) concludes that

> material aspects of global society are widely ignored in social science, in part because they implicate knowledge and methodologies generally reserved for the natural sciences. Nor can they be fully grasped by the natural scientists themselves, simply because these researchers generally have a poor understanding of society. (p. 238)

The cause of issues related to the used car trade is not to be found either in the physical properties of the technology involved or the properties and limitations of the local environment, the recycling techniques employed, the laws and policies regulating the former, nor in the social relations in which all of this is embedded. It is rather the outcome of a particular interaction between all of the above and the context in which they exist.

The subject of interest has so far been investigated either from an industrial ecology perspective (Fuse et al., 2009) or focusing on the social welfare gains originating from the used vehicle trade (Clerides, 2008; Grubel, 1980; Pelletiere & Reinart, 2002). While in the latter, environmental effects are mentioned as possibly considerable aspects, they were not included in the calculation of those social welfare gains. I consider technical aspects evaluated in former analyses, but rather in the I attempt to locate them in their socio-political context. I argue that used vehicles and their localized effects can be understood as being produced through particular processes that are of social and natural, as well as of historical and geographical nature characterized by unequal power relations. Hence, the question is if used vehicles are a product of an environmentally and socially problematic regime of accumulation, why does this regime continue to exist? How are the environmental implications legitimized, how do certain assumptions and narratives present these consequences as possible or even inevitable?

### 2.2.2. World-System Theory

The idea to widen the perspective from local environmental issues to global connections is well reflected in world-system approaches in political ecology (Engel-Di Mauro, 2009). Considering the used car trade as part of a global supply chain allows one to place the (in)formal trade practices within a world-system context, which allows for the analysis of the economic roles of geographical regions in the global network of unequal exchange. The world-system theory was originally proposed by Wallerstein (2004) and has been used as a theoretical basis for understanding the overarching structure of our global economic system. It is argued that the phenomenon of globalization and its intricate interconnectedness led to unique power relations within the capitalist world-system, eventually resulting in a sharply delineated division of labour and production processes between and within different countries. This division is described with differences in geography and economic "strength", resulting in the categorisation of a region as either core, semi-periphery, and periphery (Wallerstein, 2004). These spheres are not only connected through exchange in economic terms, but also in physical and metabolic terms (Hornborg, 2009, 2020; Martinez-Alier et al., 2010; Rice, 2007, 2009). The world-systems perspective emerged like political ecology as an anti-capitalist critique founded on Marxist ideas and political commitments. Engel-Di Mauro (2009) argues that

> the explanatory usefulness of world-system theories as a systemic and relational macro-spatiotemporal scale analytical framework should be of interest to political ecologists trying to explain particular outcomes in people-environment relations at specific space-time conjunctures. Borrowing from and improving upon the world-systems paradigm should help political ecology "become a global project" (Walker, 2003, p. 11) without risking incoherence and reinvigorate radical political commitments – such as alternative development and anti-capitalist critique – (Brown and Purcell, 2005; the works edited by Muldavin, 2008) without losing sight of world economy mechanisms and constraints and without social reductionism. (p. 123)

An exclusively local perspective on sustainable mobility similarly places the responsibility solely on local actors. Acknowledging that all local aspects of sustainability are deeply entangled in a complex and dynamic global world-system can help us widen our understanding of observable problems and provoke more viable solutions. One could argue that in the case of the EU's used car trade, the debate around end-of-life-vehicles (ELV) in the Global North is (a part of) the other side of the coin of increasing air pollution and carbon emissions in countries of the Global South. Therefore, I use the concepts of core and periphery to describe areas that benefit or are burdened differently by the trade. I focus on the relation between regions and countries, not to neglect the core-periphery relations within these regions, but to show macro-scale inequalities between regions in the Global North and the Global South.

### 2.2.3. Processes at the End of the Supply Chain in the World-System

Noting that the work on world-system analyses has so far mainly focused on the first part of global commodity chains, such as raw material extraction and production processes, Jorgensen and Rice (2012) call for more attention on the other side of the coin: the flow of waste and hazardous materials from the core to the periphery and impacts of environment and living conditions of the populations in the receiving countries. Disregarding these processes neglects that waste and pollution are as much the end-results of production as commodities are. The analysis of post-consumption practices extends the project of "lengthening global commodity chains" (Ciccantell & Smith, 2009, p. 371) at the other end of commodity life-cycles.

Frey (2012b) described the world-system as "a global economic system in which goods and services are produced for profit and the process of capital accumulation must be continuous if the system is to survive" (Frey, 2012b, p. 80). Wealthy core regions in the Global North use disproportionate amounts of resources to create an abundance of commodities, in result creating a substantial amount of waste for disposal. They often encounter resistance to local waste treatment facilities and stricter regulations for the disposal and recycling of waste increase the local waste management costs (Clapp, 2001). Therefore, Frey (2012b) argued that it is necessary to understand the world-system in metabolic terms, as the "entry of energy and materials and exit of dissipated energy and material waste" (Frey, 2012b, p. 80). Fostered by unequal power relations, core regions export this entropy to peripheral sinks outside of their territorial borders (Frey, 1998; Hornborg, 2012).

Research has shown that the centrality of a region in the world-system allows it to displace its environmental harms to other countries, resulting in the substantial exposure of importing countries to environmental and health-related risks (Bai & Givens, 2021; Demaria, 2010; Frey, 1998, 2012b, 2013). Hazardous and non-hazardous materials, traded illegally and legally, are exchanged for (officially) different purposes, from reuse, over recycling to the actual final disposal (Clapp, 2001). Much of this strand of literature focused on "straightforward" waste trade cases, such as the shipbreaking industry in India (Demaria, 2010), e-waste exports (Frey, 2012b), or plastic waste (Bai & Givens, 2021). Although the trade with used cars arguably does not represent a classic case of waste trade, it is helpful to identify similarities and differences between these cases. This comparison is useful to understand why the investigated phenomenon is such a sensitive matter and why it has so far not been discussed academically as a case of environmental load displacement or anti-wealth (Frey, 2006).

### 2.2.4. Pollution Havens, Anti-Wealth and Environmental Load Displacement

Frey (2006) described global waste disposal practices as the displacement of *anti-wealth* or the appropriation of carrying capacity through the transfer of waste exports to the sinks in the periphery. Certain actors in core regions benefit from this trade while the periphery (and in particular specific

marginalized groups) bears the costs associated with these displacement practices. Although Frey never further developed the concept of anti-wealth, I would argue that is a broader understanding of what is called *environmental load displacement* (ELD).

According to Hornborg (2012) ELD is an uneven distribution of environmental burdens and "a social strategy that is integral to the political economy of world-systemic processes rather than the incidental effect of certain patterns of production and consumption" (p. 48). ELD arguably enables the wastefulness and unsustainability of industrial resource management and the increasing welfare in the Global North. The concept has been used to describe how core regions in the world-system appropriate resources from periphery regions and displace the negative consequences of resource extraction and production processes (*upstream impacts*); or how the *downstream impacts* of core economies are exported to peripheries in form of pollutants (Hornborg, 2006, 2009; Jorgensen & Rice, 2012; Muradian & Martinez-Alier, 2001; Peng et al., 2016). Hornborg (2012) argued that the measurement of ELD needs to be adapted to different historical and geographical contexts of specific kinds of capital accumulation. In the case of used vehicles, we need to extend our understanding of ELD, as the exported anti-wealth does not take on a self-evident form of post-consumption commodities. Second-hand markets require us to rethink what we consider to be waste or an environmental burden. Waste is an unstable, relational category within specific configurations of culture and economy (Gidwani & Reddy, 2011) and while some see it as a burden, others consider it a resource (Gregson & Crang, 2015). I would suggest that this understanding depends on, among other things, the observer's position within the world-system and acknowledge that "waste is not a trans-historical given, either in form or content; rather it is a mobile description of that which has been cast out or judged superfluous in a particular space-time" (Gidwani & Reddy, 2011, p. 1649).

Previous research evaluated environmental consequences of the used car trade as a case of the *pollution haven hypothesis*, suggesting that trade liberalization causes pollution displacement from countries with stricter environmental standards to sites with lower ones. They found for the US-Mexico trade that although the vehicles exported from the US were more polluting than the average vehicles in the US, they were less polluting than the cars already existing in Mexico. Even though it contributed to declining average vehicle emissions, the imports led to an extensive growth of the fleet, cancelling out all "efficiency gains" (Davis & Kahn, 2010). In my opinion, the focus on efficiency of individual vehicles prevents us from taking the larger context into account, as a goal of global initiatives is supposedly "to help developing countries to leapfrog past environmental mistakes that the North made, not to repeat them" (Clapp, 2006, p. 16). Clapp (2002) argues that the pollution haven argument is too narrow and is generally hard to prove quantitatively because the growth of polluting industries in the Global South is often argued being a "normal" part of development, making this concept less helpful in the environmental justice context.

### 2.2.5. Environmental Justice vs. Transport Equity

Environmental justice (EJ) is a normative concept used by environmental scholars and an activist movement. It is described as

> the unequal distribution of burdens and risks; the creation of "sacrifice zones"; the usual path of least resistance targeting low-income, peripheral communities; the denial strategy that governments and private corporations use regarding environmental and health damages; and the exclusion from the decision-making process of the people most affected by the very decision. (Armiero & D'Alisa, 2012, p. 56)

Environmental justice indicates the struggles for equal distribution of environmental risks and benefits among classes, races, and genders (Gleeson & Low, 1998) and has expanded from local cases to a global project (Sze & London, 2008). Moreover, the movement has expanded the subjects of debate to not only the right to live in a healthy environment, but also pushed the boundaries of what we understand as environment from traditional perceptions of nature and wilderness to all human surroundings (Novotny, 2000). Thus, concerns about the environment and human health are not seen as distinct matters, but are connected to a common cause (Armiero, 2008). EJ concerns are argued to be directly related to actors' position in the world-system, allowing economically and politically powerful stakeholders to displace their environmental burdens onto weaker ones (Adeola, 2000). Hence, ELD and the shift of anti-wealth are connected to the question of EJ. Especially the case of hazardous waste exports has been described as EJ issue or even environmental racism on a global scale placing a disproportionate burden on specific communities which frequently lack the capacities to deal with the waste in an environmentally sound manner (Clapp, 2001; Lipman, 1998). Understanding used cars as a traded (waste) commodity opens up a debate about ELD and EJ to the extent that importing countries become dumping grounds (Pellow, 2010).

Transportation is discussed as concern of EJ in both Global North and Global South, showing that especially low-income and marginalized groups are disproportionately exposed to air pollution and other environmental and health-related burdens although these groups usually contribute the least to it (Chakraborty, 2009; Kingham et al., 2007; Lucas, 2004; Sider et al., 2015). These arguments are challenged by debates about transport equity, hence, the ideal of providing accessible transportation for the entire population. From this perspective, mobility and transportation are seen as something fundamentally desirable. Scholars of a new mobilities paradigm, however, challenge this perception. They question if simply more mobility is necessarily better, calling for a review of how and why we move instead of simply providing more transport (Sheller, 2018). Yet, debates about just mobility, especially in the Global North, focus on "transport and access to services and opportunities and their justice implications, without taking into account transport externalities and their justice implications –

including threats to global and intergenerational justice arising from climate change" (Mattioli, 2016, p. 119).

Cases of EJ are often presented as win-win-situations by supporters, drawing on arguments of modernization, scientific knowledge, monetary compensation and jobs for the communities (Armiero & D'Alisa, 2012). Usually, EJ cases describe practices which place the burden of industrialization on marginalized communities without them receiving any of its advantages. Questions about distributive justice ask 1) who are the recipients of EJ, 2) what is to be distributed, and 3) what is the principle of distribution? Additionally, how environmental injustices manifest in specific cases is not only a question of the form and quantity of the environmental burden that is shifted, but is also influenced by the vulnerability and needs of the receiving community and questions about responsibility (Walker, 2011).[1]

In the justice context, the question of responsibility is particularly important, usually based on the principle of "the polluter pays" (Pedersen, 2010). Frey argued that although there have been multiple discussions about the *risk globalization problem*, the success of efforts to globalize responsibility remains limited due to weak enforcement, limited resources, capital mobility, and the neoliberal project that frames regulation as a trade barrier (Frey, 2012a). In my analysis, the question of responsibility and how it is related to our understanding of the vehicles as *used cars* or *end-of-life-vehicles* is particularly important.

### 2.3. Data Collection and Methods

Based on a political ecology approach, which traditionally attempts to combine social and natural science disciplines, I draw on mixed methods to gain a multi-faceted understanding of the investigated phenomenon. Hence, I draw on qualitative and quantitative data.

During my research I found a very limited amount of academic literature, as well as public discourse on an international level related to the topic. Moreover, due to the complex and informal nature of the used car trade, reliable and generalizable data is hardly available. Therefore, this thesis aims to outline the general tendencies of environmental impacts that are manifested through this trade, rather than determining clearly quantifiable results. Through my interviews it became evident that problems to quantify the impacts of the trade make it difficult to make exact claims in the increasing political debate. These, however are often the basis for the justification of policy change.

[1] Debates about EJ include apart from distributive justice questions about the recognition of the diversity of the participants and experiences in the affected communities, and the participation in the political process, which create and manage environmental policy (Schlosberg, 2004). These debates about different aspects of EJ are valuable for further research on the topic, but go beyond the scope of this thesis. I would suggest the arguments made here are not so much wrong, than incomplete.

My point of departure was UNEP's work (UNEP, 2020b) which provides a general overview over global dynamics in the global cross-border used car trade, but it calls for theoretical reflections on it. Because the ongoing Covid-19 pandemic restricted possibilities for field research, the research aim was adapted to a project mostly relying on desk research. The major sources of empirical qualitative data were documents, gathered through the review of academic and non-academic literature, legal documents, official and media reports, and five semi-structured expert interviews as supporting information. An expert is selected because the researcher assumes that

> he she or he has knowledge, which she or he may not necessarily possess alone, but which is not accessible to anybody in the field of action under study. It is this advantage of knowledge which the expert interview is designed to discover, and it is an exclusive realm of knowledge which is highly potential because and in as far as it is linked with the power of defining the situation. (Meuser & Nagel, 2009, p. 18)

I used the information collected with these semi-structures interviews as supporting information, not as the main sources for this research project as only five interviews could be conducted. I especially focused on the perception of responsibility and EJ related to the used car trade. The interviewees were 1) a researcher conducting EU impact assessments on ELV regulations, 2) a UNEP employee involved in the used vehicles report and four experts on sustainable mobility from non-governmental organizations from 3) Kenya, 4) Ukraine and 5) Bosnia and Herzegovina (Appendix A).

*Trade Flow Analysis*

To understand the implications concerning the trade with used cars, one must first understand the established trade patterns through the analysis of the material and monetary flows that characterize them. After consultation with an employee working on the UNEP report, I used a strategy similar to the one applied there. I extracted the official trade data provided by Eurostat (European Statistical Office) from the Comext platform, Eurostat's statistical database on the trade of goods between the EU member states and non-EU countries. I extracted export data consisting of the flows of used cars in terms of quantity, monetary value (in Euros), and material weight (in kg) from the EU28 member states to the respective importing countries. (For a more detailed description of the methodology for the database compilation, see Appendix B). The analysis of this data allowed me to identify the key importing countries, as well as differences in monetary value of the traded commodities. I focused on data from *light-duty-vehicles* (Appendix B), to which I will refer as *cars* in this thesis for simplification.

*Environmental Impacts*

In contrast to field-work-based environmental impact assessments of case studies in natural environmental science, my approach relies on reviewing secondary sources in order to evaluate the present environmental hazards related to the phenomenon. The informal character of the trade and a lack of reliable information makes a comprehensive impact assessment on this scale and nature would not be

feasible in this thesis. The goal of this thesis is not a quantifiable analysis of environmental impacts of used cars but to contribute to the understanding of general tendencies related to the EU's used car trade. Therefore, I needed to rely on fragmented, secondary material available for major importing countries. Based on the preliminary results of my research I identified four key areas of concern related to environmental and health-related impacts that I attempt to evaluate critically: 1) carbon dioxide emissions, 2) other air pollutants, 3) environmental impacts of disposal practices, and 4) road safety (based on a preliminary literature review, the UNEP report and input from interviews).

*Policy Analysis*

To understand the political environment enabling this trade pattern I used a retrospective descriptive approach to analyse policies related to the EU's used car trade (Patton et al., 2016) grounded in a political ecology perspective. Bridge et al. (2018) argue that this perspective provides an "an alternative lens on the 'problems' [that] reveals some of the unspoken assumptions underpinning current (…) policy and strategy" (p. 166). For this thesis I asked to what extent the trade with used cars and its impacts are recognized as a problem in climate, mobility, or trade policy, and to examine possible contradictions at different scales between these policies through "deconstructing (…) policy's objectives, discourses and guiding concepts" (Bridge et al., 2018, p. 172). Therefore, I identified policies related to used vehicles in the EU and their export. The analysis of how they attempt to regulate the used car trade allows me to ask (1) to what extent the existing policies and the context in which they are implemented create an enabling environment for the exports to happen and (2) how responsibility for the environmental impacts of the exported cars is understood.

## 2.4. Positionality

Being a white, female 24-year-old growing up in a privileged environment in Germany and having worked in activist groups for sustainable and just mobility and climate justice in Germany, certainly influenced preconceived ideas I had on the issue when I started researching on the matter. I attempted to be critical, humble and reflective of my biases and my own privileged position for which the interviews with researchers and activists from importing countries were essential and helped me gain a more nuanced picture of the conflict of interest involved.

As I aim to discuss aspects of environmental justice in this thesis, it is essential to note that engaging with debates about this topic within academia is a normative practice based on specific values and ideas about the world held by the researcher. Walker (2011) describes research engaged in environmental justice in three elements: the evidential description of how things are, the normative reasoning of how things ought to be, and the explanatory process of why things are how they are. Therein, he emphasizes that the "evidence" is not a "set of truths waiting simply to be revealed (…) [but] is constructed and produced in ways that reflect the routines, epistemological predispositions, cultures, and values of those

doing the producing" (p. 41) despite scientific rigour and rationality. A researcher with a different worldview might come to a different conclusion than I do when considering the same material, as environmental justice research is inherently normative. The conclusions drawn in any of this work involve a fair share of uncertainties, assumptions and unreliabilities, making them "provisional and contingent rather than definitive. Claims rather than truths" (Walker, 2011, p. 7).

## 2.5. Limitations

As stated before, my objective in this thesis is not to give an in-depth analysis of a specific case and I can therefore not draw conclusions on how the environmental consequences of the trade manifest specifically in the distinct contexts. Instead, I aim to show a general tendency and provide a reflection on how we can extend our understanding of EJ by comparing traditional cases to a more complex issue. Especially the outline of the environmental impacts opens up a whole field of questions that requires more in-depth research of specific cases in order to be able to make stronger claims. With the currently available data and academic literature, such an analysis would be difficult to conduct, but requires extensive fieldwork and primary data generation. However, the current Covid-19 pandemic situation did not allow for this research. Moreover, a further extension would exceed the scope of this thesis project which was heavily restricted in terms of time, resources and size.

Furthermore, due to difficulties in the identification of experts and in the organisation of interviews with them, I was only able to talk to a small amount of people and perspectives, limiting the generalizability. However, within the interviewees' perspectives were surprisingly similar. Moreover, the aspects outlined in this thesis require elaboration and investigation in more detail in future research, including an in-depth investigation of the differences in restrictive policies implemented in the countries of destination and specific case studies related to environmental impacts. However, this is less relevant for this thesis as I am to generally understand to what extent this trade represents a possibility for ELD for actors in the EU. I do not neglect the importance of factors on the importing side, but I did not have the chance to conduct an in-depth assessment of specific cases; rather, I leave open questions to be investigated in the future. Therefore, this thesis cannot (dis)prove an environmental injustice hypothesis quantitatively but aims to open up the discussions why it is difficult to talk about it in this context. However, further research will be needed to examine the context-specific consequences and to investigate possible differences in how the implications are grounded in particular cases. Furthermore, it is fundamental for further research on specific cases to highlight the historical processes and power relations, such as the colonial roots of these trade connections, as well as aspects that shape people's perceptions of this trade in the analysis.

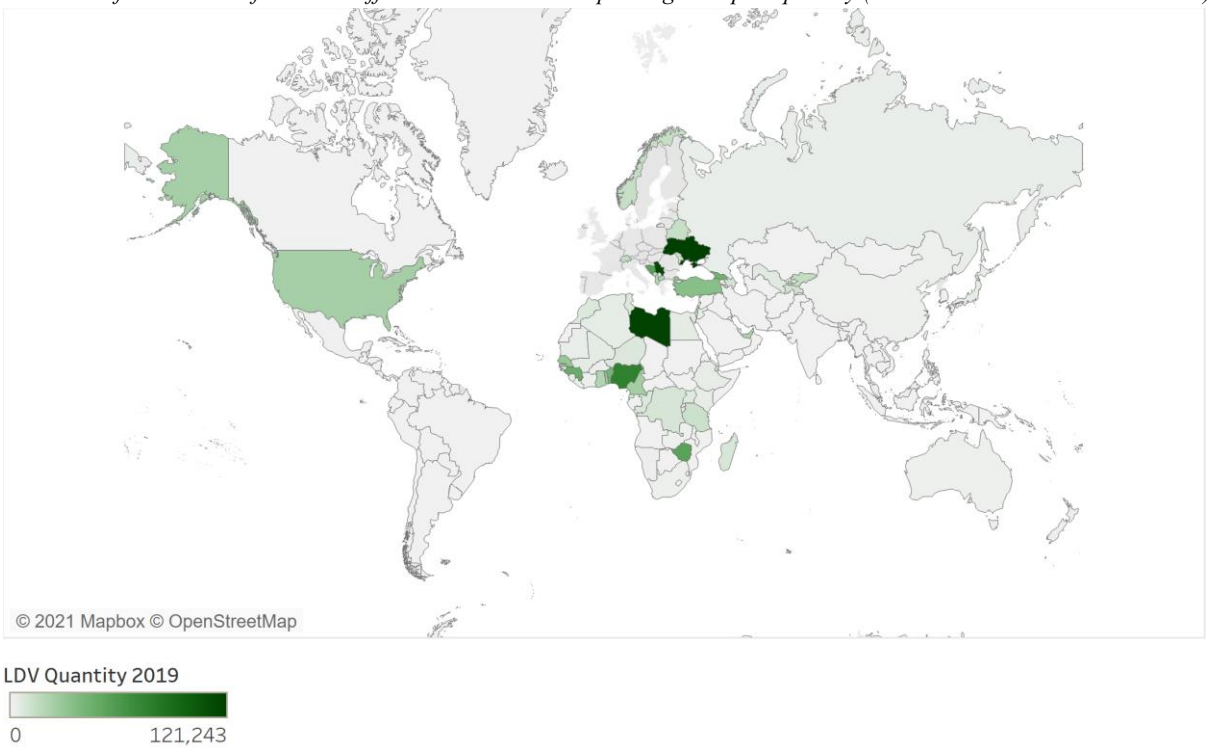
## 3. Findings and Analysis

### 3.1. Global Dynamics of the Used Car Trade in the World-System

The main exporting regions of used cars are currently the United States, Japan, South Korea and the EU (UNEP, 2020b), although with increasing motorization China plans soon to become an important actor (Nicholas, 2021). A large quantity of used vehicles is exchanged within and between countries of the Global North, including Australia or New Zealand. However, a significant share of the used cars is exported from the Global North to the Global South. The general trade patterns are characterized by geographical proximity. While the US mainly exports its cars to Latin America, Japan's and South Korea's exports are destined for most of Asia, East Africa and the Middle East (UNEP, 2020b). In the EU approximately half of the used cars are traded within its borders,[2] while the other half of the official exports is destined for non-EU countries. Most of them are directed towards the Global South, in particular countries in Eastern Europe and (Western) Africa (Figure 1). While the quantity of vehicles exported to specific countries fluctuated during the period of analysis, the main importing regions have remained mostly consistent (Table 1, Annex C). Generally, a clear tendency of displacement from the EU, considered a core region in the world-system, to the system's peripheries or semi-peripheries can be observed. The reverse trade is negligible.

**Figure 1**

*Countries of destination of the EU's official used car trade depending on export quantity (calculation based on Comext Data)*




[2] Even within the EU vehicles are shifted from Western EU to Eastern EU countries, especially to Poland and Bulgaria, reflecting a core-semi-periphery pattern (Vanherle & Vergeer, 2016). This is especially the case for diesel cars with manipulated air pollution control systems, causing concern for the shift of pollution between regions within the EU (Transport & Environment, 2018).

**Table 1**

*Top 20 importing countries of EU-28's official used car trade (calculation based on Eurostat Comext Data)*

| 2016 | | 2017 | | 2018 | | 2019 | | 2020 | |
|---|---|---|---|---|---|---|---|---|---|
| Nigeria | 104,916 | Serbia | 103,143 | Serbia | 125,496 | Ukraine | 121,243 | Ukraine | 166,891 |
| Serbia | 101,825 | Ukraine | 65,696 | Ukraine | 69,219 | Libya | 119,207 | Serbia | 134,902 |
| Bosnia and Herzegovina | 57,022 | Bosnia and Herzegovina | 57,835 | Libya | 68,453 | Serbia | 115,434 | Nigeria | 57,009 |
| Cameroon | 41,143 | Nigeria | 51,064 | Bosnia and Herzegovina | 63,889 | Nigeria | 76,652 | Libya | 52,504 |
| Côte d'Ivoire | 37,202 | Côte d'Ivoire | 38,770 | Nigeria | 58,065 | Bosnia and Herzegovina | 54,055 | Bosnia and Herzegovina | 47,669 |
| Ukraine | 37,072 | Guinea | 34,838 | Tanzania | 38,738 | Zimbabwe | 54,016 | Guinea | 45,724 |
| Guinea | 36,056 | Senegal | 29,718 | Guinea | 36,993 | Guinea | 46,974 | Cameroon | 31,552 |
| Senegal | 28,362 | Libya | 27,046 | Benin | 29,333 | Georgia | 43,660 | Benin | 30,835 |
| Togo | 25,888 | Togo | 26,024 | Ghana | 29,289 | Benin | 40,909 | China | 28,739 |
| Georgia | 23,706 | Cameroon | 24,971 | Georgia | 27,995 | Turkey | 34,309 | Senegal | 26,969 |
| Ghana | 21,988 | Israel | 19,624 | Senegal | 27,847 | Senegal | 28,801 | Togo | 25,124 |
| Benin | 19,715 | Somalia | 19,381 | Cameroon | 23,162 | Togo | 25,424 | Albania | 24,624 |
| United Arab Emirates | 19,196 | Ghana | 18,549 | Togo | 23,154 | Cameroon | 23,979 | North Macedonia | 23,269 |
| Switzerland | 18,234 | Georgia | 18,202 | Côte d'Ivoire | 21,460 | United States | 23,456 | Switzerland | 20,095 |
| North Macedonia | 15,254 | Benin | 18,129 | North Macedonia | 20,857 | North Macedonia | 21,729 | Ghana | 18,241 |
| Israel | 15,145 | Norway | 16,155 | Zambia | 17,723 | United Arab Emirates | 20,583 | Georgia | 18,035 |
| United States | 14,116 | Switzerland | 16,034 | Somalia | 17,657 | Ghana | 19,234 | Tunisia | 14,553 |
| Lebanon | 13,377 | United States | 14,364 | Albania | 17,606 | Albania | 19,178 | Belarus | 13,985 |
| Albania | 12,817 | Albania | 14,077 | Algeria | 15,721 | Switzerland | 14,031 | Montenegro | 13,297 |
| Malawi | 12,217 | North Macedonia | 13,914 | Montenegro | 15,566 | Montenegro | 14,014 | Israel | 11,747 |
| Congo | 11,325 | Singapore | 12,883 | Norway | 14,755 | Kyrgyzstan | 13,440 | Kosovo | 11,363 |
| Tunisia | 10,627 | Algeria | 12,005 | Israel | 12,990 | Norway | 12,716 | Moldova | 10,282 |
| Norway | 10,366 | Tajikistan | 10,725 | Switzerland | 12,723 | Israel | 12,404 | Tajikistan | 10,247 |
| Pakistan | 9,625 | Zambia | 10,347 | Tunisia | 12,289 | Belarus | 12,279 | Norway | 9,231 |
| Libya | 9,313 | Montenegro | 10,344 | Qatar | 12,132 | Tanzania | 11,420 | Gambia | 9,098 |
| Total Extra-EU | 850,615 | Total Extra-EU | 887,805 | Total Extra-EU | 1,013,118 | Total Extra-EU | 1,164,147 | Total Extra-EU | 962,768 |

*Note*. The results found in my own analysis of the Comext trade statistics are not consistent with the results reported by UNEP in their 2020 Report (UNEP, 2020b, p. 16). Discrepancies between the results are in process of confirmation with UNEP representative. Therefore, I needed to rely on the results of my analysis, despite significant differences. However, my calculated results are similar to calculations by Mehlhart et al. (2017). A detailed description of the methodology can be found in Appendix B.

In 2019 the EU28 member states exported officially 1,164,147 used cars to non-EU countries, dropping to 962,768 vehicles in 2020 (Table 1). Generally, since the beginning of the 2000s the official exports ranged between 600,000 and 1,600,000 cars annually (Appendix C). Compared to the official export numbers in 1988, the number of vehicles is approximately ten times higher and particularly increased at the beginning of the 2000s (Table 2).[3]

**Table 2**

*EU's official used vehicle exports 1988-2020*

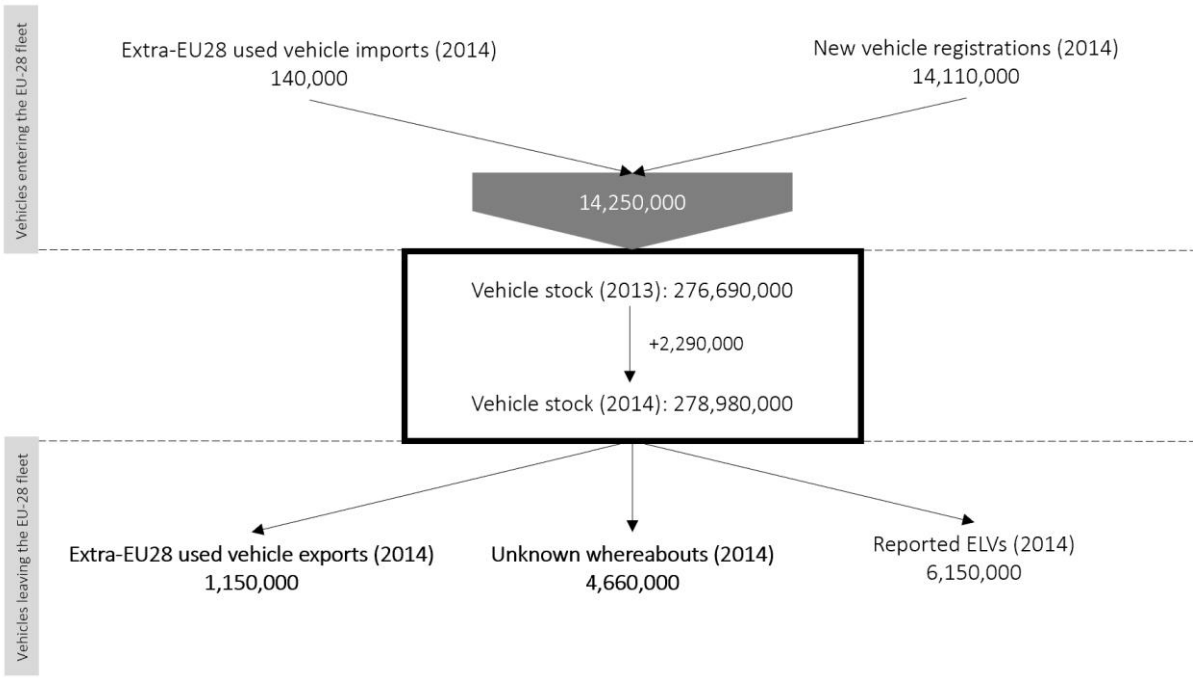
| Year | Total Used Car Exports | Year | Total Used Car Exports | Year | Total Used Car Exports |
|---|---|---|---|---|---|
| 1988 | 102,166 | 1999 | 344,364 | 2010 | 1,003,484 |
| 1989 | 150,788 | 2000 | 551,306 | 2011 | 1,201,688 |
| 1990 | 159,723 | 2001 | 884,507 | 2012 | 1,631,174 |
| 1991 | 322,111 | 2002 | 910,742 | 2013 | 1,496,495 |
| 1992 | 238,720 | 2003 | 692,568 | 2014 | 1,153,999 |
| 1993 | 248,044 | 2004 | 829,961 | 2015 | 896,899 |
| 1994 | 232,207 | 2005 | 831,286 | 2016 | 850,615 |
| 1995 | 241,696 | 2006 | 1,027,696 | 2017 | 887,805 |
| 1996 | 534,304 | 2007 | 1,273,680 | 2018 | 1,013,118 |
| 1997 | 385,519 | 2008 | 1,016,303 | 2019 | 1,164,147 |
| 1998 | 349,944 | 2009 | 905,592 | 2020 | 962,768 |

Moreover, the official statistics seem to significantly underestimate the number of cars that are actually exported. Annually, 3 to 4 million cars are de-registered in the EU but remain of unknown whereabouts. Experts in the field estimate that approximately half of them are exported to non-EU countries, while the other half are unofficially scrapped within the EU in illegal recycling companies (Mehlhart et al., 2017; G. Mehlhart, personal communication, March 16, 2021; Sander et al., 2017). From Germany many ELVs are exported illegally through other EU member states to non-EU countries without end-of-life recycling, especially to African and Middle Eastern countries (Europol, 2011; Schneider et al., 2010; Wilts et al., 2011). Practices like these also include the halving of ELVs and their re-assembling in destination countries with high import restrictions (Sander et al., 2017). Although the used car exports do not represent the majority of the de-registered vehicles in the EU, they have a significant effect on the car fleets of the importing countries. Especially in many African countries, these cars account for 70-90% of the entire car fleet (Baskin, 2018).

[3] Comprehensive statistics in Eurostat are only accessible since 1988. However, the global trade with used cars is estimated to have risen to larger numbers in the late 1970s or early 1980s. Especially the trade connections to West Africa have been persistent and intensified throughout the decades (Beuving, 2004).

**Figure 2**

*Vehicle entries and exits to and from the EU-28 in 2014 (own illustration based on Mehlhart et al. (2017))*




The quantification and untangling of the used car trade network poses many challenges being characterized by complex and informal trade practices that circumvents political and economic institutions, setting up complex networks rather than linear supply chains (Brooks, 2012). These complexities occur all along the supply chain. Indeed, most cars are exported from hubs, especially from large port cities like Antwerp and Hamburg (Ministry of Infrastructure and Water Management, 2020), which is reflected in the trade statistics. Within the EU cars can be traded mostly without regulation and therefore are freely shifted between member states. Hence, exports from Belgium or the Netherlands are overestimating the number of cars that actually originate from these countries, this is also called the "Rotterdam-Effect" (Mehlhart et al., 2017). Lithuania and Poland are sales hubs for Eastern European countries (Sander et al., 2017). The trade is mostly conducted through independent dealerships, including various sub-dealers, often citizens from the destination countries, buying cars from local vendors and scrap yards. Others described this "as a source of repatriating wealth" (Ezeoha et al., 2019, p. 189) for the African diaspora in Europe. Today, online platforms play an important role in the trade (Akloweg et al., 2011; Roychowdhury, 2018; H. Kamau, personal communication, March 23, 2021).

Shipping companies have a significant influence on the determination of the trade routes and have a substantial interest in the continuance of these supply chains. The shipping of used vehicles is even more profitable for shipping firms than that of new vehicles, as they represent a critical return or "make-up" cargo, filling the cargo vessels for effective utilisation (Nieuwenhuis et al., 2007). The shipping activities are dominated by multinational western corporations (Apitsa & Milliot, 2021; Fuchs, 2005) and are a central element of the re-valuation of superfluous vehicles in the EU. Hence, the official

shipping destinations reflected in the trade statistics are not always the final destination of the vehicles. Rather, they function as regional hubs for further distribution to adjacent countries – including legal and illegal border crossings (Brooks, 2012; Golub, 2012). One of the most important regional hubs for West Africa is the port of Cotonou in Benin. The country's imports exceed its domestic consumption by a wide margin. Approximately 85% of the imports to Benin are re-exported to Nigeria, other landlocked West African countries, like Chad, Niger, Mali, or Burkina Faso, are smaller vehicle recipients. Togo's port of Lomé plays a similar role, re-exporting 75% of its imports to Nigeria, and others to Mali, Burkina Faso, and Niger (Baskin, 2018). These hubs are traditionally attractive due to their geographical location and favourable free trade policies. Benin, for example, abolished all trade restrictions as part of their trade liberalisation policies with the main target to increase re-export revenues in 1993. However, the used vehicle re-export to Nigeria is entirely informal, as it is legally banned (Ezeoha et al., 2019). Similar patterns have been observed for Libya. Although the trade is restricted with an age limit, the vehicles are often much older than allowed and being re-exported to adjacent regions like Sudan, Chad, and Niger, often by specific ethnic groups like the Toubou (Ministry of Infrastructure and Water Management, 2020; Taha, 2017).

## 3.2. Environmental Impacts

The effects of trade on the environment generally have been widely discussed. The persistent perspective of many (neo-)liberal economists is that free trade has a positive effect for all parties (Clapp, 2006). Ecological economists argue that this is the case because environmental impacts – so-called externalities – are not included in the cost-benefit analysis, distorting the calculation (Muradian & Martinez-Alier, 2001). Generally, more critical perspectives question to what extent the monetary valuation of environmental impacts is reasonable, questioning the possibility of a such an analysis (e.g. Frey, 2012b).

Used cars arguably provide access to cheap mobility and therefore offer economical and welfare development possibilities in the Global South. Yet, they are a source of concern about road safety, health issues due to air pollution and dangerous dismantling processes as well as rising $CO_2$ emissions in a climate restrained world (Chen et al., 2019; Grubel, 1980; UNEP, 2020b). Depending on the prioritisation of these aspects the global trade of used cars can be seen as either a case of welcomed development prospective or of EJ (Demaria, 2010).

The environmental and health-related impacts depend not only on the quantity but also on the quality of the exported vehicles and the context in which these vehicles are placed. Among others, they are related to the vehicle age due to wear and tear and technological development. The Dutch Ministry of Infrastructure and Water Management (2020) found that used vehicle exports from the Netherlands to Africa grew not only in number, but also in age. Nearly 30% of the legally exported vehicles are at least 16 years old, which is usually the end of the lifespan of vehicles in the EU (see also Agbo, 2011;

EC, 2021). Another report found that income level of countries is strongly correlated with the average age of vehicles. Cars in countries of the Global North tend to have an average vehicle age of less than eight years in contrast to 12 to 17 years in the Global South (Roychowdhury, 2018).

Others have used the monetary export value of the cars sold to different countries as an indicator of differences in vehicle quality (Janischweski et al., 2003). My analysis showed a striking price difference between countries in the Global South and the Global North, indicating that the vehicles are of significantly differing quality. However, even vehicles exported to African countries and vehicles exported to Ukraine and the Balkans fall into different categories. While cars were exported for 38,000€ to 17,000€ to other core regions, the prices ranged between below 1,000€ to 2,000€ for African countries and around 4,000€ for Eastern European and Central Asian countries (Table 3).

**Table 3**

*Average price (in €) per vehicle and price per kilo for the exported used vehicles from the EU-28 to the Top 20 importing countries, 2019*

| Destination country | Average price per vehicle (€) | Average price per kilo (€) |
|---|---|---|
| Ukraine | 4,368.35€ | 2.78€ |
| Libya | 1,113.97€ | 0.96€ |
| Serbia | 2,338.85€ | 1.79€ |
| Nigeria | 1,276.65€ | 0.92€ |
| Bosnia and Herzegovina | 4,254.66€ | 2.91€ |
| Zimbabwe | 193.58€ | 1.31€ |
| Guinea | 1,500.46€ | 1.24€ |
| Georgia | 1,219.82€ | 0.83€ |
| Benin | 1,229.02€ | 1.03€ |
| Turkey | 1,222.80€ | 6.51€ |
| Senegal | 2,329.76€ | 1.77€ |
| Togo | 1,321.81€ | 1.03€ |
| Cameroon | 1,62.09€ | 1.38€ |
| United States | 17,368.45€ | 28.70€ |
| North Macedonia | 3,146.97€ | 2.21€ |
| United Arab Emirates | 5,690.41€ | 25.62€ |
| Ghana | 1,680.98€ | 1.54€ |
| Albania | 4,759.14€ | 3.02€ |
| Switzerland | 38,114.25€ | 23.01€ |
| Montenegro | 3,652.08€ | 3.13€ |
| Kyrgyzstan | 2,580.97€ | 1.41€ |
| Norway | 22,975.87€ | 16.57€ |
| Israel | 18,904.19€ | 13.48€ |
| Belarus | 8,768.55€ | 5.40€ |
| Tanzania | 785.10€ | 2.42€ |

### *$CO_2$ Emissions*

Transportation, predominantly motorized individual traffic, has been one of the major contributors to the global greenhouse gases fostering climate change, disproportionally originating from the Global North (Sims et al., 2014). Interestingly, my interview partners stated that due to the comparatively small contributions to climate change of the importing countries, discussions around $CO_2$ emissions and the used car trade are somewhat limited.

However, the total transport emissions increased by 75% in Sub-Saharan Africa from 2000 to 2016 and 95% in North Africa, with used car imports representing the main contributor to the growing vehicle fleets (Baskin, 2018). Even though the total $CO_2$ emissions caused by transport in the importing countries in the Global South are relatively small compared to the Global North, the motorization rate is expected to increase rapidly in these regions in the coming decades (Sims et al., 2014). With regions like the EU striving for a decarbonised transport system, one can suspect that the number of cars displaced to the Global South will increase by a high rate in the future (UNEP, 2020b). This line of reasoning also reveals that motorization, particularly in form of private vehicles is not fundamentally questioned as a core aspect of economic development. It follows the narrative that transport generally contributes to the recipients' "progress" and welfare, although this has been a source of debate among mobility researchers (Mattioli, 2016; Schwedes, 2017; Urry, 2004).

The general problem of arguments about transport decarbonisation is that it usually does not approach absolute emissions of the sector, but vehicle efficiency – the emissions caused per kilometre driven e.g., EU vehicle emission standards. Despite better fuel efficiency, growing road transport emissions indicate that the increasing transport volume often equals out the efficiency savings (Schwedes, 2017). The regulation of the absolute amount of emissions is argued to be problematic as it is (among other things) dependent on the distance travelled – and would therefore fall within the consumers' responsibility (Paterson, 2007). Although many cars imported to countries of the Global South might be less carbon-intensive than the ones that already exist there, one can hardly speak of substitution effects. Instead, the influx of used cars leads to the growth of the entire vehicle fleet (OICA, 2015), seemingly cancelling out achieved efficiency gains. Others have shown this for the case of the US and Mexico (Davis & Kahn, 2010). In the light of the global climate crisis, it is highly questionable if these kinds of "technology transfers" can be considered a form of sustainable development at all. A study for the German Sustainability Council aimed to quantify the net impact of exported second-hand goods, including machinery and vehicles. They estimated that the used vehicles exported from Germany in 2001 an additional 150,000t $CO_2$ per year caused compared to new vehicles (Janischweski et al., 2003). One can apply this logic for the current situation on EU-level based on data collected by the Dutch Ministry of Infrastructure and Water Management (2020). They found in field research that vehicles exported from the Netherlands to African countries had an average age of 18.2 years. In 2001 the average $CO_2$ emissions of a vehicle newly registered in the EU were 169.7g/km $CO_2$ compared to 122.4g/km $CO_2$ in 2018 (EEA, 2021). Hence, per km driven, the used vehicles emit 47.3g/km $CO_2$ more. For an average 15,000km driven per year per vehicle, each vehicle would emit 709,500t $CO_2$ additionally per year.[4]

[4] This is a massive simplification and not a reliable quantification. To investigate the quantitative effect on $CO_2$ emissions, the whole life-cycle emissions would need to be considered, and more detailed information of each exported vehicle (e.g., age, type, weight) needs to be compiled. Furthermore, arguments that vehicle re-use reduces the necessity new car production and impacts of raw material extraction need to be evaluated. Taking only

*Local Air Pollution*

The global vehicle fleet is also a source of air pollutants posing a significant danger for the health of the people exposed to them, especially in urban areas. Among other things, they lead to strokes, lung cancer, ischemic heart diseases, chronic respiratory diseases, and other non-communicable diseases through air pollutants like small particulates, nitrogen oxides, or carbon monoxide (Health Effects Institute, 2020).

In the EU, air pollutants from cars are regulated with emission standards for newly produced vehicles, first introduced in 1992 (Euro Standards). Old vehicles with uncontrolled emissions emit more than 16 times the amount of particulate matter compared to the 2005 Euro IV standards (Roychowdhury, 2018). Although these emission standards apply only to new and not to used vehicles on an EU-level, countries like Germany and the Netherlands (among the EU's key exporters) will start measuring particulate emissions from diesel vehicles in annual inspections from 2021. It is expected that a significant share of these vehicles will not pass the test and will therefore be a source for exports as they will be permissible within most trade restriction barriers set up by importing countries – despite their high emissions (Ministry of Infrastructure and Water Management, 2020).[5] An assessment of the environmental implications of used cars in Nigeria, for example, found that 82% of the emitted pollution is carbon monoxide concentrated in urban areas, with used vehicles contributing about 90% of this air pollution (Ajayi & Dosunmu, 2002; Beuving, 2004). Especially dysfunctional vehicles are the source of high levels of air pollution. About 20% of the vehicles exported to West Africa are estimated to have a malfunctioning engine (Agbo, 2011) and generally, vehicles exported to Africa seem to frequently fail emission requirements (Ministry of Infrastructure and Water Management, 2020).

Furthermore, there is evidence that emission control devices (catalytic converters from petrol cars as well as diesel particulate filters) are removed from the vehicles before or after the export for two reasons: 1) to allow the use of leaded petrol, 2) for economic incentives of reselling the converters due to their resource value (Dimitrov, 2004; Ministry of Infrastructure and Water Management, 2020). Catalytic converters reduce harmful pollution from vehicle exhaust emissions such as nitrogen oxides and carbon monoxide; diesel exhaust is classified as Group 1 carcinogen. However, the high market value of the rhodium, palladium, and platinum in the devices incentivized increased theft and other types of removal from vehicles. Diesel particulate filters have an average lifespan of 150,000 to 220,000 km, which is approximately the moment of vehicle exports. Although catalytic converters for petrol cars are built to last longer, their functioning reduces over their lifetime. Therefore, both emission control

emissions statistically into account, a vehicle life of 18 years, or 10-14 considering external costs of pollution to society are estimated optimal (Spitzley et al. 2005).

[5] These regulations were established in the aftermath of the 'Dieselgate' scandal 2015, when diesel vehicles were found to emit significantly more pollution than stated on their type-approval certificates caused by software implemented to reduce the emissions during the certification process artificially, which can lead to the additional export of emissions levels that were illegal within the EU (Ministry of Infrastructure and Water Management, 2020).

devices need to be replaced at some point, causing replacement costs of more than 1,000€. Revenue from selling the raw materials built in the devices, in contrast, can range between 50 and 250€ (Ministry of Infrastructure and Water Management, 2020), causing many cars to be driven without converters.

*Road Safety*

The export of used vehicles has also significant effects on the road safety in the importing countries. Many of the vehicles exported for secondary use are considered not roadworthy according to EU standards. Most vehicles exported from the Netherlands to Africa do not have a roadworthiness certificate or had a certificate about to expire at the moment of export (Ministry of Infrastructure and Water Management, 2020), representing a substantial danger to traffic participants. According to the WHO, nearly 1.3 million people are killed on the world's roads each year. The risk of a road casualty is three times higher in middle- and low-income countries compared to high-income countries. Although only 1% of the world's motor vehicles are driven in low-income countries, they account for 13% of the road casualties (WHO, 2018).[6]

*Repair and Dismantling Processes*

Many countries in the Global South have not yet established recycling and scrapping regulations due to the small number of vehicles that leave the fleet. Most scrapping is described as "backyard scrapping" leaving non-repairable vehicles to vehicle graveyards or abandoning them after stripping them of re-usable parts. Experts note that the magnitude of the necessary recycling and disposal of ELVs in the closer future has not been realized so far by many importing countries (Buchert et al., 2016; Roychowdhury, 2018). However, proper detoxification and sound disposal of hazardous components are crucial parts of vehicle recycling. One interviewee compared the problem of vehicle disposal to the issue of plastic water bottles – while some countries set up return and recycling systems, these do not exist in every country, resulting in significantly different environmental outcomes.

Non-environmentally sound handling of liquids, like excess oil, petrol, diesel, transmission-power steering, and brake fluids leads to surface and groundwater contamination. Particles of petroleum hydrocarbons contained in these liquids are known carcinogens. About six to twelve litres of liquids other than fuels are separated from the ELVs during the depollution processes per vehicle (Mehlhart et al., 2017; Ministry of Infrastructure and Water Management, 2020). Consequently, the total number of exported vehicles – one million officially and 2 million unofficially – account for 18 to 36 million litres of exported hazardous liquids annually. Moreover, fluorinated and chlorinated hydrocarbons from air conditioners (Mehlhart et al., 2017; Papasavva et al., 2009) and the unsound handling of lead-acid car

[6] One interviewee also noted that franchise dealers of international manufacturers are often not allowed to support or service the used vehicles that are being imported from Europe, making it difficult to get even simple things like brake pads, therefore making it difficult to ensure proper maintenance and roadworthiness (H., Kamau, personal communication, March 23, 2021).

batteries can lead to contamination of soil and water bodies with toxic lead and sulfuric acid (Ericson et al., 2016; Gottesfeld et al., 2018). The plastic parts of these batteries are often burned, posing an imminent health risk to the people involved in the dismantling processes. A lead-acid car battery needs to be exchanged approximately every three years, especially high temperatures and bad road conditions negatively affect the lifetimes of batteries. As used vehicles are hardly exported with new batteries, one could consider the used vehicle trade as a way of exporting actual waste batteries within a legal frame. The high economic value of lead in the batteries makes their recycling highly attractive, so that battery recyclers in the importing countries often expose themselves to dangerous and unsafe recycling practices (Tür et al., 2016).

Repair and dismantling practices led to the rise of multiple environmental problems in importing countries. In Nigeria, the influx of used vehicles led to the creation of so-called mechanic villages, areas of open land allocated by the government for automobile repair, that flourished especially since the 1980s with the dramatic increase of used cars from the US and Western Europe. Research has indicated in particular problems with soil pollution, especially with heavy metals and oil from automobile wastes that result from dismantling and repair processes. Activities in these workshops typically include the working with and spilling of oils, greases, petrol, diesel, battery electrolyte, paints, and other heavy metals (Adelekan & Abegunde, 2011; Duru, 2019; Erhunmwunse et al., 2016; Gushit et al., 2018; Iwegbue, 2007; Nwachukwu et al., 2010). Standard disposal methods for waste engine oil vary from spilling into sewers or land to storage in plastic containers. Generally, there is little or no organized treatment for waste oil recycling in Nigeria (Obinia & Afiukwaa, 2013). Due to the absence of metal recycling systems, scrap car dumpsites in the proximity of human settlements and close to the mechanic workshops are created, causing soil, underground and surface water contamination (Aisien et al., 2013).

Similar results for substances related to the treatment of (used) cars were found in Kenya (Katana et al., 2013), Zimbabwe (Kanda et al., 2018), and other African countries (Gottesfeld et al., 2018). Shewere (2013) documented in Tanzania how the presence of used vehicles had significant adverse environmental effects, ranging from air pollution to increasing breakdowns along the road, oil leaks, or unsound disposal practices of vehicle fluids. Attempts in Ukraine to establish a car recycling network failed so far; official scrapping remains scarce and old cars (older than 30 years) are usually abandoned, or car scraps are disposed of in unauthorized landfills (Aguili, 2018). Similar problems to establish a sound system for end-of-life vehicle treatment have been observed in Serbia (Simic & Dimitrijevic, 2015). An interviewee from Bosnia and Herzegovina commented on the disposal situation: “We don’t have any kind of facilities for conventional trash. And we will not have any for vehicles” (D. Kabic, personal communication, April 15, 2021).

*Environmental Impacts = Environmental Load Displacement?*

A quantitative analysis of the environmental impacts of the used vehicle exports would require a detailed analysis of the life-cycle within each context. However, from the present evidence, one can conclude that the exports contribute continuously to people in the importing countries being exposed to environmental and health hazards. The question is, what would be the alternative? A common argument in the interviews was that vehicles from the EU at least have some emission control systems in contrast to locally produced or already existing vehicles. The question here is if environmental impacts should be considered a relative matter of "better or worse" than something that already exists, rather than acknowledging the absolute consequences.

One could certainly argue that due to the environmental and health-related hazards the export of used vehicles is a practice of surplus anti-wealth displacement. However, I would argue that to evaluate the matter of ELD one needs to distinguish between pollution through disposal and pollution due to vehicle use. One usually speaks of ELD when the pollution of one place benefits another one – therefore shifting the environmental burden. In terms of air pollution, carbon emissions, and road safety, this argument is difficult to uphold. However, the displacement of the disposal processes directly benefits different stakeholders in the EU in economic and environmental terms. The additional (air) pollution caused by these vehicle's extended use could be considered more "collateral damage" caused by the displacement of anti-wealth. As the number of vehicles is still comparatively low and the number of cars with final end-of-life status is minimal, observable pollution will probably intensify in the future. Finally, it would be ignorant to assume that the benefits and burdens of these imports are equally distributed within the importing countries. Rather, specific groups within these countries, such as the people working in the unsafe environment of dangerous repair and disposal practices, would carry the main burden of these impacts.

## 3.3. A Political Economy Perspective on the EU's Used Car Trade

In this chapter, I want to outline political-economic aspects that shape the used vehicle trade from the EU as a core region to peripheries. Before diving into particularities of the case at hand, one needs to acknowledge the fundamental condition enabling this trade – the globalized nature of the world economy, including the increased fluidity of trade, low transportation and communication costs, facilitating the transfer of all kinds of commodities, including waste (Clapp, 2001).

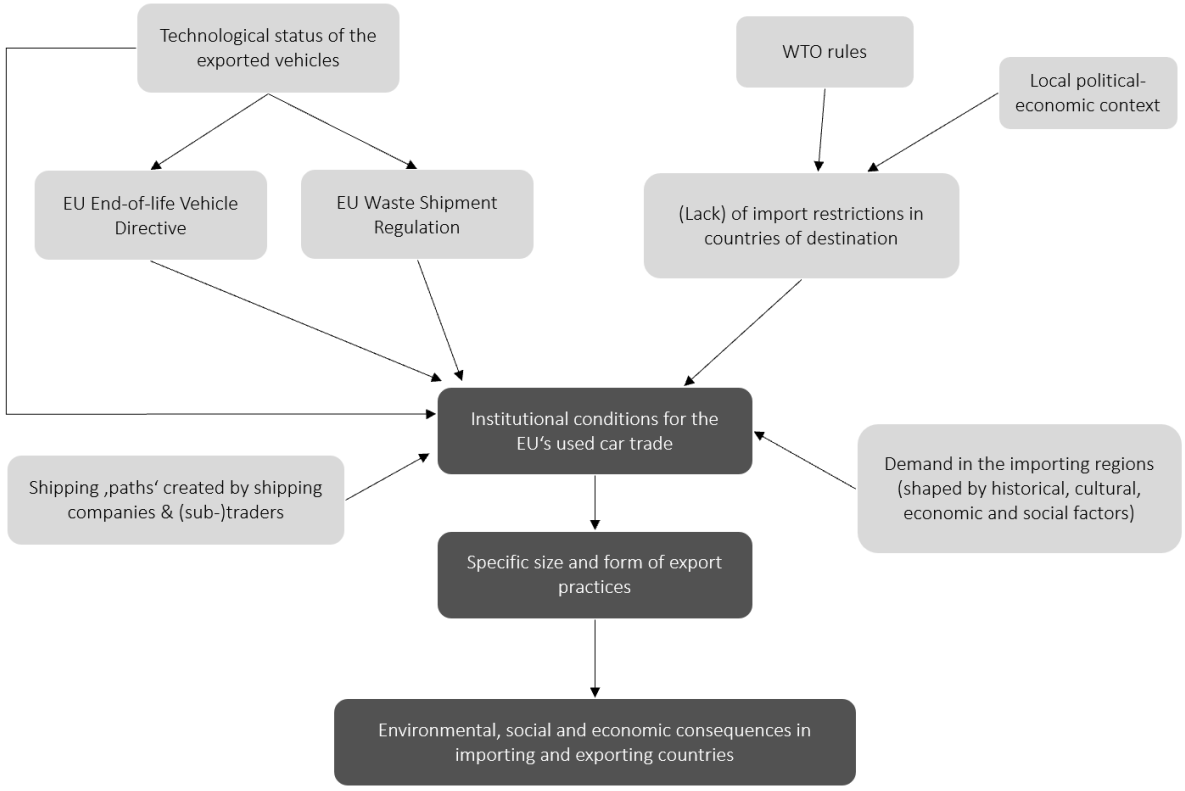
Nieuwenhuis et al. (2007) describe the international trade with used cars in simple words of supply and demand: "Push and pull factors at work: – Used exports are profitable – Expanding markets growing and maturing" (p. 13).The important question is however: why is that? Capital generally adopts the path of least resistance to employ the most cost-effective resource exploitation and pollution disposal practices.

> Given the weakness of national environmental policy in most developing nations, the lack of rigorous environmental laws and sanctions against corporate polluters, the antienvironmental content of the so-called "free-trade" agreements, and a growing willingness by many desperately poor countries to accept long-term environmental problems in exchange for short-term economic gains, the growing mobility of capital is facilitating the export of environmental problems from the advanced capitalist countries to the Global South and sub-peripheral states. (Faber, 2017, p. 69)

Based on an initial model by Fuchs (2005), I organized my (non-exhaustive) review of (institutional) conditions of the EU's international used vehicle trade schematically (Figure 3).

**Figure 3**

*Institutional conditions of the EU's used vehicle trade (Source: own elaboration based on Fuchs (2005))*




Used car exports are not only considered sources for the second-hand market but also material loss for the EU's circular economy goals and (cost-)effective resource management (Eurometaux, 2020; Fuse et al., 2009; Simic, 2015; Wilts & Bleischwitz, 2013). They are also seen as access cheap mobility in importing countries and source of employment, for example, for people in the repairing sector (UNEP, 2020b). However, others stress the significant environmental and health hazards as described before (Janischweski et al., 2003; UNEP, 2020b). These different perspectives have an impact on how the used car trade is governed.

### 3.3.1. Used Vehicles vs. End-of-Life Vehicles

To understand what enables the export of used vehicles from the EU, it is fundamental to compare the categories *used vehicle* and *end-of-life-vehicle* (ELV). The crucial question is: when does a used car cease to be a commodity of use-value and is then considered an ELV – therefore a waste product? At the same time, this leads to a normative question: When *should* a used car be considered ELV due to harm the further use of the vehicle could do?

There are no internationally agreed-on guidelines when a vehicle is to be considered an ELV. In EU legislation, a vehicle is defined waste when "the holder disposes of or is required to dispose of pursuant to the provisions of national law in force" (Council Directive of 15 July 1975 on waste, 1975, art. 1(a)). To make a distinction clearer beyond national legal frameworks, the Correspondent's Guidelines No. 9 were created in 2011 to establish a common understanding of these categories, but are not legally binding. This distinction is fundamental, because the labelling of a car as a used vehicle or an ELV, determines how they are regulated in the EU and gives different answers to "who is responsible" for their impacts – despite the same material object being discussed. These categories are not at all fixed or clearly distinguishable, leaving a regulatory gap which allows the legal justification and rationalization of the trade with used vehicles. Generally, two principal regulations deal with used cars on an EU level: The *Waste Shipment Regulation* (WSR) and the *End-of-Life Vehicles Directive*. The latter regulates the trade of waste (hence, ELVs) between EU member states and with third party countries, while the former focuses on the ELV treatment within the EU borders. At this moment, there exists no regulation on an EU-level that restricts the trade with used vehicles. This applies for the intra-EU trade, as well as the extra-EU trade (EC, 2021).[7] Generally, the regulation of the trade of used vehicles has been notably absent from national and regional legislation in the Global North – despite debates about it in the EU since the 2000s – as well as from global strategies for air pollution control, climate mitigation, and road safety, leaving it to the countries of destination to control the influx of vehicles of questionable state.

### 3.3.2. EU Waste Shipment Regulation

After the *Basel Convention on the Transboundary Movement of Hazardous Wastes and Their Disposal* was agreed upon in 1989, the *Council of the European Communities introduced in 1993 the Convention on the control of transboundary movements of hazardous wastes and their disposal* (93/98/EEC), which was later in 2006 re-formulated into the *Regulation (EC) No 1013/2006 of the European Parliament and of the Council of 14 June 2006 on shipments of waste* (WSR). These regulations acknowledge that hazardous wastes should not be accounted for as tradeable goods (EC, 2021; Schneider et al., 2010).

[7] Currently, there are few newly implemented regulations on member state level, such as in Ireland and the Netherlands. A vehicle is categorized as an ELV when it is not possible to repair it for market realistic costs in the country of export (EC, 2021).

This law officially forbids the export of non-depolluted ELVs to non-OECD countries. For depollution, the vehicle must be freed of all liquids and other hazardous components, whose unregulated export is not allowed. The WSR obliges all actors involved in the waste shipments to ensure environmentally sound management *within the borders of the EU and beyond it* (EC, 2020a) in order "[t]o ensure that wastes exported outside the EU do not create adverse effects on the environment or public health in the countries of destination" (p. 19). Yet, this obligation is not applicable if a vehicle is officially exported as used vehicle. The above-mentioned Correspondent's guidelines No. 9 were developed as guidance documents for the enforcement of the regulation related to ELVs. However, as the document is not legally binding, it plays a minor role (Mehlhart et al., 2017). The impact assessment for the revision of the ELV Directive in 2017 revealed that car manufacturers and importers opposed making the Guidelines No. 9 legally binding, increasing the inspections of the vehicles to be exported, or setting an age limit for used car exports considering the environmental risks in the future. The latter measure was neither strongly supported by other stakeholder groups from industry or authorities (Mehlhart et al., 2017). Similarly, customs authorities indicated that simply the number of exported vehicles make further case inspections unrealistic (Trinomics B.V., 2020).

This flexible and uncontrolled categorization of vehicles enables an environment in which it is possible to export vehicles independently of their quality in a legal way, while the export of the very same vehicle is at the same time forbidden under the WSR. Currently, expert estimate that only 1-2% of the vehicles exported to West Africa are identified as ELVs before export although the import restrictions set by the countries of destination apply probably for 80% of the exported cars (Ministry of Infrastructure and Water Management, 2020).

### 3.3.3. EU End-of-Life Vehicle Directive

As an increasing amount of illegal dumping of old vehicles was observed in the EU in the 80s and 90s in the EU, efforts focused on the creation of a ELV management system (Rovinaru et al., 2019). The ELV Directive was proposed in 1997 to manage and control the millions of tonnes of waste that were generated annually in the EU by the construction and disposal of cars (Directive 2000/53/EC of the European Parliament and of the Council of 18 September 2000 on end-of life vehicles, 2000). Every year approximately six to seven million ELVs are scrapped in compliance with the ELV Directive (Mehlhart et al., 2017), which is part of the *Strategy on the Prevention and Recycling of Waste* aiming at "increasing the EU's resource efficiency and reducing the negative environmental and health impacts over the life-cycle of resources" (EC, 2011, p. 2).

ELVs are to be depolluted and dismantled in so-called Authorized Treatment Facilities (ATF) before being shredded at a different facility. Among others, car manufacturers are obliged to ensure the possibility to recover 95% of the materials from ELVs already in the design process and to exclude

hazardous materials from the production. It is built on the rationale that producers which will have to internalise the costs for treatment and disposal are incentivized to avoid waste already at the design stage, applying the polluter pays principle (Pouikli, 2020).

The directive aims to implement the concept of *Extended Producer Responsibility* (EPR) but does not fully establish it compared to waste regulation directives (Trinomics B.V., 2020).[8] EPR is considered being a fundamental element for the creation of the so-called "recycling society" (EC, 2011), as "environmental policy approach in which a producer's responsibility, of both, physical and/or financial nature, for a product is extended to a post-consumer stage of a product's life cycle" (OECD (2004), as cited in Wilts et al., 2011, p. 905). The ELV Directive applies this principle not simply to the car manufacturers but to the *economic operators* including producers, distributors, collectors, motor vehicle insurance companies, dismantlers, and companies for shredding, recovery and recycling of the ELV. Based on EPR, the EU member states need to ensure that end-of-life treatment does not result in costs for the last vehicle owner. However the debate if the costs are fairly distributed between producers and ATFs is contested (Trinomics B.V., 2020).

The obligation of EPR, nevertheless, ends ultimately at the EU borders. The ELV Directive arguably led not only to cherry-picking in the recycling process focusing on the profitable vehicle parts, but to "aggravating a shift of the environmental policy problem due to the export of used cars" (Wilts & Bleischwitz, 2013, p. 88), allowing enterprises to avoid EPR. Wilts and Bleischwitz (2013) argue that companies have an interest in maintaining these production networks as it allows them to continue using their production facilities and supply chains. In wealthier countries like Germany, only a small share of the ELVs is treated within the country, while the rest is exported to other EU member states like Spain or Poland due to lower disposal costs (Schneider et al., 2010). Exports of ELVs as used vehicles are to date "a cost-effective option to evade product responsibility" (Wilts & Bleischwitz, 2013, p. 90).

Economic motives are the key drivers in these practices. "The producer will always select the cheapest disposal according to economic criteria (Beyer and Kopytziok, 2005). Even if products in principle could be recovered profitably, transaction costs lead to a preference for primary raw materials, due to the spatially and temporally distributed generation of secondary raw materials" (Wilts et al., 2011, p. 906), which is further reinforced by rising recycling and disposal costs caused by the ELV Directive (Trinomics B.V., 2020; Wilts et al., 2011). Evidence indicates that ATFs in the EU tend to operate at loss, and further obligations directed towards them would increase non-dismantling or illegal practices. Usually, they hardly cover the costs of the dismantling process and the disposal of non-recyclable

[8] The term *Extended Producer Responsibility* is never explicitly used in the ELV Directive, but implies in Article 5(4) that the disposal of the vehicle should not be at the costs of the last consumer and that the producers should carry the main financial burden of the end-of-life treatment (Directive 2000/53/EC of the European Parliament and of the Council of 18 September 2000 on end-of life vehicles, 2000).

materials through the revenue generated by the trade with the extracted recycled materials (EC, 2021; Schneider et al., 2010; Terra SA et al., 2015). ATFs receiving ELVs of zero or negative market value have no incentive for proper end-of-life treatment, "but rather to extract the maximum value for it e.g. sell it on for illegal disposal or *maybe export to countries with lower wage costs so that value can still be extracted from it* [emphasis added]" (Trinomics B.V., 2020, p. 66). Therefore, exports are considered the only possibility for a lot of ATFs to make profits (Sakai et al., 2014). An interviewee stated:

> It is actually known that if the initial treatment facilities, the ATFs, would only dismantle the vehicles, would only attend their duties to dispose of the harmful substances and would get a bit from the shredding facilities, which take over the dismantled vehicle body, the business would normally not be profitable. (G. Mehlhart, personal communication, March 16, 2021)

There is a pattern of vehicles being de-registered incorrectly in the vehicle register for end-of-life treatment, indicating illegal waste exports through "fictitious dismantling" (Ministry of Infrastructure and Water Management, 2020, p. 29) enabled by the lack of obligatory certificates of destruction after ELV treatment (Mehlhart et al., 2017). As sound disposal within the EU represents for the most stakeholders involved (from the last consumer to treatment facilities) no or a negligible economic incentive compared to revenue generated with its export, economic reasons are the main driver on the supply side (Schneider et al., 2010). These factors influence in particular the unofficial exports of vehicles of "unknown whereabouts".

A further reason for the lack of regulation of the used vehicle trade in the EU is arguably a responsibility gap between the different policy departments in the EU (so-called Directorates-General, DG) and difficulties to enforce EU regulations at the national level. Waste management (including ELVs) and hazardous waste trade are under the responsibility of DG Environment. Regulation for content of vehicle registration documents is under the responsibility of DG Move and general rules for export are under the responsibility of DG TAXUD. To what extend Certificates of Destruction are reported to other EU member states and to what extend export (intra-EU and extra-EU) is reported to the national vehicle registers relies on mixed responsibility between DG MOVE and DG Environment and in the case of extra-EU trade additionally concerns DG TAXUD. For the execution of the rules to distinguish used vehicles from ELVs the national customs services are in charge. But the sheer number of vehicles makes a continuous control of the vehicles impossible given the institution's limited resources (EC, 2021, G. Mehlhart, personal communication, March 16, 2021).

The before mentioned vehicles of "unknown whereabouts" are currently a topic of debate in the revision of the ELV Directive, touching upon the broader issues connected to the used car trade (EC, 2021; Hatzi & De Rotalier, 2020). In December 2020, a stakeholder meeting was organized by the UNRSF. The UNECE representative declared a "shared burden" between exporting and importing countries a main goal; vehicles not meeting minimum standards should not be allowed to leave the

exporting countries (Nissler, 2020). However, these new regulations aim to reduce the "collateral damages" related to the trade, like road safety or air pollution but do not challenge on a deeper level how responsibility for these vehicles and their disposal is shifted through the trade. The representatives of the Dutch Human and Transport Inspectorate and the German Environment Agency emphasized this aspect during the workshop, advocating for EPR on an international level. The representative of the EC confronted this stating that some European countries already oblige professional importers to show proof of an agreement with an ATF in the importing countries, but "it is primarily up to importing countries to adopt such legislation" (UNEP, 2020a, p. 6). Hence, considering the goal to include "life-cycle thinking" into the EU's waste treatment seems to depend on who decides when a vehicle is waste, and the EU's product life-cycle seems to end at its borders, leaving a "responsibility gap" (Wilts et al., 2011, p. 905) in the global redistribution system.

### 3.3.4. Struggles to Deal with Import Floods

Commonly, trade is rationalized by the demand of the consumers. Similarly, the demand for used vehicles from the EU in countries of the Global South is often considered the primary driver of the trade. However, the demand itself is seldomly questioned. The US International Trade Commission describes three reasons for the trade with used cars to the Global South: the lack or small share of local automotive production, the low prices for used vehicles, and the cheap labour costs for car maintenance in the importing countries (Coffin et al., 2016).

These labour costs indeed contribute to the creation of active demand of used vehicles from the EU (Fuchs, 2005), enabling the flexible understanding of an used vehicle worth repairing in comparison to a waste product. In the Global South, the lifetime of a car can be well extended beyond the approximate 10 to 12 years in Europe to 35 years (Agbo, 2011). Cultural and political processes lead to the devaluation of used commodities in the Global North, but uncertainties and flexibilities in the process of stabilizing the meaning and value of economic objects allow for open-ended political contestation thereafter (Gregson & Crang, 2015). Commodities devalued in affluent core regions in the world-system "are re-produced as commodities that are systematically traded through global networks" (Brooks, 2012, p. 80). The use-value of a vehicle is not fixed or simply dependent on its materiality but depends on the legal, political and cultural context in which it is situated (Brooks, 2012). The flexibility of the categorization of a car as used vehicle or ELV for trading purposes reflects that. ELVs might be understood as "unintended effects" of the global mobility and transport systems, but similar to other waste products can "be revalorized or take on new use values depend[ing] inter alia on issues of meaning and processes of re-valuation" (Hudson, 2008, p. 423). It is argued that exactly the political disconnect between production and disposal makes the externalization of the negative effects of production choices possible (Hudson, 2008; Pickren, 2015).

In order to gain a more nuanced understanding, the naturalisation of the demand for used cars needs to be avoided, as it relies on the unquestioned existence of automobility and its necessity or desirability. The question of why automobility represents a symbol of progress and modernity (Chalfin, 2008), how governmental policies incentivised the use of private cars in contrast to more sustainable transport modes and how automobility managed to integrate ever more regions in the global capitalist economic system has been argued elsewhere and cannot further be elaborated on within this thesis (e.g. Mattioli et al., 2020; Paterson, 2000, 2007; Sheller, 2018; Urry, 2004). However, acknowledging these arguments and reflections is important to my critique as it challenges the fundamentally optimistic idea of automobility. For importing countries, the price was named the single most important driving factor for purchasing a used car from abroad (e.g. Partnership for Clean Fuels and Vehicles, 2019). However, this should not be considered a natural given, but historical, political, economic, and cultural contexts shape the choice to buy a (used) car. For the case of Nigeria, it is argued that cuts in public spending for organized public transportation, trade liberalization policies and the severe devaluation of the Nigerian currency that resulted from Structural Adjustment Programmes after IMF interference made the imports of used vehicles from abroad the only viable option to access mobility in the country (Ajayi & Dosunmu, 2002; Sama'ila, 2019).

Especially peripheral low-income countries lacking strict environmental legislation and a domestic vehicle industry are vulnerable to “dumping” practices (Nieuwenhuis & Wells, 2003; Roychowdhury, 2018). In response to the influx of used vehicles and the lack of export regulations from the Global North, a variety of restrictive import policies in the destination countries were introduced. They range from complete import bans to age limits or tax regulations (UNEP, Roychowdhury, 2018; 2020b). For example, the ECOWAS (Economic Community of West African States) members recently agreed on a directive harmonising the emissions limits in the region, which entered into force in 2021. Vehicles will be required to meet at least a Euro IV standard and a maximum age of five years within the next ten years. Even though trade restrictions were found to reduce the number of vehicles imported (Coffin et al., 2016), countries seem to oftentimes receive the banned vehicles nevertheless (Ministry of Infrastructure and Water Management, 2020).

The Ukraine is an interesting example shining light on the conflicts of interest. For a long time, the import of used cars involved very high excise taxes. This did not stop the imports; instead, cars were not officially registered but driven with their EU number plates in the country (I. Bondarenko, personal communication, March 23, 2021). In consequence, the Ukrainian government implemented a programme for the regulation of these cars through delayed customs clearance. However, attempts to regulate the import, are met with protests from civil society groups like Avto Euro Syla (BBC, 2017). Additionally, the IMF encouraged policies cancelling additional import taxes as part of the *Law on measures to stimulate foreign economic activity* and the WTO declared special import duties on cars as

against its rules (Hill et al., 2016). Therefore, in 2015, the vehicle registration- and environmental tax on emissions from cars have been abolished; the environmental civil society organisations in Ukraine argue that the imports of used vehicles from the EU are even privileged through the current legislation (Abashina et al., 2020).

The WTO rules on free trade play an important role as they limit possibilities for trade restrictions and the promoted free trade regime is the fundamental condition for the trade to take place; exemptions are only admissible based on Article XX of the GATT (General Agreements on Tariffs and Trade) to protect human, animal, or plant life or health or to ensure natural resources conservation. Generally, one must show that the restrictive measures are necessary for the indicated goal and global environmental issues affecting the global commons are not admissible (Clapp, 2006). Some argue that governments exploit these exceptions as indirect subsidy to domestic industry, justified through protection of environment and health (Clerides & Hadjiyiannis, 2008). In fact, the influx of used vehicles from the Global North led to the destruction of local automotive industries (Sama'ila, 2019). Yet, countries in the Global South often enter free trade agreements to attract foreign investment but are in return flooded with imports (Clapp, 2001; Janischweski et al., 2003). Interestingly, import restrictions based on Article XX related to the used car trade have not experienced wide opposition (Roychowdhury, 2018).

An interesting aspect in this conflict are the different interest of the automotive industry, with the automotive industry in the importing countries supporting the ban or restriction of used car, opposing used car traders. Imports are cheaper than new, domestically produced vehicles, making those highly uncompetitive (Black & McLennan, 2016). According to Schaefer, head of Volkswagen Africa, used vehicle imports from Japan and the US (he interestingly did not mention Europe) cause the local markets to fail (Bavier et al., 2019). Grubel (1980) observed that the imports of used vehicles have a quick negative effect on the new vehicle market in developing countries. Similarly, Ezeoha et al. (2019) argue that Nigeria with its infant automotive industry has a stronger incentive for import restrictions than Benin, Gambia or Togo. Therefore, the international automotive industry has recently joined forced supporting governments to set up import restrictions allowing them create a viable market for their products. The cooperation between the European Business Council for Africa and the African Association of Automotive Manufacturers led by South African representatives of the automotive industry, as well as the German Association of the Automotive Industry is exemplary for this (EBCAM & AAAM, 2020; VDA, 2020). Companies like Volkswagen, Nissan and Peugeot are already investing heavily in new plants (Bavier et al., 2019). The African continent is described as “last frontier of the automotive industry” (Black & McLennan, 2016) and the “last bastion of internal combustion engines” (Bavier et al., 2019), representing a lucrative market for specific companies. This development is surprising given the statement of the European Automobile Manufacturers Association (ACEA) that they support the export of used vehicles with the purpose of reuse as it is “enabling the extension of

vehicle lifetime thus saving energy and raw materials that would otherwise be used to make new cars" (ACEA, 2020). These contradictions might indicate the idea that the even the responsibility to control the trade should be carried by the importing countries, avoiding additional costs for the producers in the EU. Furthermore, one could suspect that Volkswagen could have a different position in emerging markets like Africa compared to other European car manufacturers, so that a restriction of used car imports is actually of economic interest for them.

Finally, although car imports represent a significant strain on foreign currency reserves (Ibukun, 2020), it is argued that import restrictions would cut a large share of state revenue generated by import taxes. Hence, it would be in the government's own interest to maintain these revenue streams. In the case of Ghana, import restrictions for cars older than ten years are estimated to cause a governmental revenue loss of $143 million in the first three years (Dontoh & Dzawu, 2020). This multitude of different aspects connected to the used car trade illustrates the complexity of the conflicts of interest involved that make a clear answer to who loses and who wins, and consequently who should be responsible for the impacts, a complicated one. I explore this question in more detail in the following chapter.

### 3.4. A Question of Environmental Justice?

The issue at hand has so far not been framed as a question of EJ in the international debate. Even in the interviews with representatives of environmental NGOs in importing regions, it was a difficult topic to touch upon. The question is: why is that? Already in 2003 a report for the German Council on Sustainable Development stated: "the export of environmentally-friendly technologies is something positive. The export of harmful is something negative. *But what impact on the environment does the export of second-hand machinery and equipment and of second-hand vehicles have*? [emphasis added]" (Janischweski et al., 2003, p. 2).

*Polluter vs. Burden-Bearer: Whose Responsibility?*

From my understanding, the phenomenon is not a simple case of EJ because the used car trade results in a shift of responsibility – in particular based on the *principle of the polluter pays*. In traditional EJ cases of waste exports, the distinction between the *polluter* and the *burden-bearer* is more apparent. To make this clearer I compared the displacement of shipbreaking industries and the one of used cars to countries of the Global South (Table 4). Shipbreaking has been argued to be a case of ELD and EJ. Shipping companies from the Global North displace shipwrecks e.g., to India, exposing the local population and workers to significant environmental and health hazards, although they have not benefitted from the use of the ships before. Hence, there is arguably an inequality and injustice involved as the polluter is not the final burden-bearer (Demaria, 2010; Frey, 2013).

**Table 4**

*Comparison between the used technology in the world-system: shipwrecks vs. used cars (based on work by Demaria (2010) and research results presented in this thesis)*

| | Shipbreaking Industry | Used Car Trade |
|---|---|---|
| Declared purpose of trade | Dismantling/recycling/scrapping | Re-using |
| Units of trade | Per ton (material resource) | Per unit (functional unit) |
| Label of trade | Waste/Recycling Material | Used goods |
| Sellers | Ship owners<br>Brokers/cash buyers | Authorized Treatments Facilities, Second-Hand Car Traders, Car Auctions |
| Buyers | Ship Breaking Companies | Local Car Vendors<br>Individual Consumers |
| Money Flows | Exporting → Importing | Importing → Exporting |
| Benefits for importing countries | Employment<br>Cheap steel source | Access to cheap mobility<br>Mobility as economic driver<br>Tax generation for government |
| Source of burdens | Disposal/scrapping practices | Use of vehicle<br>Disposal/scrapping practices<br>Drain on foreign reserves |
| Burdens for importing countries | Environmental contamination, health effects | Air pollution & Climate Effects<br>Road Safety<br>Environmental contamination, health effects from disposal |
| Disposal practices | 'Organized' practice in Shipbreaking Yards | Unorganized, unregulated<br>Barely official scrappage |
| EU Regulations | Regulation (EU) No. 1257/2013 on Ship Recycling | Waste Shipment Regulation<br>ELV Directive |

Waste is generally considered something unwanted. But during the life-cycle of a commodity, the attributed status as *waste* or *unwanted* can change depending on who is asked. The environmental load displacement and environmental justice argument clearly assigns roles within distributional conflicts. Affluent regions of the Global North displace environmental burdens, e.g., in form of waste, polluting industries or appropriation of natural resources, disproportionally to marginalized communities in the Global North and the Global South without them receiving any benefits – resulting in distributional inequality. In response, the Basel Convention was intended to increase EJ, assigning nation-state responsibility for the disposal of their own waste. However, it has by no means eradicated the problem. Rather it led to the development of various loopholes, such as "sham recycling" where wastes are fraudulently labelled as for recycling rather than disposal (Clapp, 2001; Walker, 2011). I would argue that the used vehicle trade can to some extent be understood as a distinct form of bypassing waste shipment regulations and additionally developing another way of capital accumulation through peripheral contamination (Frey, 2012b).

The case of EJ related to the trade with used vehicle stands at the crossroads between two related questions, resulting in different answers to who is the *polluter* and who is the *burden bearer*. Firstly, it depends on the scale of observation and secondly on how the car itself is understood: as waste or a product in use. Looking at the exported vehicles as waste products from affluent regions would support the hypothesis of ELD because the export to non-EU countries allows to circumvent the responsibility

to safely treat vehicles at the end of their lives within the EU. Strict environmental standards in the EU meant to reduce the environmental pressures in the EU nevertheless incentivize the transfer of these burdens to countries of the Global South by circumventing the local environmental standards (Janischweski et al., 2003; Nieuwenhuis & Wells, 2003; Wilts et al., 2011). The burden of ELV-treatment and disposal is clearly shifted to countries where specific groups are exposed to environmental and health hazards resulting from these practices. The fact, that the producers' responsibility does not go beyond the borders of the EU underlines this pattern (Zorpas & Inglezakis, 2012). EJ is not just a question of distribution of pollution, but also about vulnerability. A common perspective that arose in the interviews was that although the car imports should not be forbidden, the producers should be responsible for sound service, disposal and recycling of the vehicles beyond EU borders and should not be able to "wash their hands off any of these exports" (H. Kamau, personal communication, March 23, 2021). Understanding the exported vehicles as an unwanted surplus product from the EU in need for disposal, would open a clear EJ case, because the polluters could be identified as actors within the EU.

However, the fact that these vehicles are exported with the objective of re-use, and are legally and socially *not* understood as waste, but a commodity of use value, the question of the polluter, and therefore the responsibility for the environmental effects seem to be shifted as well. This is also reflected in the direction of money exchange. In contrast to waste exports, e.g. shipwrecks, exporting countries do not pay the importing countries for taking over their old vehicles, but are paid for them. One interviewee expressed this reverse logic very clearly:

> When we think about it, we will be damned for the disposal of these cars. I think the EU should pay us something. Instead, we pay for the car (…). Because we save the money that is supposed to be spent on the disposal of old parts in your country. And yet we pay for it (…). But then we lose twice. (T. Dakic, personal communication, April 15, 2021)

From a critical realist perspective this case illustrates how a material reality (a specific material assemblage as a used car) can be understood differently – in legal and social contexts – depending on who is asked and where this person is located within the world system. It furthermore shows how these shifting understandings allow distinct practices related to the material entity to take place, consequently resulting in distinct (environmental) impacts.

The central point is then that the question of who the polluter is and who is responsible for the environmental impacts cannot be clearly answered. For this reason, it is so difficult to navigate around EJ here. A comment by the NGO employee from Ukraine reflects this complexity:

> I can definitely see that there is injustice that is created by the steps of different people, of different governments and different policies. So, it is hard to say exactly what is wrong and who should be blamed. (I. Bondarenko, personal communication, March 23, 2021)

*Costs vs. Benefits – A Question of Balance?*

The fact that people in the peripheries pay for the cars could give the impression of a completely free and independent choice made, disregarding the contextual factors that influence such activities. Therefore, the question of who is actually responsible for the air pollution, carbon emissions and road accidents caused by the use of old used cars becomes blurred. The question would then also be, what is the alternative? "At the end of the day, it is a question of how we will afford a new car (…). So, now I am not driving anymore a Lada Samarra, the Russian car from 1991. I'm driving a Seat Alhambra from 2002." (T. Dakic, personal communication, April 15, 2021). Attempts to more strictly regulate the imports of used vehicles have caused the resistance from within society, arguing it would jeopardize development prospects for the importing countries, restricting the access to affordable (individual) mobility, especially for poorer and middle-class people, when there is a lack of realistic alternatives (e.g. Audu, 2015; Muhumuza & Mutsaka, 2020). In some cases attempts to restrict imports even led to the formation of civil society groups fighting against import restrictions, such as Avto Euro Syla (BBC, 2017) or Dostupne avto in Ukraine that frequently organize road blocks when new restrictions are discussed. Opposition is also expressed by used-cars dealers, arguing that it would threaten their livelihoods (Bavier et al., 2019) and taxi drivers who rely on cheap vehicles in order to make their business economically viable given the low transport fares (Muhumuza & Mutsaka, 2020). One could even go as far as arguing it is a case of *environmental blackmail*, leaving recipients with little other realistic options than purchasing a used vehicle (Bullard & Wright, 1987, p. 23). To put it in Steven Keeva's words: "The poor have always lived downwind and downstream from what the privileged could afford to avoid" (Keeva, 1994, p. 88). This is not to say that richer people in the EU do choose less polluting vehicles – actually the opposite is the case (Tietge et al., 2020) – or that this is the case for all people in the importing countries, but is also a question of possibility.

Demaria (2010) described this utilitarian reasoning in the discussion about EJ and shipbreaking. He argued that this field of tension between different values is rationalized with the *principle of balance*, "based on a trade off between development and environment that does not recognize the incommensurability among the expressed values. It rests upon the idea that economic benefit [e.g. short term benefits through cheap transportation] can compensate for environmental degradation" (p. 259). These debates about balance and cost-benefit evaluations are reflected in the considerations about discussed restrictive measures to approach the negative impacts of the used car trade. But in comparison to shipbreaking practices, especially as the benefits rationalizing the trade arguably affects a large group of people, it is argued that a complete ban of used vehicle imports is not just either, competing with transport equity goals:

> (…) how can we achieve a fair level of what is exported, which is also controllable and works in practice (…)? This is an obligation we have in Europe, but I mean, we cannot approach them and

> say, you cannot have any cars anymore from us, that would be a bit difficult (G. Mehlhart, personal communication, March 16, 2021)

This line of reasoning also shows the tensions between legal and moral perspectives on what is right according to law and what would be just, as argued by an UN representative:

> (…) the argument is usually that if the importing countries do not have standards, (…) I would say they are legally in the right if they export a product that is not really fit for purpose in their own borders. So that's a tricky one. But on the other hand, we look at it from the moral side, would you not be benefiting from your waste? (A. Mwangi, personal communication, March 24, 2021)

Consequently, debates within the UNEP project opened up an international debate about how the responsibility *should* be distributed and what *should* be considered as an ELV. This also resulted in a renewed debate within the EU. The current stance taken is usually one of *shared responsibility* (UNEP, 2020a). Michael Walsh, Chairperson Partnership for Clean Fuels and Vehicles of UNEP, concluded about this approach:

> It takes two to tango. Exporting countries must play an important role just as they must with hazardous waste. Exporting countries have the expertise and the technical capacity to distinguish between safe and relatively clean vehicles and those which are unsafe and highly polluting. On the other hand, some of the importing countries lack that capacity. Also in especially poor countries, there will likely be some demand for anything that will roll and the exporting countries cannot allow the citizens in those countries to be exposed to dirty, unsafe vehicles just as they can't allow them to be recipients to hazardous waste. (cited in Roychowdhury, 2018, p. 106)

*Global Justice and Climate Change*

My attempts to assess the environmental and health related impacts and their significance for justice is an example for the difficulties of getting to the core of injustices and making clear justice claims in general. The complexity and seeming impossibility to quantitatively compare costs and benefits involved – not least due to a lack of a common measure of comparison – is a central problem in the debates.

One could also continue this line of thinking related to climate mitigation solutions based on global responsibility and justice. Although it would go beyond the scope of this thesis to evaluate how the different understandings of climate justice (as a concept evolving from environmental justice) would tie into this debate, it is nevertheless an important aspect to consider, acknowledging that the displacement of used vehicles also entails the shift of respective carbon emissions. The concept of climate justice is understood and applied differently by various groups and individuals. However a central argument is the historical responsibility of some groups for the current situation, arguing that the historically primary polluters should bear the main burden of mitigation and adaptation as they "can afford to right the

wrong" (Schlosberg & Collins, 2014, p. 365), implementing the "common but differentiated responsibilities and respective capacities" (Schlosberg & Collins, 2014, p. 365) that were laid out by the UNFCCC in 1992. It would not only require wealthier countries to reduce their disproportional greenhouse gas contributions within their geographical borders, but also avoid the shift of emissions to peripheries in the presence of more "sustainable" solutions. An interviewee from Bosnia and Herzegovina clearly expressed his frustration about how in the current situation they "have to be here silently waiting that something drops from the EU in order to move towards cleaner vehicles, while serving at the same time as a dumping ground" (T. Dakic, personal communication, April 15, 2021).

Up to this moment, the trade with used cars contradicts the EU's declared goal of "global action towards sustainable and smart mobility" (EC, 2020b, p. 23), as its goals and policies related to climate change are not (yet) reflected in its activities and policies related to its used car trade affecting regions outside of its borders. Failing to implement policy changes related to climate effects of its used car trade reveals a hypocrisy in the efforts of transport decarbonisation in the Global North, while benefitting from the transfer of the issue to the Global South. This might result not in a total reduction of $CO_2$ emissions, but in a shift of emissions whose quantitative impact has yet to be assessed. The NGO representative from Ukraine summarized these concerns quite clearly:

> For the planet it does not really matter, which country produces the greenhouse gases. Because the planet has no borders. So, the answer should not be pushing old cars to the countries around, but just to get rid of these cars. That is the question, how you should get rid of these cars, right, but they should not work and should not increase the amount of $CO_2$ emissions. (I. Bondarenko, personal communication, March 23, 2021)

Hence, the EU's used car trade and the respective displacement and distribution of environmental impacts across the Global South illustrates the clash of different perspectives on what is understood as just trade. I would argue that this is largely due to the difficulties in the identification of the "polluter", resulting in a contested allocation of responsibility for environmental impacts and respectively also for solutions. Emphasizing the global connections of local issues related to (sustainable) mobility, can give a more nuanced understanding of the parties involved, therefore giving grounds for demanding accountability of stakeholders that have been left out of the debates so far.

## 4. Conclusion

In this thesis I attempted to show how the used car trade connects core and periphery regions in the world-system with practices of environmental load displacement. It enables actors in core regions like the EU to displace environmental hazards related to the treatment and disposal of used vehicles to sites outside of their borders, and to benefit economically from this practice of anti-wealth displacement. The EU's trade with used vehicles is characterized by a displacement of often (near) end-of-life vehicles to

(semi-)peripheries in Africa or Eastern Europe, enabled by a responsibility gaps in EU legislation and a blurred category of used vehicles. With the trade, not only a material entity is transferred, but also the responsibility for it and its environmental impacts. Therefore, the responsibility to regulate the trade has been placed on the importing countries so far. This responsibility shift is a reason for the complexity of environmental justice debate in this case, as it blurs the answer to the question – who is the polluter? Looking at this phenomenon through a critical realist lens enables us to understand how a material reality – a vehicle with specific characteristics – can be perceived (legally and socially) very differently depending on one's position within the world-system. These different perspectives on a material reality are reflected in and enable the outlined legal and social practices. These structures and practices open up a platform for debates about global justice and responsibility. This case leaves a multitude of questions open for further research, especially the quantitative evaluation of shifted carbon emissions or the exploration of specific country case studies.

This case further illustrates that discussions around sustainable mobility need to fundamentally question the focus on automobility and transport equity and shift our understanding of just mobility to the *mobile commons*, "constructing new, mobile constellations of shared life" (Sheller, 2018, p. 213). One needs to fundamentally challenge notions of how and why we move in a larger anti-capitalist critique. Doing so would avoid the focus on cars to satisfy mobility needs that itself creates and takes the need to decarbonize the global mobility system into account – having the potential to create a fundamentally different and possibly more just and sustainable approach to mobility in the future – instead of shifting pollution between regions.

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# Appendix A: Interview Guide & Interviewees

**Interview guide for semi-structured interviews**

Q1: Can you shortly outline your work and how it is related to the trade of used cars (in [country])?

Q2: What role does the EU play in the second-hand car trade? How does the environment in the EU and in [country] enable the trade? (Follow-up on specific regulations if necessary)

Q3: Do you see discrepancies in the way the EU approaches sustainable mobility within its own borders and outside of it?

Q4: What are the key drivers behind the increasing used car trade?

Q5: Who are the key actors involved in the trade and who benefits from the trade?

Q6: What impacts does the used car trade have in [country]? (Follow-up questions related to environmental, health-related and climate impacts)

Q7: Do you see the trade with used vehicles as a possibility for stakeholders in the EU to displace environmental burdens?

Q8: What impact does the trade have on the development of a sustainable transport system in [country]?

Q9: Would you say the trade with used vehicles is a fair trade and why? (Follow-up question: Who do you think should be responsible for what happens with the cars after the trade?)

Q10: Should the trade be regulated differently and why?

**Interviewees (via Zoom)**

All interviews were conducted and recorded via Zoom. They each had a duration of 40 minutes to one hour. All interviewees were asked for consent for the recording as well as the use of direct citation in this thesis and approved.

***Table A1***

*Overview over interviewees*

| Interviewee | Organisation/Role | Date |
|---|---|---|
| Dr. Georg Mehlhart | Ökoinstitut e.V. Germany (Impact Assessment of EU ELV Directive & participant in UN Conference on Used Vehicles) | 16 March 2021 |
| Henry Kamau | Director of the NGO Sustainable Transport Africa (Kenya), participant in UN Conference on Used Vehicles with the UNEP Partnership for Clean Fuels and Vehicles | 23 March 2021 |
| Iryna Bondarenko | Transport Expert of the NGO Ecoaction, Ukraine | 23 March 2021 |
| Amos Mwangi | Programme Management Assistant at UNEP Sustainable Mobility Division (Kenya), involved in UNEP Used Vehicle Report | 24 March 2021 |
| Dragan Kabic | Transport Coordinator at NGO Centar za životnu sredino (Centre for Environment, Bosnia and Herzegovina) | 15 April 2021 |
| Tihomir Dakic | President of NGO Centar za životnu sredino (Centre for Environment, Bosnia and Herzegovina) | 15 April 2021 |

# Appendix B: Trade Flow Analysis Methodology and Limitations

The methodology was developed based on the ones applied by Mehlhart et al. (2011) and respectively in communication with an employee of the UNEP Sustainable Mobility Division, responsible for the statistical analysis in the UNEP Used Vehicle Report (United Nations Environment Programme, 2020b).

### Data Collection

Datasource: Eurostat Comext Database (reference database for international trade in goods)

Dataset: International Trade – EU trade since 1988 by HS2-4-6 and CN8 (DS-045409) – [Includes the Dataset DS-016890 – EU Trade Since 1988 By CN8 used by UNEP]

***Table B1***

*Parameters for extraction*

| Parameter | Selected |
|---|---|
| Reporter | EU28-European Union<br>+ All individual member states |
| Partner | All listed individual partner countries<br>+ World (= total amount of registered vehicle exports)<br>+ ExtraEU28 (= total amount exported to non-EU28 countries)<br>+ IntraEU28 (= total amount traded between EU28 countries) |
| Product | Product codes acc. to CN8 (Combined Nomenclature 8) for customs declaration:<br>87012090, 87021019, 87021099, 87029019, 87029039, 87032190, 87032290, 87032390, 87032490, 87033190, 87033290, 87033390, 87042139, 87042199, 87042299, 87042399, 87043139, 87043199, 87043299, 87163980, 87034090, 87036090, 87038090 |
| Flow | Export |
| Period | 1988-2020 (annual accounts) |
| Indicators | Supplementary Quantity (number of exported vehicles)<br>Quantity (Weight in 100kg)<br>Value (Export value in €) |

### Vehicle Categorization

Distinction light-duty vehicles (LDVs: passenger cars, vans) vs. heavy duty vehicles (HDVs)

- LDVs: motor vehicle for the transport of <10 persons OR for goods, lighter than 5t
- HDVs: motor vehicle for the transport of >= 10 persons OR for goods, heavier than 5t

Usually, LDVs are categorized with a max. weight of 3.5t, but this differentiation was not possible through the given custom codes. For the analysis of HDVs further differentiation would be necessary, but not further followed-up here as they were not of research interest in this thesis.

***Table B2***

*Categorization of custom codes as LDV or HDV*

| | | Vehicle Type | Engine type | Cylinder Capacity | Weight |
|---|---|---|---|---|---|
| HDV | 87012090 | Road tractors for semi-trailers | | | |
| HDV | 87021019 | Motor vehicles for the transport of >= 10 persons, incl. driver | diesel engine | > 2.500 cm³ | - |
| HDV | 87021099 | Motor vehicles for the transport of >= 10 persons, incl. driver | diesel engine | <= 2.500 cm³ | - |
| HDV | 87029019 | Motor vehicles for the transport of >= 10 persons, incl. driver | spark-ignition internal combustion piston engine | > 2.800 cm³ | - |
| HDV | 87029039 | Motor vehicles for the transport of >= 10 persons, incl. driver | spark-ignition internal combustion piston engine | <= 2.800 cm³ | - |
| LDV | 87032190 | Motor vehicles for the transport of <10 persons | spark-ignition internal combustion reciprocating piston engine | <= 1.000 cm³ | - |
| LDV | 87032290 | Motor vehicles for the transport of <10 persons | spark-ignition internal combustion reciprocating piston engine | > 1.000 cm³ but <= 1.500 cm³ | - |
| LDV | 87032390 | Motor vehicles for the transport of <10 persons | spark-ignition internal combustion reciprocating piston engine | > 1.500 cm³ but <= 3.000 cm³ | - |
| LDV | 87032490 | Motor vehicles for the transport of <10 persons | spark-ignition internal combustion reciprocating piston engine | > 3.000 cm³ | - |
| LDV | 87033190 | Motor vehicles for the transport of <10 persons | diesel engine | <= 1.500 cm³ | - |
| LDV | 87033290 | Motor vehicles for the transport of <10 persons | diesel engine | > 1.500 cm³ but <= 2.500 cm³ | - |
| LDV | 87033390 | Motor vehicles for the transport of <10 persons | diesel engine | > 2.500 cm³ | - |
| LDV | 87042139 | Motor vehicles for the transport of goods | compression-ignition internal combustion piston engine | > 2.500 cm³ | <= 5 t |
| LDV | 87042199 | Motor vehicles for the transport of goods | compression-ignition internal combustion piston engine | <= 2.500 cm³ | <= 5 t |
| HDV | 87042299 | Motor vehicles for the transport of goods | compression-ignition internal combustion piston engine | - | > 5 t but <= 20 t |
| HDV | 87042399 | Motor vehicles for the transport of goods | compression-ignition internal combustion piston engine | - | > 20 t |
| LDV | 87043139 | Motor vehicles for the transport of goods | spark-ignition internal combustion piston engine | > 2.800 cm³ | <= 5 t |
| LDV | 87043199 | Motor vehicles for the transport of goods | spark-ignition internal combustion piston engine | <= 2.800 cm³ | <= 5 t |
| HDV | 87043299 | Motor vehicles for the transport of goods | spark-ignition internal combustion piston engine | - | > 5 t |
| HDV | 87163980 | Trailers and semi-trailers for the transport of goods | - | - | - |
| LDV | 87034090 | Motor vehicles for the transport of <10 persons, | both spark-ignition internal combustion reciprocating piston engine and electric motor as motors for propulsion | - | - |
| LDV | 87036090 | Motor vehicles for the transport of <10 persons, | both spark-ignition internal combustion reciprocating piston engine and electric motor as motors for propulsion, charged by plugging to external source of electric power | - | - |
| LDV | 87038090 | Motor vehicles for the transport of <10 persons, | electric motor for propulsion | - | - |

## Data Compilation

For each year (1988-2020) the sum of the total LDV and HDV exports was calculated based on the aggregated export numbers for the reporter EU28 given annually per custom code. For the years 1988-1998 and 2020 this aggregated value was not available, therefore I calculated it based on the numbers reported by the individual member states. For the years that the aggregated value was available, I compared it to the manually calculated value to the given one. No differences between these values were observed. The further analysis was conducted with the exports categorized as LDVs.

Annual export numbers for exports to non-EU28 countries were separated from exports to EU-28 countries and respective annual sums per year were calculated. Finally, the importing countries were sorted according to the quantity of vehicles that were officially exported from the EU28, in order to identify the most important target countries.

For the year 2019 (pre Covid-19) I calculated the ratio of value (in €) per vehicle and per weight (in kg) for the different importing countries in order to describe differences in the type of vehicle exported. Respectively I drew on the aggregated values of the indicators: *quantity, value and supplementary quantity* for the year 2019 reported by EU28 and extracted the ones of the top importing countries.

**Limitations and Validity**

These export numbers only reflect the official exports declared at the customs in the EU and seems of significantly underestimate the number of used vehicles that are actually exported due to illegal exports (Mehlhart et al., 2017). Moreover, only vehicles with a weight over 1000kg and a value of more than 1000€ are usually registered in the customs statistics (Sander et al., 2017). Moreover, when considering the numbers of vehicles exported in total from the EU28 member states one needs to consider the historical development and expansion of the EU since 1988. For the sake of simplification, I did not consider the vehicles exported to former non-EU countries, that are today members of the EU-28, such as e.g., Poland, but focused on the countries of destination that have remained non-EU countries until the point of investigation.

It was useful to focus on the EU28 as an exporter, as the statistics reported by individual countries can be misleading. A large share of the vehicles is first exported from the origin member state to another, from where it is then exported to a third party. This intra-EU cross-border trade is however only reported beyond high-thresholds in terms of value or quantity by individual economic operators. These thresholds for reporting even increased with time, making it easier to shift vehicles between countries without reporting to the customs (Mehlhart et al., 2017)

# Appendix C: Complete Results of the Trade Flow Analysis

**Table C1**

*Total extra-EU used car exports from EU28 1988-1992*

| 1988 | | 1989 | | 1990 | | 1991 | | 1992 | |
|---|---|---|---|---|---|---|---|---|---|
| Lebanon | 23,201 | Lebanon | 19,961 | Libya | 16,474 | Canary Islands | 110,720 | Nigeria | 41,222 |
| Japan | 7,344 | Algeria | 14,283 | Algeria | 13,592 | Lebanon | 31,878 | Serbia and Montenegro | 24,129 |
| Democratic Republic of Congo | 4,939 | Japan | 10,771 | Nigeria | 11,739 | Libya | 31,744 | Algeria | 17,989 |
| Ghana | 4,638 | Libya | 8,040 | Soviet Union | 11,088 | Soviet Union | 20,287 | Libya | 14,398 |
| Thailand | 4,154 | Nigeria | 8,022 | Lebanon | 10,954 | Algeria | 18,952 | Russian Federation | 12,866 |
| Canary Islands | 3,602 | Tunisia | 6,110 | Yugoslavia | 9,572 | Nigeria | 17,708 | Lebanon | 11,219 |
| Bangladesh | 3,025 | Democratic Republic of Congo | 6,097 | Japan | 8,821 | Serbia and Montenegro | 11,092 | Angola | 10,148 |
| Suriname | 3,022 | Ghana | 5,694 | Cameroon | 7,807 | Cameroon | 7,506 | Ghana | 8,021 |
| Guinea | 2,968 | Cameroon | 4,794 | Ghana | 7,386 | Benin | 6,634 | Benin | 7,791 |
| Senegal | 2,773 | Soviet Union | 4,741 | Turkey | 4,379 | Yugoslavia | 4,992 | Soviet Union | 7,537 |
| Yugoslavia | 2,735 | Thailand | 4,087 | Angola | 4,194 | Angola | 4,616 | Cameroon | 6,499 |
| Cameroon | 2,619 | Liberia | 3,479 | Democratic Republic of Congo | 3,961 | Ghana | 3,987 | Niger | 6,429 |
| Switzerland | 2,365 | Guinea | 3,478 | Serbia and Montenegro | 3,563 | Suriname | 3,401 | Suriname | 6,139 |
| Algeria | 2,058 | Yugoslavia | 3,348 | Togo | 3,078 | Japan | 3,289 | Albania | 5,291 |
| Morocco | 2,029 | Angola | 3,267 | Benin | 3,069 | Togo | 3,281 | Togo | 3,936 |
| United States | 1,723 | Switzerland | 2,564 | Malaysia | 2,491 | Malaysia | 2,775 | Tunisia | 3,490 |
| Nigeria | 1,705 | United States | 2,420 | Guinea | 2,422 | Niger | 2,591 | Morocco | 3,276 |
| Liberia | 1,653 | Canary Islands | 2,249 | Zimbabwe | 2,266 | Congo | 2,567 | Congo | 2,915 |
| Angola | 1,626 | Senegal | 2,199 | Switzerland | 1,935 | Tunisia | 1,987 | Senegal | 2,603 |
| Soviet Union | 1,436 | Suriname | 2,193 | Tunisia | 1,645 | Kuwait | 1,874 | Malaysia | 2,574 |
| Libya | 1,372 | Turkey | 2,090 | Suriname | 1,382 | Guinea | 1,772 | Yugoslavia | 2,301 |
| Egypt | 1,318 | Egypt | 2,056 | Senegal | 1,376 | Democratic Republic of Congo | 1,752 | Japan | 2,147 |
| Togo | 1,143 | Togo | 1,883 | Niger | 1,331 | Senegal | 1,581 | Guinea | 1,892 |
| Tunisia | 1,111 | Sierra Leone | 1,634 | Congo | 1,318 | Albania | 1,454 | Hong Kong | 1,763 |
| Hong Kong | 953 | Morocco | 1,397 | United States | 1,288 | Switzerland | 1,384 | Switzerland | 1,459 |
| Total Extra-EU | 102,166 | Total Extra-EU | 150,788 | Total Extra-EU | 159,723 | Total Extra-EU | 322,111 | Total Extra-EU | 238,720 |

**Table C2**

*Total extra-EU used car exports from EU28 1993-1997*

| 1993 | | 1994 | | 1995 | | 1996 | | 1997 | |
|---|---|---|---|---|---|---|---|---|---|
| Nigeria | 55,243 | Nigeria | 32,948 | Russian Federation | 40,735 | Zimbabwe | 226,020 | Russian Federation | 55,568 |
| Russian Federation | 32,209 | Russian Federation | 30,530 | Algeria | 27,127 | Russian Federation | 44,603 | Algeria | 39,514 |
| Algeria | 17,641 | Algeria | 16,377 | Nigeria | 21,092 | Algeria | 34,137 | Ghana | 21,594 |
| Libya | 16,261 | Libya | 15,896 | Lebanon | 14,660 | Norway | 15,471 | Niger | 18,455 |
| Lebanon | 9,106 | Lebanon | 14,940 | Benin | 9,155 | Lebanon | 14,958 | Norway | 18,246 |
| Benin | 8,108 | Ukraine | 8,797 | Ukraine | 8,442 | Benin | 14,171 | Benin | 16,531 |
| Ghana | 7,550 | Ghana | 6,955 | Ghana | 6,733 | Niger | 11,430 | Ukraine | 13,279 |
| Albania | 6,561 | Benin | 6,367 | Niger | 6,255 | Ukraine | 11,162 | Lebanon | 12,733 |
| Niger | 6,001 | Norway | 5,616 | Norway | 6,052 | Cameroon | 8,935 | Japan | 12,398 |
| Malaysia | 4,668 | Albania | 4,982 | Cameroon | 5,403 | Ghana | 8,417 | Cameroon | 11,117 |
| Ukraine | 4,569 | Malaysia | 4,833 | Togo | 4,979 | Nigeria | 8,144 | Togo | 9,026 |
| Cameroon | 4,492 | Niger | 4,247 | Democratic Republic of Congo | 4,327 | Côte d'Ivoire | 7,698 | Côte d'Ivoire | 9,021 |
| Turkey | 4,051 | Tunisia | 4,026 | Turkey | 4,118 | Togo | 6,993 | Iceland | 8,680 |
| Angola | 4,026 | Japan | 3,751 | Malaysia | 4,008 | Democratic Republic of Congo | 6,181 | Turkey | 8,558 |
| Hong Kong | 3,809 | Angola | 3,653 | Japan | 3,870 | Albania | 6,130 | United States | 8,531 |
| Tunisia | 3,546 | United Arab Emirates | 3,622 | Albania | 3,835 | Liechtenstein | 6,106 | Angola | 8,152 |
| Suriname | 3,472 | Guinea | 3,581 | Angola | 3,756 | Turkey | 5,574 | Senegal | 6,951 |
| Guinea | 2,990 | Democratic Republic of Congo | 3,547 | Belarus | 3,644 | Ethiopia | 5,275 | Tunisia | 6,121 |
| Japan | 2,896 | Hong Kong | 2,669 | Liechtenstein | 3,598 | United States | 4,863 | Belarus | 5,799 |
| Congo | 2,663 | Belarus | 2,648 | Tunisia | 3,545 | Senegal | 4,814 | Bosnia and Herzegovina | 5,755 |
| Senegal | 2,409 | Switzerland | 2,591 | Guinea | 3,245 | Angola | 4,569 | Madagascar | 5,709 |
| United Arab Emirates | 2,141 | Cameroon | 2,466 | Libya | 2,699 | Belarus | 4,393 | Libya | 5,370 |
| Morocco | 2,058 | Togo | 2,258 | Switzerland | 2,565 | Tunisia | 4,012 | Nigeria | 4,964 |
| United States | 1,911 | Suriname | 2,149 | United States | 2,444 | Japan | 3,944 | Democratic Republic of Congo | 4,221 |
| Norway | 1,782 | United States | 2,133 | Côte d'Ivoire | 2,266 | Congo | 3,862 | United Arab Emirates | 4,128 |
| Total Extra-EU | 248,044 | Total Extra-EU | 232,207 | Total Extra-EU | 241,696 | Total Extra-EU | 534,304 | Total Extra-EU | 385,519 |

**Table C3**

*Total extra-EU used car exports from EU28 1998-2002*

| 1998 | | 1999 | | 2000 | | 2001 | | 2002 | |
|---|---|---|---|---|---|---|---|---|---|
| Russian Federation | 47,518 | Algeria | 42,978 | Algeria | 53,939 | Russian Federation | 169,655 | Russian Federation | 216,491 |
| Algeria | 36,203 | Libya | 27,530 | Nigeria | 51,478 | Nigeria | 136,657 | Algeria | 77,157 |
| Niger | 22,011 | Nigeria | 20,232 | Russian Federation | 49,241 | Algeria | 59,379 | Nigeria | 69,073 |
| Norway | 16,127 | Benin | 20,076 | Benin | 42,917 | Benin | 51,756 | Benin | 51,884 |
| Benin | 15,118 | Russian Federation | 18,252 | Niger | 40,906 | Senegal | 43,239 | Niger | 49,887 |
| Ghana | 13,964 | Ghana | 17,367 | Jordan | 30,982 | Niger | 39,120 | Belarus | 48,426 |
| Cameroon | 13,572 | Albania | 16,128 | Norway | 24,874 | Ukraine | 38,899 | Ukraine | 37,650 |
| Libya | 12,778 | Norway | 15,068 | Lebanon | 18,969 | Belarus | 34,934 | Norway | 30,695 |
| Ukraine | 12,499 | Cameroon | 14,223 | Togo | 18,289 | Norway | 25,260 | Togo | 25,223 |
| Senegal | 11,309 | Niger | 13,519 | Ghana | 16,175 | Togo | 22,585 | Cameroon | 21,371 |
| Angola | 9,497 | Senegal | 11,582 | Senegal | 15,864 | Jordan | 22,553 | Kazakhstan | 20,853 |
| Nigeria | 8,824 | Belarus | 9,881 | Cameroon | 15,374 | Lebanon | 19,150 | Angola | 20,137 |
| Côte d'Ivoire | 8,794 | Lebanon | 9,027 | Ukraine | 14,561 | Ghana | 18,352 | Jordan | 17,207 |
| Lebanon | 8,430 | Tunisia | 8,497 | Belarus | 12,375 | Angola | 16,353 | Ghana | 16,904 |
| Madagascar | 7,043 | Côte d'Ivoire | 6,402 | Madagascar | 9,062 | Cameroon | 15,994 | Senegal | 16,764 |
| Tanzania | 6,863 | Ukraine | 6,337 | Angola | 8,449 | Kazakhstan | 13,577 | Lebanon | 14,916 |
| Togo | 5,600 | Togo | 6,255 | Yugoslavia | 7,765 | Switzerland | 8,746 | Yugoslavia | 14,109 |
| Belarus | 5,517 | Madagascar | 6,232 | Tunisia | 6,630 | Côte d'Ivoire | 8,426 | Switzerland | 10,331 |
| Tunisia | 5,082 | Angola | 4,748 | Switzerland | 6,558 | Madagascar | 8,190 | Tunisia | 9,508 |
| Democratic Republic of Congo | 4,735 | Switzerland | 4,651 | Côte d'Ivoire | 5,938 | Tunisia | 8,140 | United States | 8,627 |
| Suriname | 4,557 | Jordan | 4,623 | Democratic Republic of Congo | 5,463 | Congo | 7,552 | Côte d'Ivoire | 8,372 |
| Congo | 3,871 | Suriname | 3,983 | United Arab Emirates | 5,226 | United Arab Emirates | 7,237 | United Arab Emirates | 6,054 |
| Switzerland | 3,453 | Democratic Republic of Congo | 3,163 | Congo | 5,081 | Saudi Arabia | 7,152 | Congo | 6,012 |
| Bosnia and Herzegovina | 3,319 | United States | 2,907 | Kuwait | 4,986 | United States | 6,426 | Guinea | 5,503 |
| Turkey | 3,259 | Bosnia and Herzegovina | 2,886 | Turkey | 4,788 | Kuwait | 5,833 | North Macedonia | 5,498 |
| Total Extra-EU | 349,944 | Total Extra-EU | 344,364 | Total Extra-EU | 551,306 | Total Extra-EU | 884,507 | Total Extra-EU | 910,742 |

**Table C4**

*Total extra-EU used car exports from EU28 2003-2007*

| 2003 | | 2004 | | 2005 | | 2006 | | 2007 | |
|---|---|---|---|---|---|---|---|---|---|
| Russian Federation | 116.644 | Russian Federation | 85.651 | Russian Federation | 98.884 | Kazakhstan | 176.414 | Kazakhstan | 222.706 |
| Algeria | 69.230 | Kazakhstan | 74.586 | Kazakhstan | 97.365 | Russian Federation | 117.478 | Russian Federation | 119.433 |
| Kazakhstan | 36.397 | Algeria | 73.501 | Algeria | 74.975 | Belarus | 85.305 | Guinea | 116.125 |
| Belarus | 35.570 | Syria | 53.806 | Belarus | 62.848 | Ukraine | 78.857 | Belarus | 99.406 |
| Ukraine | 34.696 | Belarus | 39.323 | Ukraine | 43.029 | Benin | 41.514 | Serbia | 59.600 |
| Benin | 29.328 | Serbia and Montenegro | 37.106 | Benin | 33.652 | Angola | 39.040 | Ukraine | 50.092 |
| Jordan | 25.950 | Benin | 34.269 | Niger | 30.022 | Nigeria | 37.501 | Benin | 48.853 |
| Yugoslavia | 24.981 | Niger | 33.081 | Nigeria | 28.429 | Norway | 31.868 | Nigeria | 41.030 |
| Norway | 24.781 | Togo | 31.081 | Togo | 27.342 | Serbia | 27.574 | Kyrgyzstan | 39.975 |
| Nigeria | 21.190 | Nigeria | 26.488 | Norway | 27.174 | Niger | 23.689 | Bosnia and Herzegovina | 38.579 |
| Angola | 18.996 | Ukraine | 25.733 | Angola | 25.502 | Bosnia and Herzegovina | 22.457 | Angola | 37.213 |
| Niger | 18.001 | Norway | 25.204 | Ghana | 18.466 | Kyrgyzstan | 21.967 | Norway | 33.103 |
| Cameroon | 17.025 | Angola | 20.294 | Cameroon | 15.039 | Georgia | 21.245 | Tajikistan | 31.263 |
| United States | 13.852 | Ghana | 18.180 | Kyrgyzstan | 13.960 | Tajikistan | 19.722 | Libya | 26.860 |
| Ghana | 13.364 | Guinea | 17.094 | Tajikistan | 12.696 | Ghana | 19.094 | Georgia | 24.524 |
| Senegal | 12.834 | Lebanon | 17.009 | Bosnia and Herzegovina | 12.035 | Togo | 18.928 | Ghana | 23.159 |
| Togo | 12.794 | Cameroon | 16.437 | Georgia | 11.600 | Montenegro | 15.002 | Switzerland | 19.664 |
| Switzerland | 10.634 | Albania | 15.490 | Guinea | 10.156 | Cameroon | 14.385 | Cameroon | 14.754 |
| Syria | 9.746 | Jordan | 14.136 | Lebanon | 9.157 | Libya | 11.886 | Côte d'Ivoire | 14.384 |
| Lebanon | 9.174 | Côte d'Ivoire | 10.480 | Serbia | 8.907 | Guinea | 11.544 | Congo | 13.628 |
| Mauritania | 8.421 | Kyrgyzstan | 10.002 | Serbia and Montenegro | 8.717 | Congo | 10.489 | Togo | 13.502 |
| Albania | 7.706 | Switzerland | 8.444 | Jordan | 8.607 | Côte d'Ivoire | 9.568 | Niger | 12.680 |
| Turkey | 7.128 | Iraq | 8.093 | Côte d'Ivoire | 8.395 | Lebanon | 9.275 | Montenegro | 11.194 |
| Côte d'Ivoire | 7.011 | Democratic Republic of Congo | 7.405 | Switzerland | 7.768 | Albania | 8.473 | Turkmenistan | 10.560 |
| Guinea | 6.219 | Bosnia and Herzegovina | 7.286 | Democratic Republic of Congo | 7.594 | Democratic Republic of Congo | 8.278 | Democratic Republic of Congo | 10.228 |
| Total Extra-EU | 692.568 | Total Extra-EU | 829.961 | Total Extra-EU | 831.286 | Total Extra-EU | 1.027.696 | Total Extra-EU | 1.273.680 |

**Table C5**

*Total extra-EU used car exports from EU28 2008-2012*

| 2008 | | 2009 | | 2010 | | 2011 | | 2012 | |
|---|---|---|---|---|---|---|---|---|---|
| Belarus | 111,799 | Belarus | 112,516 | Belarus | 152,467 | Belarus | 174,884 | Benin | 230,878 |
| Russian Federation | 102,838 | Benin | 76,893 | Benin | 89,192 | Benin | 84,236 | Libya | 122,176 |
| Benin | 84,334 | Kazakhstan | 66,058 | Nigeria | 74,245 | Ukraine | 65,670 | Nigeria | 106,432 |
| Kazakhstan | 76,442 | Angola | 55,106 | Serbia | 54,881 | Serbia | 62,423 | Ukraine | 93,308 |
| Serbia | 49,647 | Nigeria | 52,591 | Ukraine | 52,336 | Thailand | 60,679 | Russian Federation | 92,065 |
| Angola | 47,351 | Serbia | 43,369 | Russian Federation | 43,431 | Nigeria | 57,026 | Serbia | 81,149 |
| Tajikistan | 40,892 | Bosnia and Herzegovina | 30,263 | Kazakhstan | 32,517 | Russian Federation | 53,178 | United Arab Emirates | 75,580 |
| Ukraine | 40,220 | Norway | 25,443 | Georgia | 29,478 | Georgia | 41,242 | Georgia | 61,685 |
| Nigeria | 39,977 | Turkmenistan | 23,910 | Norway | 29,110 | Kazakhstan | 37,679 | Belarus | 59,826 |
| Kyrgyzstan | 37,856 | Cameroon | 23,064 | Ghana | 27,474 | Ghana | 29,191 | Ghana | 52,771 |
| Georgia | 35,339 | Tajikistan | 22,279 | Afghanistan | 27,250 | Bosnia and Herzegovina | 28,412 | Switzerland | 39,493 |
| Bosnia and Herzegovina | 35,020 | Ghana | 21,740 | Angola | 26,346 | Norway | 27,994 | Tajikistan | 39,058 |
| Norway | 23,683 | Ukraine | 20,094 | Tajikistan | 25,150 | Tajikistan | 25,455 | Tunisia | 37,967 |
| Cameroon | 18,131 | Georgia | 19,328 | Bosnia and Herzegovina | 23,777 | Switzerland | 25,164 | Zimbabwe | 37,877 |
| Togo | 17,501 | Democratic Republic of Congo | 17,521 | Uganda | 20,377 | Cameroon | 24,879 | Norway | 32,509 |
| Guinea | 17,298 | Guinea | 16,902 | Brunei Darussalam | 20,053 | Afghanistan | 24,441 | Kyrgyzstan | 31,712 |
| Ghana | 15,378 | Russian Federation | 16,664 | Moldova | 17,723 | Brunei Darussalam | 22,342 | Bosnia and Herzegovina | 30,663 |
| Democratic Republic of Congo | 15,279 | Afghanistan | 16,113 | Switzerland | 17,258 | United Arab Emirates | 16,409 | Cameroon | 26,829 |
| Côte d'Ivoire | 14,278 | Zimbabwe | 16,016 | Cameroon | 14,403 | North Macedonia | 16,308 | Namibia | 26,319 |
| Niger | 14,219 | Lebanon | 12,950 | North Macedonia | 13,614 | Sri Lanka | 15,121 | Guinea | 20,205 |
| Turkmenistan | 14,001 | Togo | 12,808 | Sierra Leone | 12,437 | Malaysia | 14,326 | Togo | 19,245 |
| Senegal | 12,961 | Switzerland | 12,112 | Togo | 10,893 | Kyrgyzstan | 14,131 | Niger | 17,670 |
| Moldova | 10,894 | Congo | 11,679 | Zimbabwe | 10,445 | Guinea | 14,040 | Congo | 14,692 |
| Congo | 10,836 | Moldova | 9,963 | Lebanon | 10,384 | South Africa | 13,539 | Moldova | 13,599 |
| Switzerland | 7,720 | Albania | 7,849 | Kyrgyzstan | 9,021 | Tunisia | 13,232 | Democratic Republic of Congo | 12,410 |
| Total Extra-EU | 1,016,303 | Total Extra-EU | 905,592 | Total Extra-EU | 1,003,484 | Total Extra-EU | 1,201,688 | Total Extra-EU | 1,631,174 |

**Table C6**

*Total extra-EU used car exports from EU28 2013-2017*

| 2013 | | 2014 | | 2015 | | 2016 | | 2017 | |
|---|---|---|---|---|---|---|---|---|---|
| Benin | 250,335 | Benin | 220,828 | Benin | 150,546 | Nigeria | 104,916 | Serbia | 103,143 |
| Nigeria | 130,735 | Nigeria | 90,127 | Serbia | 75,954 | Serbia | 101,825 | Ukraine | 65,696 |
| Serbia | 97,717 | Serbia | 58,432 | Nigeria | 66,426 | Bosnia and Herzegovina | 57,022 | Bosnia and Herzegovina | 57,835 |
| Ukraine | 81,008 | Ukraine | 55,369 | Bosnia and Herzegovina | 54,082 | Cameroon | 41,143 | Nigeria | 51,064 |
| Belarus | 74,465 | Bosnia and Herzegovina | 51,714 | Georgia | 29,432 | Côte d'Ivoire | 37,202 | Côte d'Ivoire | 38,770 |
| Russian Federation | 70,097 | Georgia | 44,609 | Switzerland | 29,103 | Ukraine | 37,072 | Guinea | 34,838 |
| Georgia | 65,261 | Libya | 39,352 | Cameroon | 29,040 | Guinea | 36,056 | Senegal | 29,718 |
| Libya | 57,979 | Kyrgyzstan | 36,146 | Guinea | 26,974 | Senegal | 28,362 | Libya | 27,046 |
| Tajikistan | 50,948 | Tajikistan | 34,731 | Ukraine | 25,333 | Togo | 25,888 | Togo | 26,024 |
| Ghana | 46,548 | Belarus | 33,403 | Libya | 21,346 | Georgia | 23,706 | Cameroon | 24,971 |
| Bosnia and Herzegovina | 40,595 | Cameroon | 27,450 | Côte d'Ivoire | 21,018 | Ghana | 21,988 | Israel | 19,624 |
| Kyrgyzstan | 36,757 | Guinea | 26,284 | South Africa | 20,301 | Benin | 19,715 | Somalia | 19,381 |
| Norway | 28,288 | Switzerland | 22,638 | United States | 18,950 | United Arab Emirates | 19,196 | Ghana | 18,549 |
| Guinea | 28,033 | Norway | 20,905 | Senegal | 18,004 | Switzerland | 18,234 | Georgia | 18,202 |
| Cameroon | 27,598 | Côte d'Ivoire | 19,841 | Togo | 17,944 | North Macedonia | 15,254 | Benin | 18,129 |
| Switzerland | 25,928 | Togo | 18,279 | Turkey | 15,399 | Israel | 15,145 | Norway | 16,155 |
| Togo | 20,242 | Russian Federation | 17,646 | North Macedonia | 15,277 | United States | 14,116 | Switzerland | 16,034 |
| Niger | 19,747 | Sri Lanka | 17,533 | Norway | 15,033 | Lebanon | 13,377 | United States | 14,364 |
| Côte d'Ivoire | 16,610 | Niger | 16,025 | Ghana | 13,480 | Albania | 12,817 | Albania | 14,077 |
| Comoros | 15,444 | North Macedonia | 15,988 | Tunisia | 13,299 | Malawi | 12,217 | North Macedonia | 13,914 |
| Congo | 14,417 | Ghana | 15,011 | Tanzania, United Republic of | 12,615 | Congo | 11,325 | Singapore | 12,883 |
| North Macedonia | 14,295 | Senegal | 13,864 | Niger | 12,357 | Tunisia | 10,627 | Algeria | 12,005 |
| Tunisia | 13,835 | Congo | 12,976 | Israel | 12,002 | Norway | 10,366 | Tajikistan | 10,725 |
| Turkey | 13,619 | Singapore | 12,279 | Congo | 10,165 | Pakistan | 9,625 | Zambia | 10,347 |
| Moldova | 12,785 | Tunisia | 12,124 | Lebanon | 9,976 | Libya | 9,313 | Montenegro | 10,344 |
| Total Extra-EU | 1,496,495 | Total Extra-EU | 1,153,999 | Total Extra-EU | 896,899 | Total Extra-EU | 850,615 | Total Extra-EU | 887,805 |

**Table C7**

*Total extra-EU used car exports from EU28 2018-2020*

| 2018 | | 2019 | | 2020 | |
|---|---|---|---|---|---|
| Serbia | 125,496 | Ukraine | 121,243 | Ukraine | 166,891 |
| Ukraine | 69,219 | Libya | 119,207 | Serbia | 134,902 |
| Libya | 68,453 | Serbia | 115,434 | Nigeria | 57,009 |
| Bosnia and Herzegovina | 63,889 | Nigeria | 76,652 | Libya | 52,504 |
| Nigeria | 58,065 | Bosnia and Herzegovina | 54,055 | Bosnia and Herzegovina | 47,669 |
| Tanzania | 38,738 | Zimbabwe | 54,016 | Guinea | 45,724 |
| Guinea | 36,993 | Guinea | 46,974 | Cameroon | 31,552 |
| Benin | 29,333 | Georgia | 43,660 | Benin | 30,835 |
| Ghana | 29,289 | Benin | 40,909 | China | 28,739 |
| Georgia | 27,995 | Turkey | 34,309 | Senegal | 26,969 |
| Senegal | 27,847 | Senegal | 28,801 | Togo | 25,124 |
| Cameroon | 23,162 | Togo | 25,424 | Albania | 24,624 |
| Togo | 23,154 | Cameroon | 23,979 | North Macedonia | 23,269 |
| Côte d'Ivoire | 21,460 | United States | 23,456 | Switzerland | 20,095 |
| North Macedonia | 20,857 | North Macedonia | 21,729 | Ghana | 18,241 |
| Zambia | 17,723 | United Arab Emirates | 20,583 | Georgia | 18,035 |
| Somalia | 17,657 | Ghana | 19,234 | Tunisia | 14,553 |
| Albania | 17,606 | Albania | 19,178 | Belarus | 13,985 |
| Algeria | 15,721 | Switzerland | 14,031 | Montenegro | 13,297 |
| Montenegro | 15,566 | Montenegro | 14,014 | Israel | 11,747 |
| Norway | 14,755 | Kyrgyzstan | 13,440 | Kosovo | 11,363 |
| Israel | 12,990 | Norway | 12,716 | Moldova | 10,282 |
| Switzerland | 12,723 | Israel | 12,404 | Tajikistan | 10,247 |
| Tunisia | 12,289 | Belarus | 12,279 | Norway | 9,231 |
| Qatar | 12,132 | Tanzania | 11,420 | Gambia | 9,098 |
| Total Extra-EU | 1,013,118 | Total Extra-EU | 1,164,147 | Total Extra-EU | 962,768 |