*sustainability*

*Review*

# Sustainable Mobility: A Review of Possible Actions and Policies

**Mariano Gallo * and Mario Marinelli**

Department of Engineering, University of Sannio, 82100 Benevento, Italy; mario.marinelli@unisannio.it
* Correspondence: gallo@unisannio.it; Tel.: +39-(0)8-2430-5565

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**Abstract:** In this paper, a review of the main actions and policies that can be implemented to promote sustainable mobility is proposed. The work aims to provide a broad, albeit necessarily not exhaustive, analysis of the main studies and research that from different points of view have focused on sustainable mobility. The structure of the paper enables the reader to easily identify the topics covered and the studies related to them, so as to guide him/her to the related in-depth studies. In the first part of the paper, there is a preliminary analysis of the concept of sustainable mobility, the main transport policies implemented by the European Union and the USA, and the main statistical data useful to analyze the problem. Next, the main policies that can promote sustainable mobility are examined, classifying them into three topics: Environmental, socio-economic, and technological. Many of the policies and actions examined could be classified into more than one of the three categories used; for each of them, there is a description and the main literature work on which the topic can be analyzed in more detail. The paper concludes with a discussion on the results obtained and the prospects for research.

**Keywords:** sustainable mobility; transportation; review

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## 1. Introduction

The concept of sustainable mobility derives from the broader concept of "sustainable development", defined as the "*development that meets the needs of the present without compromising the ability of future generations to meet their own needs*" [1]. The term "sustainable mobility" was coined five years later [2]; the following overall objective is associated to sustainable transport: "*To ensure that our transport systems meet society's economic, social and environmental needs whilst minimising their undesirable impacts on the economy, society and the environment*" [3]. All the main definitions found in the literature stress that it is not enough to refer to environmental aspects, although they are of primary importance, but also social and economic impacts must be taken into account. Moreover, strategies to pursue the objective of sustainable mobility cannot be limited to producing/using less polluting transport systems, although this is of fundamental importance.

Promoting sustainable mobility is one of the most widespread objectives in transport policy, at all territorial levels, whatever the "political color" of the decision-maker. Nowadays, no plan, project, or policy direction concerning the transport sector does not (at least) mention the concept of sustainable mobility. From a scientific standpoint, the international literature has been and continues to be massively interested in the subject, from multiple points of view (technological, territorial, urban, social, economic, health, etc.). For example, to date (3 April 2020), the words "sustainable mobility" or "sustainable transport" in a generic web search are quoted about 4.23 million times and are contained in over 60,000 publications indexed on Google scholar, and over 18,500 publications indexed on Scopus. Many other references can be found in languages other than English.

A survey report on this argument is, therefore, a difficult challenge and, necessarily, will not cover all possible facets of the problem or be exhaustive. In this paper, the state of the art on sustainable mobility will be covered from three main angles: Environmental, socio-economic, and technological.

### 1.1. Related Works

In the literature, several reviews can be found on sustainable mobility or some of its single topics; limiting to some of the most recent ones only, here we refer to [4–18]. In [4], the effects of technology on promoting the shift in behavior towards sustainable transportation modes are investigated. Gonzales Aregall et al. [5] reviewed green port strategies for reducing negative externalities on hinterlands. The innovative strategies for last-mile logistics were reviewed in [6]; another review on sustainable logistics is proposed in [17]. Taiebat et al. [7] reviewed the implications of connected and automated vehicles on sustainable mobility; the prospects of autonomous driving were studied also in [12]. Reviews on shared mobility were proposed in [8] and [10]. Electric mobility was examined in [9] and [11]. Technological innovations in transit systems and their impact on environmental and social sustainability are studied in [13]. More general reviews on sustainable mobility can be found in [14–16,18].

This paper tries to give an overall description of the subject and the individual topics, focusing on the importance of the contribution that each topic can give in the near future to sustainable mobility.

### 1.2. Methodology

The review was based on the following classic steps: (a) Choice of sources; (b) keyword search; (c) screening and selection of papers; (d) in-depth analysis of the main topics covered.

The sources used were: (a.1) Scopus, Science Direct, and MDPI site, for scientific papers; (a.2) Google for technical and transport policy reports, and some proceedings; (a.3) specific sites for some topics or data (World Health Organisation, Environmental European Agency, European Commission, Eurostat, Environmental Protection Agency, etc.).

The keyword search was addressed to (b.1) general keywords ("sustainable mobility", "sustainable transport", "transport and environment", "sustainability", etc.); (b.2) specific keywords for each topic ("air pollution", "car-sharing", "noise", "ecodriving", etc.), combined with "transport", "transportation", "traffic", and "mobility". Moreover, other papers were identified by examining the references of more recent papers.

The papers found with this keyword search were very numerous. A careful analysis and selection phase was necessary, knowing that an exhaustive review would not be possible. The selection criteria were based on (not in order of importance): (c.1) Diffusion and prestige of the place of publication; (c.2) type of product, favoring journal papers over conference proceedings; (c.3) centrality of the paper with reference to the topic in which it is cited; (c.4) date of publication, favoring the most recent ones, all other characteristics being equal; (c.5) diffusion in the scientific community based on citations.

Finally, for each topic, further research was carried out by examining other work mentioned in the papers selected in the previous phase.

### 1.3. Structure of the Paper

Many topics related to sustainable mobility can be classified in more than one of the 3 categories listed above. For example, electric cars can be classified both from a technological and environmental point of view. In Table 1, the main topics we will discuss in this paper are presented by theme. The circle indicates the theme in which the topic is covered, while × indicates another point of view in which the topic can be classified.

The main purpose of this paper is to provide the reader, after a brief analysis of the problem, with an overview of the main policies and actions that can promote sustainable mobility. The references reported also allow those who want to deepen a single topic to have a solid basis for specific research.

Finally, the paper can be useful to policymakers as it provides a compendium of actions that can be implemented or included in wider transport policy programs.

**Table 1.** Topic classification.

| Topic\Theme | Environmental | Socio-Economic | Technological |
|---|---|---|---|
| air pollution | • | × | × |
| car-sharing | × | | • |
| connected and automated vehicles | × | × | • |
| cycling promotion | • | × | × |
| ecodriving | • | | × |
| electric and hybrid vehicles | × | | • |
| equity | | • | |
| e-commerce | × | • | |
| fuel | × | | • |
| green-house gases | • | × | |
| intelligent transportation systems | × | | • |
| micro-mobility | × | | • |
| noise | • | × | × |
| pricing | × | • | |
| public transport promotion | × | • | × |
| safety | | • | × |
| taxes and incentives | × | • | |
| teleworking | × | • | |
| traffic-lights | × | | • |
| transit improvements | × | • | |
| walking promotion | • | × | |

This paper is organized as follows. Section 2 examines the main transport policies and statistical data on sustainable mobility. Sections 3–5 examine environmental, socio-economic, and technological topics, respectively. Section 6 discusses the results and Section 7 concludes.

## 2. Transport Policies and Statistical Data

### 2.1. Transport Policies

European transport policy has always focused on the sustainability aspects of transport. The White Paper on Transport [19] outlines the transport policy for 2050. European transport policy aims at a 60% reduction in greenhouse gas emissions by 2050, with the following 10 targets:

1. *"Halve the use of 'conventionally fuelled' cars in urban transport by 2030; phase them out in cities by 2050; [...].*
2. *Low-carbon sustainable fuels in aviation to reach 40% by 2050; also by 2050 reduce EU $CO_2$ emissions from maritime bunker fuels by 40% (if feasible 50%).*
3. *Thirty per cent of road freight over 300 km should shift to other modes such as rail or waterborne transport by 2030, and more than 50% by 2050, [...].*
4. *By 2050, complete a European high-speed rail network. Triple the length of the existing high-speed rail network by 2030 and maintain a dense railway network in all Member States. [...]*
5. *A fully functional and EU-wide multimodal TEN-T 'core network' by 2030, with a high-quality and capacity network by 2050 and a corresponding set of information services.*
6. *By 2050, connect all core network airports to the rail network, preferably high-speed; ensure that all core seaports are sufficiently connected to the rail freight and, where possible, inland waterway system.*
7. *Deployment of the modernised air traffic management infrastructure (SESAR) in Europe by 2020 and completion of the European common aviation area. [...].*
8. *By 2020, establish the framework for a European multimodal transport information, management and payment system.*

9. *By 2050, move close to zero fatalities in road transport. In line with this goal, the EU aims at halving road casualties by 2020. [...].*
10. *Move towards full application of 'user pays' and 'polluter pays' principles and private sector engagement to eliminate distortions, including harmful subsidies, generate revenues and ensure financing for future transport investments." [19].*

Some of these goals are very ambitious. For example, the former calls for the complete elimination of the use of conventional fuel cars in urban areas by 2050 and their halving by 2030. It can be seen that most of the objectives listed (from 1 to 6), which should, therefore, guide European transport policy over the next 30 years, tend to promote and develop sustainable mobility, with a strong emphasis on rail transport for passengers and goods and reducing the use of transport systems and fuels that have a strong environmental and climate-changing impact. Goal 9 focuses on another important aspect of sustainable mobility: Transport safety. Goals 7 and 8 promote investments in technologies, while goal 10 tries to introduce more equity by charging more for the use of infrastructure and the production of pollution, also to gather resources to finance investments in the transport sector.

A more recent document [20] addresses the issue of sustainability in Europe until 2030, including mobility issues. About mobility, this paper refers to the Action plan for low-emission mobility [21] that states "*Low-emission mobility is an essential component of the broader shift to the low-carbon, circular economy needed for Europe to stay competitive and be able to cater to the mobility needs of people and goods*". This document confirms the main goals provided in the White Paper and identifies the following pillars of the action plan, underlining the centrality of sustainable mobility in the European transport policy:

- Optimizing the transport system and improving its efficiency (ITS, pricing, multi-modality);
- Scaling up the use of low-emission alternative energy sources (low-emission alternative energy for transport, standardization, and inter-operability for electro-mobility);
- Moving towards zero-emission vehicles (vehicle efficiency, action on heavy-duty vehicles);
- Horizontal enablers to support low emissions mobility.

For urban areas, in the Action Plan on Urban Mobility [22], the European Commission proposed 20 actions; among these, eight refer directly to sustainable mobility on the following topics: Sustainable urban mobility plans; sustainable urban mobility and regional policy; transport and health in urban areas; campaigns on sustainable mobility; energy-efficient driving; lower and zero-emission vehicles; clean and energy-efficient vehicles; internalization of external costs.

Particular attention is paid to the SUMP (Sustainable Urban Mobility Plan) that is defined as follows: "*A Sustainable Urban Mobility Plan is a strategic plan designed to satisfy the mobility needs of people and businesses in cities and their surroundings for a better quality of life. It builds on existing planning practices and takes due consideration of integration, participation, and evaluation principles*." [23]. This planning tool is becoming increasingly popular, although it is not mandatory; today [24], over 1100 cities in Europe have prepared a SUMP.

Sustainable mobility is promoted, albeit in a less organic way, in the USA, where there is an overlap of powers and competences between the federal state and the individual states of the union, as underlined by [25] that proposed a review of policies between 2000 and 2011. The same paper shows how "*[...] there is a lack of governmental mandates for sustainability actions [...], and there are (rightly so) more local sustainability initiatives and programs than federal ones [...]*".

It is well known that many cities in the United States have been built and developed as car-oriented systems. Only recently, some cities (e.g., Boston, Dallas, Houston, Los Angeles, Minneapolis, Pittsburgh and Seattle) are trying to promote more sustainable transport alternatives by redesigning their roads to accommodate cyclists and buses and introducing Light Metro (LRT) and Bus Rapid Transit (BRT) lines [26].

This analysis leads to identifying how the European transport policy is focused on sustainable mobility, with particular reference to reducing emissions. Furthermore, there is a strong trend towards the elimination or extreme reduction in the use of conventional fuels for passenger and freight transport, favoring electric mobility for land transport: Rail transport, in urban and suburban areas, and electric or zero-emission vehicles, in urban areas. This trend, in addition to having an important impact on future mobility habits, is expected to direct the automotive industry to invest more and more in alternative fuel vehicles, with particular attention to electric vehicles. This industrial transformation is already beginning to be seen today, with an increasing presence of electric or hybrid car models and a corresponding growth in market share.

### 2.2. Main Statistical Data

There are many statistical sources useful to study sustainable mobility at the global level and its impacts; most of the data refer to aspects related to air pollution and greenhouse gas emissions, although studies and data on road accidents, congestion, and noise can be found. The main government agencies that collect, analyze, and publish data on environmental issues are the Environmental European Agency (EEA) [27], the U.S. Environmental Protection Agency (EPA) [28], the U.S. Department of Transportation (DoT) [29], and the World Health Organization (WHO) [30].

The amount of data available is very large and is, of course, updated on an annual basis. In this section, only some data are reported to highlight the significant impact of transport on environmental sustainability aspects.

The Environmental European Agency [31] estimated the total pollutant emissions in Europe (EU-28) and the percentage of the same emissions from the transport sector. Focusing on particulate emissions, which are the most harmful to human health, it can be seen that the transport sector is responsible for about 13%, of which about 11% due to road transport. Transport sector emits, instead, about 47% of $NO_x$ (39% due to road transport). The same agency [32] estimates greenhouse gas emissions in Europe; the transport sector produces 946,902 kt $CO_2$ eq., equal to 21.9% of the total.

In the USA (at the year 2016), transport sector produced about 29.3% of total greenhouse gas (GHG) emissions [33]; the Environmental Protection Agency [34] estimated 387 kt of primary PM10 from transport (17.1% of all classified sources), of which about 65% due to road transport. Data on consumption and emissions are distributed by Energy Information Administration (EIA) [35], while transportation noise data can be found in the National Transportation Noise Map [36].

At the global level, the World Health Organization publishes, inter alia, data on the effects of air pollution on human health [37] and road accidents [38]. Air pollution is the biggest environmental risk to health in the world, killing 3 million people each year. Road accidents, instead, cause 1.35 million deaths and up to 50 million injuries worldwide.

Many other data useful for the analysis of sustainable mobility can be found in other statistical sources. In Europe, Eurostat [39] provides data on transport safety (all modes), greenhouse gas and pollutant emissions, energy consumption, and more generally on transport systems and their use.

## 3. Sustainable Mobility: Environmental Topics

This section examines the main sustainable mobility issues related to environmental aspects of the problem.

Sustainable mobility policies are very focused on environmental protection; sometimes, sustainable mobility is identified only as mobility that is able to reduce environmental impacts. Even if this concept is not correct, indeed most of the interventions aimed at the development of sustainable mobility have as their main objective the reduction of pollutant emissions and greenhouse gases. In fact, in the following sections of the paper, although dedicated to other topics, it will be noted that many of the socio-economic and technological aspects of the problem also have environmental objectives to achieve (see Table 1).

As shown in Table 1, the following topics will be referred to in this section: Air pollution; cycling promotion; eco-driving; green-house gases; noise; and walking promotion.

In more detail, air pollution and greenhouse gases are treated only in general terms because the possible actions on transport for their reduction are numerous and are specifically dealt with in the other parts of the paper.

This section is organized as follows. Section 3.1 describes the problems related to air pollution and global warming caused by transport, with the corresponding social, economic, and human health impacts, and the main approaches to their reduction, which are dealt with elsewhere in the paper, are identified. Section 3.2 examines the main actions to promote "soft mobility", i.e., cycling and pedestrian modes of transport. Section 3.3 looks at eco-drive techniques for energy saving, both on road and rail transport systems. Finally, Section 3.4 studies the problem of noise pollution and possible mitigation and reduction measures.

### *3.1. Air Pollution and Greenhouse Gases*

In summary, air pollution is defined as any alteration of the natural characteristics of the Earth's atmosphere. We refer, talking about mobility, to anthropogenic causes. It is well known that there can also be natural causes of air pollution and that mobility contributes only partially to all man-made pollution. Greenhouse gases, on the other hand, are not real pollutants, as carbon dioxide is naturally present in the atmosphere. The high concentration of $CO_2$, produced by anthropogenic causes, is responsible of global warming and climate change.

Another fundamental difference between air pollution and greenhouse gases is that the former can be more or less harmful depending on where the pollutants are emitted; in fact, the main damage of air pollution is to human health and depends on the number of people exposed. In particular, air pollution is a major and serious problem in large urban centers, where there is also a high concentration of population. On the other hand, greenhouse gases have a global effect on the climate, regardless of where they are emitted and whether or not people are exposed.

The main pollutants produced by transport are [31]: $PM_{10}$ and $PM_{2.5}$ (particulate matter), $O_3$ (ozone), $NO_2$ (nitrogen dioxide), BaP (benzo[a]pyrene), $SO_2$ (sulphur dioxide), CO (carbon monoxide), and benzene. In Table 2, the percentages of the urban population in EU-28 exposed to concentrations above certain reference value are reported. The corresponding impacts on human health are significant (see Table 3).

**Table 2.** Percentage of the urban population in EU-28 exposed to air pollution (2015–2017) [31].

| Pollutant | EU Reference Value | Urban Population Exposure [%] | WHO Air Quality Guidelines | Exposure Estimate [%] |
|---|---|---|---|---|
| $PM_{10}$ | Day (50 μg/m$^3$) | 13–19 | Year (20 μg/m$^3$) | 42–52 |
| $PM_{2.5}$ | Year (25 μg/m$^3$) | 6–8 | Year (10 μg/m$^3$) | 74–81 |
| $O_3$ | 8 h (120 μg/m$^3$) | 12–29 | 8 h (100 μg/m$^3$) | 95–98 |
| $NO_2$ | Year (40 μg/m$^3$) | 7–8 | Year (40 μg/m$^3$) | 7–8 |
| BaP | Year (1 ng/m$^3$) | 17–20 | Year (0.12 ng/m$^3$) | 83–90 |
| $SO_2$ | Day (125 μg/m$^3$) | <1 | Day (20 μg/m$^3$) | 21–31 |

**Table 3.** Premature deaths attributable to exposure to main air (2016) [31].

| Pollutant | Premature Deaths in Europe | Premature Deaths in EU28 |
|---|---|---|
| $PM_{2.5}$ | 412,000 | 374,000 |
| $NO_2$ | 71,000 | 68,000 |
| $O_3$ | 15,100 | 14,000 |

The main greenhouse gases emitted by transport systems are carbon dioxide ($CO_2$), methane ($CH_4$), and nitrous oxide ($N_2O$). Greenhouse gas emissions are usually measured in $CO_2$ eq., where 1 t of $CH_4$ equals 21 t of $CO_2$ eq. and 1 t of $N_2O$ equals 310 t of $CO_2$ eq.

Total greenhouse gas emissions worldwide amounted to 37.9 Gt $CO_2$ in 2018 [40]. The variation between 1990 and 2018, for the different sectors, is summarized in Table 4. It can be seen that in

EU28, only the transport sector has increased. On a global level, however, the increase affected all sectors. This analysis shows that even in the countries of the European Union, where policies to reduce greenhouse gas emissions have been pursued, the transport sector is the only one with a significant increase, while in all other sectors, emissions have decreased. It, therefore, shows that we are still a long way from a solution to the greenhouse gas reductions generated by the transport sector.

**Table 4.** Changes in $CO_2$ emissions from 1990 to 2018 by sector [40].

| Sector | Globe | EU28 |
|---|---|---|
| Power industry | +82% | −30% |
| Other industrial combustion | +60% | −40% |
| Buildings | +6% | −34% |
| Transport | +77% | +21% |
| Other sectors | +110% | −20% |

The high concentration of greenhouse gases is now considered by almost all scientists to be the cause of climate change, which could prove disastrous in the coming years. The research aimed at estimating the damage caused by climate change is so numerous that it would need to receive a specific review. Here, referring to some work, in which you can find further references, we quote [41–49]. In particular, a welfare theoretic approach to estimate the damage caused by climate change is proposed in [41], while the consequences on economic growth are examined in [42]; an economic quantification of damage is reported in [45,48]. Legal aspects related to climate change damage are examined in [43], while a human rights-based approach is reported in [46]. Specific studies are reported in [44,49] for the US and in [47] for China.

The transport policies proposed to reduce pollutant and greenhouse gas emissions are numerous and many of them are covered in other sections of this article. Indeed, most of the actions reported in Table 1 have as a direct or, more rarely, indirect effect a reduction in pollutant and greenhouse gas emissions. These policies may be classified according to the subject on which they act:

- The vehicle: Low-emission vehicles, electric vehicles, hybrid vehicles, etc.;
- The fuel: Low-carbon fuels, biodiesel, etc.;
- The users: Use of less polluting modes of transport, changes in mobility habits, incentives, pricing, etc.;
- Management technologies: Intelligent Transportation Systems (ITS), traffic control, connected vehicles, etc.

This analysis shows that emissions are one of the main external impacts of the transport sector, causing serious damage both on the planet and on the human health of the people exposed. Most policies promoting sustainable mobility put the reduction of emissions at the heart of their actions, as also highlighted in Section 2.1. It is believed that the objective of reducing emissions will remain primary for a long time to come, at least until zero-emission vehicles are widely deployed. At present, the problem is particularly acute in developing countries, both because of the rapidly growing need for mobility and because it is economically impossible for large sections of the population to access new, low-emission vehicles. Therefore, it would be useful to envisage appropriate economic support policies in these contexts, to promote the transition to clean vehicles, in addition to the actions that are usually planned in more developed countries.

### *3.2. Cycling and Walking Promotion*

The promotion of walking and cycling, also known as "soft mobility", is one of the most popular sustainable mobility policies in urban areas. The propensity to use these modes of transport is linked to the urban environment, which should be redesigned overall [50–52].

Increased use of non-motorized modes, especially when replacing motorized trips, has several positive effects. The effects on the environment are, of course, only if the trip made by bike or on foot is a substitute for a trip otherwise done by car. Clearly, this type of trip has a distance limit. Usually, pedestrian trips can replace car trips within a range of up to 1–2 km, while bike trips can be up to 10 km. For example, in Italy, a survey by ISFORT (an Italian institute for research and training in the transport sector) [53] showed that trips up to 2 km are made 58% on foot, 8.7% by bike, 1.7% by motorbike, 27% by car, and 3.9% by public transport. In the range between 2 and 10 km, on the other hand, pedestrian trips decrease to 4.6% (over 10 km the value is 0), 4.9% by bike, 72.8% by car, and 13.9% by public transport. Beyond 10 km, the bike is practically not used (0.9%) and the car rises to over 82% of trips.

In addition to the effects on the environment, some studies have shown positive effects on human health [54–56].

The main policies that can promote pedestrian mobility are:

- Creation of pedestrian areas;
- Creation of limited traffic zones;
- Creation of 30-zone;
- Maintenance and renovation of sidewalks;
- Construction of underpasses and overpasses or marked and illuminated pedestrian crossings (increasing the perceived safety);
- Construction of mobile infrastructure to assist pedestrian movements (escalators, conveyor belts, lifts).

The main policies to promote cycling are:

- Construction of cycle paths;
- Preparation of parking areas dedicated to bicycles;
- Incentives for the purchase of bicycles;
- Bike-sharing systems.

The literature on all these topics is extensive; here, we refer to some general papers that are useful to deepen the specific topics [57–66].

### 3.3. Ecodriving

Ecodriving is one of those policies for sustainable mobility also known as “soft policies”. It consists of promoting, in the case of private car drivers, or in providing, in the case of collective transport systems, energy-efficient driving styles that produce, for the same number of km travelled, lower consumption and emissions.

The literature reports various data on the reduction of consumption and, correspondingly, emissions achievable with the ecodrive; an interesting review can be found in [67]. Studies in Japan [68,69], quoted in [70], have shown average savings of between 10 and 20%. In [71], the results showed an average savings value of 6.8%, after ecodriving training, regardless of fuel type and road type. De Vlieger [72] has shown that aggressive driving can lead to higher fuel consumption of between 12 and 40% and higher emissions of between 20 and 50%. On the other hand, Van Mierlo et al. [73] have shown that it is possible to achieve consumption reductions of between 5 and 25% with appropriate fuel-saving driving courses. Coloma et al. [74] examined the potential of driver behavior for reducing emissions in a small non-congested city; their results showed that the average $CO_2$ savings were 17% (gasoline engines) and 21% (diesel engines), while the travel times has been increased of about 7.5%.

Bifulco et al. [75] proposed a linear model for estimating fuel consumption related to the use of ADAS (Advanced Driving Assistance Systems) for ecodriving; Chen et al. [76] proposed a driving-events-based model for evaluating ecodriving behavior; Muslim et al. [77] identified 17 different ecodriving behaviors and concluded that “*driver’s personalities (including physical, psychological and psychosocial characteristics) have to be integrated for advanced in-vehicle driver assistance system*”.

Five fuel and emission saving actions can be identified:

- Anticipate traffic flow and signals;
- Drive smoothly (and non-aggressively) and, as far as possible, maintain a steady speed;
- Change gear so to keep the engine in the optimal range (from 2000 to 3000 routes per minute, depending on the vehicle and engine); change gear earlier than usual;
- Check the tyre pressures more frequently;
- Limit the use of air conditioning and electrical equipment when not needed.

The first three points can be improved with specific driving lessons aimed at saving fuel.

In recent years, research has been very focused on ecodriving applied to rail transport [78–89]. Although the rail transport system is more environmentally friendly, energy consumption and greenhouse gas emissions, where the energy consumed is not produced from renewable sources, are still high.

Most studies and applications refer to suburban or regional services. In this case, the reduction in consumption can be achieved by extending the journey times between two stations, often using the recovery times available on each leg; if recovery times are used, the overall total travel time does not change for most users, who would have been standing still at the station during the recovery time. Driving strategies are based on the use of a speed diagram divided into four phases: Acceleration, regime, coasting, and braking. In many cases, additional energy recovery is also possible during the braking phase [90–92]. On metro lines, on the other hand, the recovery time is only available to the terminus and, given the short distance between stations, usually only the speed is taken as a project variable [93].

These strategies are more efficiently implemented with automatically guided convoys [94,95], but it is also possible to use systems that transmit signals to the driver to approximate the ideal speed trajectory.

### 3.4. Noise

Noise can be a serious problem in both urban and rural areas, as it significantly reduces the quality of life, produces annoyance, sleep disturbance, and health damage. The transport sector is one of the main culprits of noise, contributing to it both by road, rail, and air transport. In urban areas, road traffic is the main source of noise. According to the World Health Organization (WHO) [96], "*... at least one million healthy years of life are lost every year from traffic-related environmental noise in western Europe. Sleep disturbance and annoyance, mostly related to road traffic noise, constitute the bulk of this burden*".

Therefore, noise is a social and health problem that should not be underestimated and should be appropriately contained. The WHO guidelines [96] propose some strong recommendations that should be taken into account in transport policy (see Table 5).

**Table 5.** Recommendations of the World Health Organization for transport noise [96].

| Transport Mode | Recommendation |
|---|---|
| Road traffic | Noise levels, in terms of $L_{den}$, should be reduced below 53 dB. Above this level, the noise by road traffic produces adverse health effects.<br>Noise levels during the night, in terms of $L_{night}$, should be reduced below 45 dB. Above this level, the noise by road traffic produces adverse effects on sleep.<br>Reduce the population exposed to noise levels above these values acting on sources and infrastructures. |
| Railway | Noise levels, in terms of $L_{den}$, should be reduced below 54 dB. Above this level, the noise by railway traffic produces adverse health effects.<br>Noise levels during the night, in terms of $L_{night}$, should be reduced below 44 dB. Above this level, the noise by railway traffic produces adverse effects on sleep.<br>Reduce the population exposed to noise levels above these values. |
| Aircraft | Noise levels, in terms of $L_{den}$, should be reduced below 45 dB. Above this level, the noise by aircraft produces adverse health effects.<br>Noise levels during the night, in terms of $L_{night}$, should be reduced below 40 dB. Above this level, the noise by aircraft produces adverse effects on sleep.<br>Reduce the population exposed to noise levels above these values acting on infrastructures. |

The European Directive 2002/49/EC [97] defines the acoustic parameter $L_{den}$ (Level day-evening-night), that is adopted to standardize noise measurements for European Countries, as follows:

$$L_{den} = 10 \cdot \log_{10} \frac{1}{24} \cdot \left[ 12 \cdot 10^{\frac{L_{day}}{10}} + 4 \cdot 10^{\frac{L_{evening}+5}{10}} + 8 \cdot 10^{\frac{L_{night}+10}{10}} \right] [dB(A)] \quad (1)$$

where:

$L_{day}$ is the equivalent noise level during the day (7:00–19:00);
$L_{evening}$ is the equivalent noise level during the evening (19:00–23:00);
$L_{night}$ is the equivalent noise level during the night (23:00–7:00).

The evening period can be reduced by one or two hours, increasing the other periods.

Research on noise and, in particular, on that produced by transport systems is very extensive. Studies have addressed the problem from different angles; the main ones are:

- Models, methods, and software for the estimation of traffic noise;
- Specific case studies;
- Impacts of noise on human health;
- Infrastructures and mitigation methods;
- Engines.

Reviews on models for estimating the noise produced by road traffic have been proposed in [98–100]. There are many case studies related to road traffic noise, and many of them also report the calibration of specific models; here, we refer to [101–108]. The impacts of noise on human health have been the focus of attention for many years; some reviews can be found in [109–116]. Infrastructures and mitigation methods were studied, among others, in [117–128]. Finally, the reduction of noise produced by engines has been studied in [129–137].

Transport policy in this sector should be directed towards reducing the exposure of the population to levels of noise that can cause damage to health, firstly, and other types of disturbances, secondly. Possible intervention strategies require multidisciplinary skills, having to act on several fronts, from the design of infrastructure and pavements to the design of mitigation structures, to the reduction of vehicle noise, to the design of buildings, to the driving style. For rail and air transport, the most effective policies, on the other hand, are territorial policies, which should avoid settlements near airports and railway lines or the location of airports far from built-up areas, while the railway crossings in urban areas should be underground.

## 4. Sustainable Mobility: Socio-Economic Topics

This section examines the main sustainable mobility issues related to socio-economic aspects of the problem.

The socio-economic aspects of sustainable mobility are numerous. Many of them could be classified as environmental or technological aspects. As shown in Table 1, in this section, we will refer to the following topics: Equity, external costs and their internalisation, freights, pricing, public transport promotion, safety, taxes and incentives, teleshopping, teleworking, and transit improvements.

This section is organised as follows. Section 4.1 examines equity as a condition for sustainability. Section 4.2 focuses on pricing, taxes, incentives, and external costs and their internalisation. Section 4.3 studies transit improvements and public transport promotion. Section 4.4 deals with safety. Finally, Section 4.5 focuses on e-commerce and teleworking.

### *4.1. Equity*

Sustainable mobility should also present aspects of equity; this concept is now widely accepted [138–140].

Several researchers highlighted the importance of equity in transportation: An equitable distribution of transportation resources (infrastructures and transit systems) contributes to achieving social equity, producing important impacts on wellbeing and quality of life [141]. Martens [142] proposed a comprehensive study of equity in transportation planning. Beyazit [143] proposed a literature review on social justice in transport. The use of Lorenz curves and the Gini coefficient for measuring public transport equity was proposed by Delbosc and Currie [144] and applied in several other studies [145–150]. Equity in Transportation Network Design problems was studied in [151–154]. Equity in pricing was studied in [155–157].

It is important to differentiate between the concepts of equity and equality. Equity is achieved when everyone is put in a position to achieve the same goals or enjoy the same benefits or advantages, taking into account the starting point of each one. Equality, on the other hand, is achieved when everyone is treated in the same way, regardless of the initial condition.

In the field of sustainable mobility, the equity should be considered from different points of view, the main ones being the following:

- Equity in the environmental impacts of transport systems;
- Equity of investment in infrastructure and services available to the population;
- Equity in the accessibility, with particular attention to the weaker segments of the population, at risk of social exclusion, and to destinations of social and cultural importance;
- Equity in the improvement of the urban environment and the regeneration of areas;
- Equity in charges for the use of infrastructure, for the use of collective transport services and the taxation of fuels and vehicles.

Achieving equity objectives should be one of the headlights of the transport policy. Any investment in this sector uses public money and equity must be taken into account in transport planning. Sustainable mobility is implicitly fair, given that often the weaker social groups are also those who suffer most from pollution and climate change. To this, however, it is necessary to add the search for social equity and investment, assessing, on the one hand, the benefits and costs, and on the other hand the possibility of providing compensation for those parts of the community that do not enjoy any benefit or that suffer adverse effects within the same intervention.

### *4.2. Pricing, Taxes and Incentives*

Pricing and taxation are two widespread policies that can be used to promote sustainable mobility [158–165].

Pricing can usually concern the use of road infrastructure (road pricing) or the parking of vehicles (parking pricing). In the first case, a toll is charged to car drivers for the use of a single infrastructure or for entering a, usually central, area of a city. In the second case, the driver pays for parking the vehicle. From the point of view of sustainable mobility, these policies aim to increase the perceived costs of private car use to promote a modal split in favor of the use of other modes of transport, such as public transport, cycling, and walking. Sometimes, road pricing has a direct environmental connotation, differentiating costs according to the environmental compatibility of the vehicle, as in the case of the Ecopass in Milan [166–168]. One of the widest and best-known applications is the congestion charge in London, which has been very well investigated [169–174].

Road pricing, with a view to sustainable mobility, should be closely linked to the concept of external costs [175]; in practice, the optimal road pricing should be that which is able to charge the user of the car for all the external costs it produces [176,177]. Indeed, it is not possible to get the ideal pricing from this point of view and parking pricing road pricing policies are always considered second-best approaches [178].

Parking pricing is, probably, the most used pricing policies in the world [179–182]. Almost all large cities in western countries, and many medium and small towns, have a parking fee on public areas, usually based on the parking time. Fares are usually a function of the destination of the parking, although there is no lack of proposals for fares based on origin-destination pair [156,183].

Taxation policies for fuels or vehicle ownership [184,185], differentiated in function of environmental impact and greenhouse gas emissions [186–188], are widely applied in western countries. The aim is to induce people to behave more virtuously in choosing the vehicle to buy [189], tending to penalise those who buy vehicles with a greater environmental impact, or the mode to choose [190]. In some cases, such as electric cars, the possession tax is eliminated or significantly reduced to encourage their purchase.

In the literature, there are also examples of the transformation of some fixed costs, such as insurance and possession tax, into variable costs, increasing fuel taxation [191–193]; these policies tend to transform some fixed costs of the private car, and therefore independent of the kilometres travelled, into variable costs perceived at each trip, to promote further the choice of public transport modes.

Incentives for the purchase of low-polluting vehicles are other economic instruments supporting sustainable mobility [194]. There are different types of buy incentives; the main ones are: (1) Incentive to buy a new car following the scrapping of a polluting car; (2) incentive to buy a low-emission car, such as electric cars [195–200], or alternative fuel cars [201]; (3) incentive to convert a petrol car into an LPG (Liquefied Petroleum Gas) car. Incentive (1) is often used by governments more to support the automotive industry than for a real desire to improve the sustainability of the vehicle fleet [202,203]. Incentive (2) has become widespread in recent years and aims to reduce the purchase cost of electric cars, which are currently not competitive with internal combustion cars. Incentive (3), which is less widespread than the others, is used to reduce particulate matter emissions in urban areas, sometimes by local governments more than by central governments.

### *4.3. Transit Improvements and Public Transport Promotion*

Improving the quality and quantity of public transport services is one of the most efficient transport policies to improve modal split and reduce car use, with positive impacts on emissions [204–213]. Countries that invest the most in public transport systems are also those with the highest shares of modal split. For example, a recent study [214] showed that the availability of rail infrastructure and services has a direct influence on modal split and greenhouse gas emissions.

Clearly, the user chooses the mode of transport to be used according to the availability of services and their quality. It should be remembered that the real competitor of collective transport is individual transport, which by its very nature has higher levels of quality and comfort than collective transport. Therefore, to subtract users from the private car, it is necessary to offer services of good quality and high frequency.

The promotion of the use of collective transport can be pursued through marketing campaigns and appropriate pricing policies, which tend to build customer loyalty, such as, for example, annual subscriptions at a significantly lower cost than the sum of the corresponding monthly subscriptions.

### *4.4. Safety*

Road accidents are one of the main causes of death. A World Health Organization (WHO) report [38] indicates that 1.35 million people die each year (3700 every day) and it is the first cause of death for children and young adults between 5 and 29 years of age; road traffic injuries are, instead, the eighth cause of death about all ages. Death rates in low-income countries are about 3 times higher than in high-income countries. Moreover, "*Tens of millions more are injured or disabled every year...*" [38], causing high social costs. Sustainable mobility must also be safe mobility.

A review on safety should require a dedicated paper. Here, we refer to some general papers [215–225] and identify possible actions and policies that can improve road safety. Actions and policies to improve road safety can be classified into three broad categories: Infrastructure actions, vehicle actions, and user actions.

As for the infrastructure, there is a wide range of actions relating to:

- Intersections (type, organization, traffic lights, pedestrian protection, canalization, etc.);
- Road layout (plano-altimetric layout, visibility distance, etc.);
- Urban roads (network organisation, 30-zone, restricted traffic zones, etc.);
- Paving (draining pavements, maintenance, etc.).
- Safety barriers (installation and maintenance, guardrails to separate carriageways, shock absorbers, etc.);
- Signage (luminous signage, variable message panels, LEDs, speed limits, road markings, maintenance, etc.).
- Lighting (intersections, pedestrian crossings, etc.).

Actions on the vehicle are also numerous and applied by manufacturers either to comply with regulations or to make the product more attractive to consumers:

- Type of lighting devices;
- Cruise control;
- Active safety belts;
- Airbags;
- Engine positioning;
- Protective devices in the bodywork;
- Automatic driving functions (automatic braking, trajectory control, intelligent cruise control, signal and speed limit recognition, etc.).

Actions on users consist of both education and the containment and repression of inappropriate behavior:

- Point driver's license;
- Alcohol tests;
- Vehicle efficiency controls;
- Awareness campaigns;
- Safe driving courses.

### *4.5. E-Commerce and Teleworking*

E-commerce (known also as teleshopping) and teleworking are the main among the so-called teleactivities; reviews can be found in [226,227].

E-commerce has been widely diffused in the last few years, thanks to the spread of the internet and the increasing offer of companies that operate online sales. Several studies have been carried out to simulate and compare this type of shopping with the traditional one [228–231] and to evaluate its impact [232–235].

Promoting teleworking is a strategy to reduce commuting and, consequently, congestion and emissions. Several studies have examined the impact of telework on transportation, land use, and pollutant emissions [236–239].

The impacts of these activities on consumption and emissions may be significant, but lower than often expected. Indeed, e-commerce replaces the trip that the consumer would have made, but the delivery of the goods produces, however, consumption and emissions; if the trip that is replaced would have been a pedestrian trip, the balance is negative. Almost always, however, the overall balance on emissions is positive because the same vehicle delivers more than one product and, therefore, replaces more trips. Teleworking also has, on the whole, a positive impact on emissions, also because it tends to reduce trips during peak hours when congestion is greatest. In this case too, however, the overall impact is lower than expected, because users tend to make more trips for other reasons, having made fewer trips for work.

## 5. Sustainable Mobility: Technological Topics

In this section, we focus on the main topics related to solutions developed for enhancing transport sustainability from a technological point of view. In the following section, our attention is paid to main alternative fuels currently used in the automotive industry, including electricity, with some references to new insights in this field (Section 5.1). Then, we describe main state-of-the-art models for sharing mobility spreading among countries as an alternative to or shared solution for private cars (Section 5.2). Finally, we report the main Intelligent Transportation System (ITS) solutions developed in the last years to change travellers' behaviour towards a smart approach to transport infrastructure usage (Section 5.3).

### *5.1. Alternative Fuel Vehicles*

As a solution to meet the targets described above, a lot of effort was given to develop new fuels and engines capable to reduce pollutant emissions. In recent decades, automotive industries increased the production of alternative fuel vehicles (AFVs) that use fuels such as electricity, natural gas, and hydrogen, since they are based on low-carbon sources and/or able to increase vehicle energy efficiency. Alternative fuels differ from traditional ones since not based on gasoline or diesel and characterized by very low pollutant emission rates. Currently, the following major types of alternative fuels are the most promising and/or used in road transportation, according to the European Commission [240] and the European Academies Science Advisory Council [241]. A comparison in terms of strengths and weaknesses related to each AFV type described below is reported in Table 6.

**Table 6.** Comparison of strengths and weaknesses for each alternative fuel vehicle type.

| Vehicle Type | Strengths | Weaknesses |
|---|---|---|
| Battery electric (BEV) | • Quiet running<br>• No GHG emissions from the car<br>• Extensive electric infrastructure<br>• Electricity partially obtainable from renewable sources | • Long charging times<br>• Limited range<br>• Expensive home chargers and limited public charging stations<br>• Complex load management for the grid |
| Plug-in hybrid (PHEV) | • Full-electric range can only address short commutes<br>• Home charging infrastructure is suitable<br>• ICE can extend the range for long trips<br>• Lower cost per kilometer and no vehicle GHG emissions in electric mode | • Batteries in addition to an ICE increase vehicle price<br>• Daytime charging could put a strain on the power grid<br>• Plug-in is required to obtain benefits<br>• Driving habits influence the obtainable benefits |
| Natural gas (NGV) | • Cheaper than gasoline<br>• Cleaner at comparable power | • Reduced trunk space due gas tanks<br>• Limited number of refueling stations and range |
| Liquefied Petroleum Gas (LPGV) | • Non-toxic and non-corrosive fuel<br>• Cheaper than gasoline and diesel | • LPG conversion can be expensive<br>• Maintenance and servicing are also slightly more expensive<br>• Safety of car parking |
| Hydrogen fuel cell (HFCV) | • Emitting only water vapor<br>• Fast refueling<br>• Fast battery charging from fuel cells<br>• Hydrogen obtainable from the use of renewable energies | • Expensive technology<br>• Hydrogen is stored on-board at extremely high pressure or very low temperature<br>• Low number of refueling stations<br>• Hydrogen transportation is very expensive |

#### 5.1.1. Electricity

Electric vehicles (EVs), instead of using an internal combustion engine (ICE) for traction, move using an electric motor. Full electric vehicles, also called Battery Electric Vehicles (BEVs), are powered by a charging infrastructure, often referred to more simply as a charging outlet, that provides the required electric energy to charge batteries. In other vehicles, like conventional hybrids (HEVs) and plug-in hybrid electric vehicles (PHEVs), both electric motor and internal combustion engine cooperate in traction.

As reported in Table 6, one of the main weakness of EV technology is its limited range due to battery capacity that creates the so-called "range anxiety" effect for drivers. Drivers' anxiety mainly depends on subjective factors that could increase their required range more than real needs [242]. From a technological point of view, different approaches were proposed in the literature to face this problem, from new battery technologies [243] to power management [244]. One of the main battery-saving technologies is the regenerative braking system (RBS) that converts the vehicle's kinetic energy into electric energy to slow down the vehicle [245]. Currently, this technology can be battery and/or supercapacitor based [246]. Another solution relies on station-based battery swapping. This system provides charged batteries in very low times but needs optimal management of energy shared between batteries and grid [247].

Another significant weakness is currently related to limited charging infrastructure and load management. A station-based charging infrastructure could be improved according to an optimal distribution of stations [248]. This solution can also lead to an increase in electric vehicle demand because reducing the range anxiety effect [249]. Grid load management could be critical when the number of vehicles will increase with consequent high energy demand [250]. Smart grid technologies have been used to face this problem [251]. One smart grid solution is the vehicle-to-grid (V2G) technology based on returning battery accumulated energy to be distributed in the grid in order to reduce the overall energy requirements from the main source. However, management approaches are required to optimize the distribution process of energy during the day to provide efficient energy service to the grid [252]. Finally, emerging charging technology is the inductive charging system on electrified roads, that allows battery charging while driving [253]. The first electrified road, called eRoadArlanda, opened in Sweden in 2018 to recharge electric vehicles transferring energy from a rail in the road [254].

#### 5.1.2. Natural Gas

Natural gases are produced from wells by the extraction process during crude oil production. As a transportation fuel, it is mainly available as Compressed Natural Gas (CNG) and Liquified Natural Gas (LNG). CNG is a natural gas stored on vehicles at high pressure to handle volumes compatible with the vehicle's available space. LNG is a liquid-state natural gas, cooled to very low temperatures. In the literature, research in this field goes towards finding new natural gas-based fuels and engines with lower emissions. For example, the hydrogen added to compressed natural gas (HCNG) is able to reduce overall emissions of this environmentally friendly fuel [255].

#### 5.1.3. Liquefied Petroleum Gas

Liquefied Petroleum Gas (LPG) or Propane is a by-product of natural gas production and refining of crude oil. It can be used as an alternative fuel for ICE vehicles. An issue for LPG vehicle is related to the safety within underground car parking in case of accidental LPG release for its flammable vapor [256]. Solutions to reduce and/or identify gas leakage were proposed in the literature introducing, for example, an automatic detection and regulator system [257] and ventilation systems in underground car parking [258].

#### 5.1.4. Hydrogen Fuel Cells

Hydrogen Fuel Cells (HFCs) generate the electricity required by an electric motor from the chemical reaction that involves hydrogen in a so-called "fuel cell", releasing water that flows out in the form of vapor. HFCs are currently one of the least used types of alternative fuels, but they are destined to catch up. Accordingly, research production in this field is significantly growing up and reaching a maturity [259]. A development of HFC Vehicle (HFCV) technology is represented by its battery hybridization called Plug-in Hydrogen Fuel Cell Hybrid Vehicles (PHFCVs), which are advantageous when compared to traditional hybrid vehicles because they use a single electric motor. A comparison of PHFCVs with BEVs was provided by Offer et al. [260] who highlighted that they are similar in life cycle costs and advantages can be obtained from efficient driving patterns. The research in this field is mainly directed in finding optimal energy management and power generation system. The latter can be obtained considering a combination of fuel cells with supercapacitors to be used in PHFCVs [261]. Energy management is then important to find an optimal balance between sources to improve the performance and durability of the storage system as proposed in [262–264].

In the literature, to the best of our knowledge, it is difficult to find an aggregated view of current alternative vehicle fleet and related refueling stations in the main countries. In this paper, we collected and elaborated data reported in Tables 7 and 8 to have a comprehensive view about Alternative Fuel Vehicles (AFVs) and Alternative Fuel Stations (AFSs), respectively, available until 2019 in three parts of the world, namely, Europe, USA, and Asia-Pacific region. It is interesting to observe that, worldwide, the most widely used AFVs are natural gas-powered (CNG/LNG), with the Asia-Pacific region being the leader in this sector with more than 20 million vehicles and 20,000 refueling stations [265]. Regarding LPG vehicles, Europe is a leader with more than 13 million vehicles, including converted vehicles, and 45,000 stations [266]. It is well-known that China leads the word regarding electric mobility, pushing the Asia-Pacific region as first in the world with more than 3 million EVs and 300,000 charging outlets [267,268]. Regarding fuel cell technology, at a country scale, most of the vehicles are in the USA (about 8,000) [269]. However, since China, Korea, and Japan are promoting the development of fuel cell vehicles, the Asia-Pacific region also results as first in the HFCV sector with more than 14,000 vehicles and 200 stations [269].

**Table 7.** Alternative Fuel Vehicle (AFV) fleet in Europe, USA, and Asia-Pacific in 2019 (elaborated data from the following sources: European Alternative Fuels Observatory [266]; U.S. Department of Energy [270]; International Energy Agency [267–269]; International Association for Natural Gas Vehicles [265]; World LPG Association [271]).

| AFV Type | Europe | USA | Asia-Pacific |
|---|---|---|---|
| BEV/PHEV | 1,808,870 | 1,450,000 | 3,649,000 |
| HFC | 2182 | 8039 | 14,894 |
| CNG/LNG | 2,062,621 | 175,000 | 20,473,673 |
| LPG | 13,026,304 | 200,000 | 3,400,000 |

**Table 8.** Number of Alternative Fuel Stations (AFSs) in Europe, USA, and Asia-Pacific available in 2019 (elaborated data from the following sources: European Alternative Fuels Observatory [266]; U.S. Department of Energy [270]; International Energy Agency [267–269]; International Association for Natural Gas Vehicles [265]; World LPG Association [271]).

| AFS Type | Europe | USA | Asia-Pacific |
|---|---|---|---|
| Electric (charging points) | 211,438 | 78,301 | 314,275 |
| Hydrogen | 133 | 61 | 212 |
| Natural Gas | 3940 | 1591 | 20,275 |
| LPG | 45,132 | 3178 | 8300 |

### 5.2. Shared Mobility Models

In this section, we report the main technological aspects of the most widespread/emerging vehicle sharing systems, namely, car and scooter sharing. We analyze the main characteristic as they were adopted in many cities highlighting the technological findings aimed to improve service performance and attractiveness.

#### 5.2.1. Car-Sharing

The traditional way of car-sharing is based on the principle that a car-sharing provider allocates at least one vehicle to a city or neighborhood to be shared between individuals. Parking spaces are usually reserved by the municipality and people registered to the service can use the car at any time according to its availability. Registered people pay only for car usage and not for purchase, maintenance, and depreciation. Generally, the term car-sharing is used to denote a mobility service with the following main characteristics:

- A verification process checks user identity and driving record once and, after that, the user can use the service's cars in future without interacting each time with the operator staff. Generally, keyless access is provided using the in-vehicle telematics.
- The service's car is usually driven by the end-user as in traditional car rental, differently from a taxi service.
- Service fees are based on minutes or hours rates, and sometimes also on travelled distance.
- Service's vehicles are usually distributed in a served area, differently from car rental in which vehicles are located in dedicated areas.

According to Meijkamp [272], car-sharing members usually use more often other sustainable modes such as cycling and public transport. This analysis was recently confirmed by Ramos et al. [273]; they observed that the majority of European car-sharing users have the weakest habits of private car use and prone to use sustainable transport modes.

From the operator point of view, a car-sharing is currently be delivered in several forms and a single operator can deliver more than one type of carsharing service model. Thus, it is important to understand both common and distinctive aspects of each type of car-sharing service.

According to the literature, researchers classified carsharing as different modes of service providing. Ferrero et al. [8], in their review, identified four car-sharing modes: (i) Two-way (station-based); (ii) one-way (station-based); (iii) free-floating; and (iv) not applicable. The latter refers to papers in which authors did not specify any mode. Santos [10] identified four shared mobility models in her analysis: (i) Peer-to-peer car rental; (ii) modern car club; (iii) Uber-like service; and (iv) new public transport on demand. In this paper, according to most of the literature, we used the common categorization in the following three modes: (i) Round-trip; (ii) one-way; (iii) peer-to-peer car-sharing.

Before analyzing the main characteristics of each mode, we first highlight the common issues related to a car-sharing service. A common aspect of all car-sharing modes is related to fuel type. Generally, operators can provide internal combustion engine (ICE) and/or electric vehicles in their fleet. Although the number of electric vehicles is increasing, most vehicles used by car-sharing operators in Europe are still ICE-based, mainly fueled by gasoline [274]. However, from this point of view, recent research is directed in evaluating and improving the performance of electric vehicles-based car-sharing, thus, in this paper, we mainly focus on this service type.

Service scheduling is a crucial task in electric car-sharing. This service needs an efficient framework for vehicles' management according to time matching, vehicle range, and customer satisfaction [275] in order to minimize costs for operators [276]. Other useful tools to evaluate service performance are simulation-based, like discrete event models that, for example, are suitable to carry out analysis of competitiveness between the electric vehicle and gasoline-fueled in a car-sharing system [277]. Simulation-based decision support systems are also very useful in carrying out an important task in service management, i.e., vehicle relocation [278]. We better describe this task below for the one-way car-sharing system. Finally, regarding the electric vehicle charging system, a strategic location planning of charging station can improve system performance finding an optimal balance between user and operator perspectives as proposed in [279].

#### 5.2.2. Round-Trip Carsharing

This car-sharing service, also called “two-way” car-sharing, is well established commercially. Users generally use a smartphone app or a dedicated website to reserve a car. Usually, the user must specify both the time of his/her reservation and its duration. Round-trip service is related to the fact that the customer must return the car to the same place where it was picked up (with few exceptions) and pay for the whole time between the beginning and end of their reservation. Thus, car-sharing vehicles are positioned in dedicated parking areas (stations).

Characteristic factors of a round-trip service include a close relationship between vehicles travelled in the peak hours and yearly subscription [280], a strong association between high usage frequency and some trip purposes, such as commuting and education [281]. Finally, an interesting characteristic of this service is trip chaining, which reflects different usage patterns and its analysis can be useful for better service management [282].

#### 5.2.3. One-Way Car-Sharing

The one-way mode, also called “point-to-point”, is based on the idea of pick up a vehicle from one point and return it to another. According to the term “point”, two main car-sharing services can be provided: Station-based, when a point is represented by a fixed and dedicated infrastructure; free-floating when a point can be any area available for vehicle parking. In a station-based service, fixed infrastructure can be represented by parking stations, such as charging outlets for electric vehicles and areas close to customer service kiosks. Meanwhile, a free-floating service allows one-way trips between any origin-destination pairs within a served area, as opposed to round-trip carsharing. However, in a free-floating system, a service provider requires an agreement with municipalities and/or parking managers to ensure the right of customers to park in any (or nearly any) legal on-street place. A comparison between one-way and round-trip modes, presented in [283], highlighted the non-competitiveness of these two modes since they are complementary.

Due to greater flexibility of a one-way mode, an important task in point-to-point service management is the vehicle relocation operation, since it generally affects the performance and effectiveness of the overall service. According to a usual one-way scheme, there could be an unbalance between user demand and vehicles’ availability at stations or parking places, especially for electric vehicles [284]. Generally, vehicles’ relocation is less challenging for a station-based car-sharing, while it is crucial for a free-floating one due to higher degrees of freedom. As already stated above, to evaluate the effectiveness of a one-way car-sharing service, simulation tools are needed to evaluate service effectiveness using, for example, discrete-event models [285,286] or object-oriented approaches [287].

In the literature, wide research on the relocation problem has been conducted. This task relies on optimization approaches in order to find the best strategy according to an objective function based on different factors. This problem has been modelled using different mathematical programming formulations, such as the integer linear programming (ILP) model as proposed in [288]. They modelled the problem including three criteria in the objective function, i.e., minimization of rejected requests, operator’s staff, and relocation operations. Di Febbraro et al. [289] proposed a relocation strategy based on the maximization of the operator’s profit with consequent reduction of rejected requests. The maximization of demand satisfaction with and without vehicle relocation was analyzed in [290] to highlight the importance of relocation operations in meeting customer demand in a one-way car-sharing service.

Focusing better on the station-based mode, as already stated above, the scientific literature is mainly directed on the relocation problem of electric vehicles. Boyacı et al. [291] proposed an optimization framework considering both electric vehicles and personnel distribution among stations. Gambella et al. [292] presented a relocation optimization model for electric car-sharing considering consumption and recharge processes at stations. Lemme et al. [293] introduced an optimization model to assess the impact of electric vehicles’ adoption on fleet composition, including hybrid and internal combustion engine (ICE) vehicles, in a station-based car-sharing. Generally, the need for a comprehensive framework for service planning is required to manage the whole station-based system. Decision support systems can be based on multi-criteria approaches, such as the analytic hierarchy process (AHP) [294] and, recently, the fuzzy Delphi method [295].

According to free-floating characteristics, the research focuses not only on vehicles' relocation, but also on other specific aspects. First, understanding the spatial and temporal distribution usage is very important to better allocate service resources. Some factors involved in spatiotemporal car-sharing demand forecast were identified in [296], such as city structure, weather conditions, and socio-demographic characteristics. Ampudia-Renuncio et al. [297,298] analyzed the spatial and temporal distribution of a free-floating car-sharing considering distance and frequency of trips. The spatial distribution of free-floating service bookings was analyzed in [299] identifying other factors in service usage, such as user propensity to new sustainable means of transport, area centrality, and availability of parking places. Planning of relocation strategies is even more important for the free-floating mode. A mesoscopic approach for electric vehicles' relocation was proposed in [300] by integrating macroscopic optimization with a microscopic rule-based model. Molnar and Correia [301] proposed a joint relocation strategy considering both booked vehicles and relocation movements. Folkestad et al. [302] introduced an optimal relocation model for shared electric vehicles based on genetic search. According to the future of free-floating service, Dandl and Bogenberger [303] made a comparison with a futuristic view of taxi service based on autonomous vehicles highlighting the higher profit can be obtained with a significant reduction of fares.

Finally, another problem in a one-way service is related to parking availability. Kaspi et al. [304,305] proposed the adoption of parking reservation policies ensure a free place at the end of the journey and improve system performance.

#### 5.2.4. Peer-to-Peer Car-Sharing

The main characteristic that distinguishes a peer-to-peer car-sharing service from the previous modes is that people choose to make available their vehicle for sharing with others and receiving payments when it is rented. Generally, shared vehicles are equipped with devices to make it available for a reservation using smartphone apps and smartcards. On the contrary, when the shared vehicle is not technologically equipped, the owner also shares keys to renters for vehicle usage. In this car-sharing model, the service operator role is to manage an online marketplace to connect vehicle-owners with vehicle-renters but not the fleet. Moreover, the operator provides to vehicle-owners insurance products and collects a percentage from each rental transaction.

The peer-to-peer model has been studied to evaluate its dynamics and impact on travel behavior. A simulation model was proposed in [306] to analyze and improve the peer-to-peer service. Shaheen et al. [307] studied peer-to-peer dynamics in the USA also considering the usage of automated vehicles. Travel behavior was analyzed in [308], where it resulted that vehicle owners tend to decrease travel distance and to move further using other modes. Finally, the use of emerging technology, namely the blockchain, is also attracting interest in future applications for peer-to-peer car-sharing since it can eliminate many bureaucratic steps in economic transactions [309].

#### 5.2.5. Shared Micro-Mobility

In the latest years, the growth of micro-mobility services, mostly based on shared electric scooters (e-scooter), is changing urban mobility patterns and introducing new challenges. Generally, users can access e-scooters through a smartphone app where a map is showed and enables unlocking them. Service operators offer e-scooter usage with lower fees than car-sharing, and the system is typically dock-less, like the free-floating concept.

Recently, the interest of researcher in analyzing this new sustainable solution is increasing. Pham et al. [310] analyzed how Industry 4.0 can influence the production behind the shared economy of electric scooters. Meanwhile, the analysis of users' intentions in adopting this new service was carried out in [311], where it figured out that students are not so prone to e-scooters usage and a certain awareness-knowledge of this systems is needed to influence users' behavior. However, an increase of e-scooter traffic could create new challenges regarding both pedestrians' and drivers' safety. Mainly pedestrians showed an initial pushback to e-scooters due to bad riders' behavior that could decrease their safety perception. James et al. [312] analyzed initial situations of illegal parking and walkways blocking and found that 16% of scooters were illegally parked and 6% blocking walkways. An overview of challenges caused by micro-mobility is given in [313]. To improve safety, a dedicated policy should be adopted to regulate riders' behavior. Some recommendations and concepts were identified in [314]. Currently, there is a lack in the literature related to specific models for micro-mobility simulation and management. This is due to the similarity to bike-sharing where huge research already exists.

### *5.3. Intelligent Transportation Systems*

The application of Information and Communication Technology (ICT) to transportation engineering is a still-emerging field, namely, the Intelligent Transportation System (ITS). The definition of ITS was provided by the European Union in the directive 2010/40/EU [315]: "*ITS are advanced applications which without embodying intelligence as such aim to provide innovative services relating to different modes of transport and traffic management and enable various users to be better informed and make safer, more coordinated and 'smarter' use of transport networks*". Thus, ITS does not rely only on road transport, but it includes all technologies and their (integrated) application to all transport modes (road, rail, air, water) to improve the whole transportation system and make it sustainable. The purpose is then to find an optimal balance between three fundamental aspects: Efficiency, eco-friendship, and safety [316]. The necessity of an intelligent transport system was born with a significant increase in traffic flows, which led to high congestion and low safety levels. In past years, most of the countries in the world are providing regulation for the adoption of ITS in their transport infrastructure network. However, there is still high uncertainty in its adoption to a large scale because it raises new concerns regarding individuals' privacy and data protection. For example, a consultation carried out in Europe in 2017 [317] found that, regarding the reasons of not utilizing ITS, 19% of the respondents have concerns on privacy and re-use of information, and 33% have other reasons in not adopting ITS, including, among others, high costs, lack of transparency, and equipped road infrastructure. In the following, we focus on the innovative solutions provided in the literature to develop ITS with some insights on the Cooperative ITS.

#### 5.3.1. Main Technologies and Applications

An ITS makes use of different ICT solutions to develop an integrated system directed to improve interoperability among its components. The main technologies at the base of an Intelligent Transportation System are: Global Positioning System (GPS); Dedicated Short-Range Communications (DSRC); wireless networks; mobile telephony; probe vehicles or devices; radio wave or infrared beacons; roadside cameras; Variable Message Signs (VMS); and traffic signals. The joint use of these technologies has led to the implementation of the following main ITS applications.

##### Advanced Traveller Information System (ATIS)

An ATIS aims to provide effective, timely, and accurate information to ensure more efficient traveler decisions and system objectives. Generally, two types of information can be provided by an ATIS: Pre-trip, when travelers acquire information before starting the trip; and en-route, when the information is perceived along a route during the travel. The first information type deals with static choices (transport mode, departure time, path, etc.); the second one can change travelers' choices during the trip obtaining an adaptive behavior according to the provided information. Joint use of these two information types can realize a traffic management system affecting travelers' perceptions and behavior. According to the uncertain nature of both travelers' perception and information, different models were proposed in the literature to handle uncertainty. The first group of methods uses the probability theory to model uncertainty; a review of these methods was provided in [318]. On the contrary, the second group includes models representing uncertainty embedded in travelers' behavior using the concepts of Fuzzy Logic [319–321]. The impact of information provided through VMSs has been widely studied in the literature. Zhong et al. [322] studied drivers' compliance with information on road condition shown on a VMS. Yan and Wu [323] analyzed the relationship between VMS position and information with drivers' behavior, using a driving simulation experiment. Chang et al. [324] investigated drivers' response to dynamic travel information provided through VMSs. The dynamic effect of information on drivers' compliance with different types of VMS information was modelled through Possibility Theory in [325]. Tu et al. [326] studied the impact of the information on environmental cost incorporated into ATIS to model drivers' attitude in choosing more environmentally friendly routes.

Advanced Traffic Management System (ATMS)

An ATMS presents a top-down traffic management perspective. Real-time data on traffic, usually coming from roadside detectors, are collected and managed in a Transportation Management Center (TMC). ATMS uses two main groups of devices, namely, in-roadway and over-roadway detectors. In-roadway devices are generally intrusive, such as inductive loop detectors, magnetic sensors, pneumatic tubes, and piezoelectric sensors. On the contrary, over-roadway detectors are non-intrusive (i.e., installed off the pavement), such as video cameras, microwave radar sensor, and infrared sensors. One of the emerging technologies for ATMS is represented by probe vehicles, i.e., equipped and connected vehicles that, travelling along roads, send useful data (GPS position, speed, travel times, etc.) to a TMC in order to estimate traffic conditions. Data acquired by probe vehicles are called Floating Car Data (FCD), which opened new challenges like big data processing. FCD can also come from smartphones useful for different analyses, such as traffic estimation [327] and vehicle positioning at intersections [328].

In the literature, several applications of this technology in conjunction with roadside detectors were proposed. Probe vehicles resulted useful in estimating traffic flow characteristics and, thus, identifying congestion. Some researchers used FCD to evaluate traffic flow at intersections [329–331] and turbo-roundabouts [332]. Traffic speed can also be estimated by using FCD [333,334]. Rahmani et al. [335] proposed a fixed-point-based methodology using FCD to estimate travel times. Traffic dynamics can be reconstructed through spatiotemporal diagrams obtained from FCD as proposed in [336]. Klunder et al. [337] evaluated the improvements that can be obtained by using in-vehicle information elaborated according to traffic estimation from FCD.

Another important application of ITS using FCD is related to traffic signal settings. Astarita et al. [338–340] deeply studied different adaptive signal settings approaches for real-time applications through the joint use of detectors and data coming from vehicles. A review of methods and technologies for signal settings optimization is presented in [341].

On the base of ITS adoption, one of the most important aspects behind ITS is safety. Data coming from probe vehicle resulted fundamental in understanding and improving traffic safety. Researchers analyzed road safety speed [342,343], safety at roundabouts [344]; others proposed techniques for incident detection [345,346].

Finally, FCD resulted also useful in estimating the origin-destination matrix [347–349] and understanding travel choice behavior [350].

Advanced Public Transportation System (APTS)

The application of ITS to public transportation deals with a class of technologies and solution dedicated to improving the efficiency of transit services. Most of these technologies are already well-established and mature. In the literature, researchers mainly focused their attention on providing solutions related to travel time estimation using GPS, telematics, and different algorithms, in order to give accurate information to users [351–355]. Canca et al. [356] proposed a recommendation system to provide real-time itineraries according to users' requests.

For evaluating the overall system, simulation-based optimization methods were proposed using mesoscopic models [357], and to evaluate a bus priority system through traffic signal synchronization [358].

5.3.2. Cooperative Intelligent Transportation Systems

As an advancement of ITS, the Cooperative Intelligent Transportation Systems (C-ITS) includes novel technologies regarding in-vehicle data transmission and automation for road traffic management. The European Union in [359] gives the following definition: "*Cooperative Intelligent Transport Systems (C-ITS) use technologies that allow road vehicles to communicate with other vehicles, with traffic signals and roadside infrastructure as well as with other road users. The systems are also known as vehicle-to-vehicle communications, or vehicle-to-infrastructure communications*". As reported in the EU definition, two new ITS applications are involved in its cooperative form, namely Vehicle-to-Vehicle (V2V) and Vehicle-to-Infrastructure (V2I) systems. Both systems also include an emerging technology to which the automotive industry is pushing on its development and commerce, i.e., connected and automated vehicles (CAVs). This technology requires advanced in-vehicle equipment to permit a continuous data exchange among vehicles and infrastructure and to reach a certain level of vehicle automation. Currently, SAE International in [360] defines six levels of automation, ranging from level 0 (no driving automation) to level 5 (fully driving automation). However, the European Union is still excluding fully automated vehicles in the development of C-ITS [359]. An overview of the C-ITS with particular attention to the European framework set up to support the development of these technologies, which are configured to enable connected, automated, and sustainable mobility, is provided in [361].

In the literature, there is a wide production in this field addressed to analyze C-ITS platforms and find technological solutions for its development. Javed et al. analyzed various data types generated by C-ITS applications and wireless technologies' potential to improve system reliability [362]. Implications of C-ITS development on safety and security was investigated in [363,364]. The impact of C-ITS adoption at a city scale was analyzed in [365], where potential benefits in terms of energy efficiency and environmental effects were quantified. Meng et al. [366] reported some technological aspects required for the implementation of C-ITS. The characteristics of the cooperation mechanism between vehicles in a CAV environment were analyzed in [367]. However, the use of CAVs requires a centralized traffic management system to optimally distribute vehicles on the traffic network in order to attenuate congestion as proposed in [368].

Focusing on in-vehicle solutions, also called Advanced Driver-Assistance System (ADAS), as part of C-ITS implementation, some researchers developed lane-changing advisory systems to help drivers in crucial maneuvers and reduce road fatalities [369,370]. Vehicle collision warning and avoidance methods for both road users' and pedestrians' safety at intersections were discussed in [371]. A review of ADAS solutions, with a focus on personalized systems, was recently reported in [372]. Regarding the technologies introduced for developing the V2V and V2I, Arena and Pau in their review [373] examined the main solutions, systems, and communication protocols for the future development of C-ITS. Finally, simulation tools for evaluating and testing C-ITS were presented by Aramrattana et al. [374,375].

## 6. Discussion

The analysis of the literature, although inevitably partial, has highlighted some fundamental aspects of sustainable mobility.

The first point is that pursuing sustainable mobility is an affirmed objective of all governments, mainly of developed countries but also of many developing countries. The external impacts of mobility are relevant from a social and environmental point of view and, as also demonstrated by the data reported in Table 4, we are still far from achieving a substantial reduction of greenhouse gases emitted by the transport sector. The European Union, among others, has focused most of its policy on sustainable mobility, identifying rail transport as one of the most promising modes in which to invest.

A second interesting point concerns the interdisciplinary nature of the problem. Indeed, the analysis of the literature has shown, even simply from an examination of the publication sites of the cited papers, how the achievement of sustainable mobility objectives requires different skills, from transport planner to environmental science expert, from mechanical engineer to civil engineer, to industrial engineer, from the economist to the social science expert, to the communication science expert and so on.

A third point concerns the strong contribution that technology can give to sustainable mobility. Just as some 20 years ago it became clear that a vehicle should be safe, and this has led manufacturers to equip their vehicles with increasingly advanced safety devices, in recent years, the idea that a vehicle should be low-emission and fuel-efficient is beginning to assert itself. As a result, over the next few years, we expect more and more low-emission or no-emission vehicles (mainly hybrid and electric vehicles) to spread, which, coupled with energy production from renewable sources, can make a significant contribution to some aspects of sustainable mobility. A significant contribution was given by the adoption of Intelligent Transportation Systems that have reached maturity, but always evolving towards a smarter usage of the available transport services and resources. Other research perspectives concern intelligent driving systems and autonomous (preferably shared and electric) vehicles that will start to replace current cars in the future. Some limitations of this study, already partially mentioned in the introduction, concern the impossibility to analyze all possible aspects and all possible work on sustainable mobility. Furthermore, reference has been made, in some topics, only to aspects of passenger transport, neglecting aspects related to goods, which would require a dedicated study. Additionally, for some topics, more emphasis was placed on road and rail transport, neglecting air and sea transport, which also have important environmental impacts. In future research, we will tend to fill these gaps with appropriate reviews.

Research in the field of sustainable mobility still has a long way to go and the future of mobility cannot ignore its sustainability. Many policies promoting sustainable mobility are widely established and implemented at the national and local level, seeking to influence user behavior so that they use less polluting and generally more sustainable modes of transport. The contribution of technology, as already mentioned, is in our view the one that will have the greatest impact on the achievement of sustainability objectives at the global level. We believe, therefore, that future directions of research will be mainly directed towards the development of new technologies. In particular, the aim should be to improve the range and efficiency of electric vehicles, which should be the only ones to circulate in urban areas, to implement and optimize the operation of autonomous vehicles, possibly shared (as well as electric traction), both to reduce consumption and occupation of public spaces, and to make mobility more equitable, allowing everyone to move (the elderly, the disabled, people on low incomes, etc.). Technology can provide other important contributions both for the diffusion of shared mobility and micro-mobility, including conventional mobility, and for reducing greenhouse gas emissions, by studying and producing more eco-friendly fuels, such as low-carbon fuels, useful in maritime and air transport. In the field of ITS, more contributions aimed to improve the effectiveness of real-time traffic information systems through personal devices (e.g., smartphones) could help to influence travelers' behavior for achieving more sustainable mobility patterns. Moreover, we think that the development of C-ITS should not be addressed to increase the number of private cars, even if low or zero-emission vehicles since it will not help in reducing traffic congestion. In this direction, CAVs are now a reality, even if under development and not accessible to everyone, but their production should be mainly addressed to develop an efficient and integrated public transport service.

## 7. Conclusions

Sustainable mobility is one of the central themes of transport policy at all territorial levels and at all latitudes. From transnational to national and local institutions, almost all political decision-makers, at least in industrialized and most developing countries, include the promotion of sustainable mobility in their programs, giving it greater or lesser emphasis depending on their sensitivity to environmental aspects.

Research in the transport sector, but also in other sectors, from medicine to environmental sciences and chemistry, from economics to industrial and information engineering, has followed this trend closely, addressing the problem from different points of view, analyzing data and proposing different solutions.

The analysis reported in this work, without claiming to be exhaustive, tends to provide an overall view of the problems and possible solutions related to sustainable mobility, referring to the numerous works mentioned for further details. In this way, the reader can appreciate the general aspects of each topic, deepening only those of interest. Furthermore, some research prospects are identified, including the technological aspects related to vehicles and fuels, as well as the more comprehensive aspects of system management, which in the authors' opinion seem to be the most promising and those on which industrial research funding will focus in the future.

As the subject is constantly evolving, this type of work needs continuous updating, also because of technological development and the tendency to consider mobility more and more as a service to be integrated into the concept of Smart City; it is believed, in particular, that the development of shared mobility, with electric and autonomous vehicles, is the future, at least in urban areas, and that this system can strongly contribute to the sustainability of the transport system. In the suburban area, on the other hand, the rail transport system is the most suitable for the pursuit of sustainable mobility objectives, but it needs to be strongly integrated with other systems (air and sea) and with urban mobility, again in the perspective of Mobility as a Service (MaaS).

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## References

1. World Commission on Environment and Development. *Our Common Future*; Oxford University Press: Oxford, UK, 1987.
2. European Commission. *A Community Strategy for 'Sustainable Mobility', Green Paper on the Impact of Transport. on the Environment*; COM (1992) 46 Final; Commission of the European Communities: Brussels, Belgium, 1992.
3. *Review of the EU Sustainable Development Strategy (EU SDS)—Renewed Strategy*; 10917/06; Council of European Union: Brussels, Belgium, 2006.
4. Klecha, L.; Gianni, F. Designing for Sustainable Urban Mobility Behaviour: A Systematic Review of the Literature. In *Citizen, Territory and Technologies: Smart Learning Contexts and Practices, Smart Innovation*; Mealha, Ó., Divitini, M., Rehm, M., Eds.; Systems and Technologies 80; Springer: Cham, Switzerland, 2018; pp. 137–149.
5. Gonzales Aregall, M.; Bergqvist, R.; Monios, J. A global review of the hinterland dimension of green port strategies. *Transp. Res. D* **2018**, *59*, 23–34. [CrossRef]
6. Ranieri, L.; Digiesi, S.; Silvestri, B.; Roccotelli, M. A Review of Last Mile Logistics Innovations in an Externalities Cost Reduction Vision. *Sustainability* **2018**, *10*, 782. [CrossRef]
7. Taiebat, M.; Brown, A.L.; Safford, H.R.; Qu, S.; Xu, M. A Review on Energy, Environmental, and Sustainability Implications of Connected and Automated Vehicles. *Environ. Sci. Technol.* **2018**, *52*, 11449–11465. [CrossRef]
8. Ferrero, F.; Perboli, G.; Rosano, M.; Vesco, A. Car-sharing services: An annotated review. *Sustain. Cities Soc.* **2018**, *37*, 501–518. [CrossRef]
9. Biresselioglu, M.E.; Kaplan, M.D.; Yilmaz, B.K. Electric mobility in Europe: A comprehensive review of motivators and barriers in decision making processes. *Transp. Res. A* **2018**, *109*, 1–13. [CrossRef]
10. Santos, G. Sustainability and Shared Mobility Models. *Sustainability* **2018**, *10*, 3194. [CrossRef]
11. Kumar, R.R.; Alok, K. Adoption of electric vehicle: A literature review and prospects for sustainability. *J. Clean. Prod.* **2020**, *253*, 119911. [CrossRef]

12. Martinez-Dìaz, M.; Soriguera, F.; Pérez, I. Autonomous driving: A bird's eye view. *IET Intell. Transp. Syst.* **2019**, *13*, 563–579. [CrossRef]
13. Lopez, C.; Ruìz-Benìtez, R.; Vargas-Machuca, C. On the Environmental and Social Sustainability of Technological Innovations in Urban Bus Transport: The EU Case. *Sustainability* **2019**, *11*, 1413. [CrossRef]
14. Letnik, T.; Marksel, M.; Luppino, G.; Bardi, A.; Bozicnik, S. Review of policies and measures for sustainable and energy efficient urban transport. *Energy* **2018**, *163*, 245–257. [CrossRef]
15. Tirachini, A. Ride-hailing, travel behaviour and sustainable mobility: An international review. *Transportation* **2019**. [CrossRef]
16. Holden, E.; Gilpin, G.; Banister, D. Sustainable Mobility at Thirty. *Sustainability* **2019**, *11*, 1965. [CrossRef]
17. Ren, R.; Hu, W.; Dong, J.; Sun, B.; Chen, Y.; Chen, Z. A Systematic Literature Review of Green and Sustainable Logistics: Bibliometric Analysis, Research Trend and Knowledge Taxonomy. *Int. J. Environ. Res. Public Health* **2020**, *17*, 261. [CrossRef]
18. Pojani, D.; Stead, D. Policy design for sustainable urban transport in the global south. *Policy Des. Pract.* **2018**, *1*, 90–102. [CrossRef]
19. *Roadmap to a Single European Transport Area—Towards a Competitive and Resource Efficient Transport System*; COM(2011) 144; European Commission: Brussels, Belgium, 2011.
20. *Towards a Sustainable Europe by 2030*; Reflection Paper; COM(2019) 22; European Commission: Brussels, Belgium, 2019.
21. A European Strategy for Low-Emission Mobility. In *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions*; COM(2016) 501; European Commission: Brussels, Belgium, 2016.
22. *Action Plan on Urban Mobility*; COM(2009) 490; European Commission: Brussels, Belgium, 2009.
23. *Guidelines for Developing and Implementing a Sustainable Urban Mobility Plan*, 2nd ed.; Consult, R. (Ed.) European Platform on Sustainable Urban Mobility Plans: Cologne, Germany, 2019.
24. Eltis. Available online: https://www.eltis.org/mobility-plans/city-database (accessed on 20 May 2020).
25. Zhou, J. Sustainable transportation in the US: A review of proposals, policies, and programs since 2000. *Front. Archit. Res.* **2012**, *1*, 150–165. [CrossRef]
26. Institute for Transportation & Development Policy. Available online: https://www.itdp.org/where-we-work/north-america/united-states/ (accessed on 2 June 2020).
27. Environmental European Agency. Available online: https://www.eea.europa.eu/ (accessed on 2 June 2020).
28. Environmental Protection Agency. Available online: https://www.epa.gov/ (accessed on 2 June 2020).
29. U.S. Department of Transportation. Available online: https://www.transportation.gov/ (accessed on 2 June 2020).
30. World Health Organization. Available online: https://www.who.int/ (accessed on 2 June 2020).
31. Environmental European Agency. *Air Quality in Europe—2019 Report*; EEA Report No. 10/2019; Publications Office of the European Union: Luxembourg, 2019.
32. Environmental European Agency. *Annual European Union Approximated Greenhouse Gas Inventory for the Year 2018*; EEA Report No. 16/2019; Publications Office of the European Union: Luxembourg, 2019.
33. Climatewatch. Available online: www.climatewatchdata.org (accessed on 18 May 2020).
34. Environmental Protection Agency. Air Emissions. Available online: https://www.epa.gov/air-emissions-inventories/air-pollutant-emissions-trends-data (accessed on 18 May 2020).
35. Energy Information Administration. Available online: https://www.eia.gov/consumption/ (accessed on 2 June 2020).
36. Bureau of Transportation Statistics. Available online: https://maps.bts.dot.gov/MapGallery/map.html?webmap=27e3d934d04b4a699c07afd08fc7f3f9 (accessed on 2 June 2020).
37. World Health Organization. *Ambient Air Pollution: A Global Assessment of Exposure and Burden of Disease*; WHO Document Production Services; World Health Organization: Geneva, Switzerland, 2019.
38. World Health Organization. *Global Status Report on Road Safety 2018*; WHO Document Production Services; World Health Organization: Geneva, Switzerland, 2018.
39. Eurostat. Available online: https://ec.europa.eu/eurostat/data/database (accessed on 20 May 2020).
40. Crippa, M.; Oreggioni, G.; Guizzardi, D.; Muntean, M.; Schaaf, E.; Lo Vullo, E.; Solazzo, E.; Monforti-Ferrario, F.; Olivier, J.G.J.; Vignati, E. *Fossil $CO_2$ and GHG Emissions of All World Countries—2019 Report*; EUR 29849 EN; Publications Office of the European Union: Luxembourg, 2019.

41. Frankhauser, S.; Tol, R.S.J.; Pearce, D.W. The Aggregation of Climate Change Damages: A Welfare Theoretic Approach. *Environ. Resour. Econ.* **1997**, *10*, 249–266. [CrossRef]
42. Dellink, R.; Lanzi, E.; Chateau, J.; Bosello, F.; Parrado, R.; de Bruin, K. *Consequences of Climate Change Damages for Economic Growth: A Dynamic Quantitative Assessment*; OECD Economics Department Working Papers; OECD: Paris, France, 2014.
43. Kugler, N.R.; Sariego, P.M. "Climate change damages", conceptualization of a legal notion with regard to reparation under international law. *Clim. Risk Manag.* **2016**, *13*, 103–111. [CrossRef]
44. Hsiang, S.; Kopp, R.; Jina, A.; Rising, J.; Delgado, M.; Mohan, S.; Rasmussen, D.J.; Muir-Wood, R.; Wilson, P.; Oppenheimer, M.; et al. Estimating economic damage from climate change in the United States. *Science* **2017**, *356*, 1362–1369. [CrossRef]
45. Auffhammer, M. Quantifying Economic Damages from Climate Change. *J. Econ. Perspect.* **2018**, *32*, 33–52. [CrossRef]
46. Toussaint, P.; Blanco, A.M. A human rights-based approach to loss and damage under the climate change regime. *Clim. Policy* **2019**. [CrossRef]
47. Yuan, X.-C.; Sun, X. Climate change impacts on socioeconomic damages from weather-related events in China. *Nat. Hazards* **2019**, *99*, 1197–1213. [CrossRef]
48. Frame, D.J.; Rosier, S.M.; Noy, I.; Harrington, L.J.; Carey-Smith, T.; Sparrow, S.N.; Stone, D.A.; Dean, S.M. Climate change attribution and the economic costs of extreme weather events: A study on damages from extreme rainfall and drought. *Clim. Chang.* **2020**. [CrossRef]
49. Neumann, J.E.; Willwerth, J.; Martinich, J.; McFarland, J.; Sarofim, M.C.; Yohe, G. Climate Damage Functions for Estimating the Economic Impacts of Climate Change in the United States. *Rev. Environ. Econ. Policy* **2020**, *14*, 25–43. [CrossRef]
50. Cervero, R.; Radisch, C. Travel choices in pedestrian versus automobile oriented neighborhoods. *Transp. Policy* **1996**, *3*, 127–141. [CrossRef]
51. Arroyo, R.; Mars, L.; Ruiz, T. Perceptions of Pedestrian and Cyclist Environments, Travel Behaviors, and Social Networks. *Sustainability* **2018**, *10*, 3241. [CrossRef]
52. Fistola, R.; Gallo, M.; La Rocca, R.A.; Raimondo, M. Soft mobility in the "oblique city". In *Town and Infrastructure Planning for Safety and Urban Quality*; Pezzagno, M., Tira, M., Eds.; Taylor & Francis Group: London, UK, 2018; pp. 319–326.
53. *15° Rapporto Sulla Mobilità Degli Italiani*; ISFORT: Rome, Italy, 2018.
54. Morris, J.N.; Hardman, A.E. Walking to health. *Sports Med.* **1997**, *23*, 306–332. [CrossRef]
55. Oja, P.; Vuori, I.; Paronen, O. Daily walking and cycling to work: Their utility as health enhancing physical activity. *Patient Educ. Couns.* **1998**, *33*, S87–S94. [CrossRef]
56. Andrews, G.J.; Hall, E.; Evans, B.; Colls, R. Moving beyond walkability: On the potential of health geography. *Soc. Sci. Med.* **2012**, *75*, 1925–1932. [CrossRef]
57. Chiquetto, S. The environmental impacts from the implementation of a pedestrianization scheme. *Transp. Res. D* **1997**, *2*, 133–146. [CrossRef]
58. Jou, K.K. Pedestrian areas and sustainable development. *World Acad. Sci. Eng. Technol.* **2011**, *77*, 483–490.
59. Kelly, C.E.; Tight, M.R.; Hodgson, F.C.; Page, M.W. A comparison of three methods for assessing the walkability of the pedestrian environment. *J. Transp. Geogr.* **2011**, *19*, 1500–1508. [CrossRef]
60. Lindelow, D.; Svensson, A.; Sternudd, C.; Johansson, M. What limits the pedestrian? Exploring perceptions of walking in the built environment and in the context of every-day life. *J. Transp. Health* **2014**, *1*, 223–231. [CrossRef]
61. Binetti, M.; Caggiani, L.; Camporeale, R.; Ottomanelli, M. A Sustainable Crowdsourced Delivery System to Foster Free-Floating Bike-Sharing. *Sustainability* **2019**, *11*, 2772. [CrossRef]
62. Yang, Y.; Wu, X.; Zhou, P.; Gou, Z.; Lu, Y. Towards a cycling-friendly city: An updated review of the associations between built environment and cycling behaviors (2007–2017). *J. Transp. Health* **2019**, *14*, 100613. [CrossRef]
63. Appolloni, L.; Corazza, M.V.; D'Alessandro, D. The Pleasure of Walking: An Innovative Methodology to Assess Appropriate Walkable Performance in Urban Areas to Support Transport Planning. *Sustainability* **2019**, *11*, 3467. [CrossRef]
64. Eren, E.; Uz, V.E. A review on bike-sharing: The factors affecting bike-sharing demand. *Sustain. Cities Soc.* **2020**, *54*, 101882. [CrossRef]

65. Fistola, R.; Gallo, M.; La Rocca, R.A.; Russo, F. The Effectiveness of Urban Cycle Lanes: From Dyscrasias to Potential Solutions. *Sustainability* **2020**, *12*, 2321. [CrossRef]
66. McLeod, S.; Babb, C.; Barlow, S. How to 'do' a bike plan: Collating best practices to synthesise a Maturity Model of planning for cycling. *Transp. Res. Interdiscip. Perspect.* **2020**, *5*, 100130. [CrossRef]
67. Allison, C.K.; Stanton, N.A. Eco-driving: The role of feedback in reducing emissions from everyday driving behaviours. *Theor. Issues Ergon. Sci.* **2019**, *20*, 85–104. [CrossRef]
68. Kato, H.; Kobayashi, S. Factor Contributing to Improved Fuel Economy in Eco-drive. *J. Soc. Automot. Eng. Jpn.* **2008**, *62*, 79–84.
69. Taniguchi, M. A Study on Eco-Driving and Driver's Behaviors (in Japanese). *J. Jpn. Soc. Traffic Eng.* **2006**, *41*, 54–62.
70. Ando, R.; Nishihori, Y. How does driving behavior change when following an eco-driving car? *Procedia Soc. Behav. Sci.* **2011**, *20*, 577–587. [CrossRef]
71. Wang, Y.; Boggio-Marzet, A. Evaluation of Eco-Driving Training for Fuel Efficiency and Emissions Reduction According to Road Type. *Sustainability* **2018**, *10*, 3891. [CrossRef]
72. De Vlieger, I. On-board emission and fuel consumption measurement campaign on petrol-driven passenger cars. *Atmos. Environ.* **1997**, *31*, 3753–3761. [CrossRef]
73. Van Mierlo, J.; Maggetto, G.; Van De Burgwal, E.; Gense, R. Driving style and trafc measures—Infuence on vehicle emissions and fuel consumption. *Proc. Inst. Mech. Eng. D J. Automob. Eng.* **2004**, *218*, 43–50. [CrossRef]
74. Coloma, J.F.; Garcia, M.; Wang, Y.; Monzon, A. Green Eco-Driving Effects in Non-Congested Cities. *Sustainability* **2018**, *10*, 28. [CrossRef]
75. Bifulco, G.N.; Galante, F.; Pariota, L.; Russo Spena, M. A Linear Model for the Estimation of Fuel Consumption and the Impact Evaluation of Advanced Driving Assistance Systems. *Sustainability* **2015**, *7*, 14326–14343. [CrossRef]
76. Chen, C.; Zhao, X.; Yao, Y.; Zhang, Y.; Rong, J.; Lui, X. Driver's Eco-Driving Behavior Evaluation Modeling Based on Driving Events. *J. Adv. Transp.* **2018**, *2018*, 9530470. [CrossRef]
77. Muslim, N.H.; Keyvanfar, A.; Shafaghat, A.; Abdullahi, M.M.; Khorami, M. Green Driver: Travel Behaviors Revisited on Fuel Saving and Less Emission. *Sustainability* **2018**, *10*, 325. [CrossRef]
78. Albrecht, T.; Oettich, S. A new integrated approach to dynamic schedule synchronization and energy-saving train control. *WIT Trans. Built Environ.* **2002**, *61*, 847–856.
79. Liu, R.; Golovitcher, I.M. Energy-efficient operation of rail vehicles. *Transp. Res. A* **2003**, *37*, 917–932. [CrossRef]
80. Sicre, C.; Cucala, P.; Fernández, A.; Jiménez, J.A.; Ribera, I.; Serrano, A. A method to optimise train energy consumption combining manual energy efficient driving and scheduling. *WIT Trans. Built Environ.* **2010**, *114*, 549–560.
81. Sicre, C.; Cucala, A.P.; Fernández, A.; Lukaszewicz, P. Modeling and optimizing energy-efficient manual driving on high-speed lines. *IEEJ Trans. Electr. Electron. Eng.* **2012**, *7*, 633–640. [CrossRef]
82. De Martinis, V.; Weidmann, U.; Gallo, M. Towards a simulation based framework for evaluating energy-efficient solutions in train operation. *WIT Trans. Built Environ.* **2014**, *135*, 721–732.
83. Gallo, M.; Simonelli, F.; De Luca, G.; De Martinis, V. Estimating the effects of energy-efficient driving profiles on railway consumption. In Proceedings of the IEEE EEEIC 2015—15th International Conference on Environment and Electrical Engineering, Rome, Italy, 10–13 June 2015; pp. 813–818.
84. Canca, D.; Zarzo, A. Design of energy-efficient timetables in two-way railway rapid transit lines. *Transp. Res. B Methodol.* **2017**, *102*, 142–161. [CrossRef]
85. Feng, J.; Li, X.; Liu, H.; Gao, X.; Mao, B. Optimizing the energy-efficient metro train timetable and control strategy in off-peak hour with uncertain passenger demands. *Energies* **2017**, *10*, 436. [CrossRef]
86. D'Acierno, L.; Botte, M. A passenger-oriented optimization model for implementing energy-saving strategies in railway contexts. *Energies* **2018**, *11*, 2946. [CrossRef]
87. Botte, M.; D'Acierno, L. Dispatching and rescheduling tasks and their interactions with travel demand and the energy domain: Models and algorithms. *Urban Rail Transit* **2018**, *4*, 163–197. [CrossRef]
88. Botte, M.; D'Acierno, L.; Pagano, M. Impact of railway energy efficiency on the primary distribution power grid. *IEEE Trans. Veh. Technol.* **2020**, in press. [CrossRef]

89. D'Acierno, L.; Botte, M. Optimising frequency-based railway services with a limited fleet endowment: An energy-efficient perspective. *Energies* **2020**, *13*, 2403. [CrossRef]
90. Miyatake, M.; Matsuda, K. Energy saving speed and charge/discharge control of a railway vehicle with on-board energy storage by means of an optimization model. *IEEJ Trans. Electr. Electron. Eng.* **2009**, *4*, 771–778. [CrossRef]
91. Nasri, A.; Fekri Moghadam, M.; Mokhtari, H. Timetable optimization for maximum usage of regenerative energy of braking in electrical railway systems. In Proceedings of the International Symposium on Power Electronics, Electrical Drives, Automation and Motion (SPEEDAM 2010), Pisa, Italy, 14–16 June 2010.
92. Teymourfar, R.; Asaei, B.; Iman-Eini, H.; Nejati Fard, R. Stationary super-capacitor energy storage system to save regenerative braking energy in a metro line. *Energy Convers. Manag.* **2012**, *56*, 206–214. [CrossRef]
93. Gallo, M.; Botte, M.; Ruggiero, A.; D'Acierno, L. The optimisation of driving profiles for minimising energy consumptions in metro lines. In Proceedings of the 20th IEEE International Conference on Environment and Electrical Engineering (IEEE EEEIC 2020) and 4th Industrial and Commercial Power Systems Europe (I&CPS 2020), Web Conference, Madrid, Spain, 9–12 June 2020.
94. Domínguez, M.; Fernández–Cardador, A.; Cucala, A.P.; Pecharromán, R.R. Energy savings in metropolitan railway substations through regenerative energy recovery and optimal design of ATO speed profiles. *IEEE Trans. Autom. Sci. Eng.* **2012**, *9*, 496–504. [CrossRef]
95. Carreno, W.C. Efficient Driving of CBTC ATO Operated Trains. Ph.D. Thesis, Universidad Pontificia Comillas, Madrid, Spain, 2017.
96. World Health Organization. *Environmental Noise Guidelines for the European Region*; WHO Regional Office for Europe: Copenhagen, Denmark, 2018.
97. European Commission. *Directive 2002/49/EC of the European Parliament and of Council of 25 June 2002 Relating to the Assessment and Management of Environmental Noise, L. 189/12, 18.7.2002*; Official Journal of the European Communities: Brussels, Belgium, 2002.
98. Steele, C. A critical review of some traffic noise prediction models. *Appl. Acoust.* **2001**, *62*, 271–287. [CrossRef]
99. Garg, N.; Maji, S. A critical review of principal traffic noise models: Strategies and implications. *Environ. Impact Asses.* **2014**, *46*, 68–81. [CrossRef]
100. Khan, J.; Ketzel, M.; Kakosimos, K.; Sorensen, M.; Jensen, S.S. Road traffic air and noise pollution exposure assessment – A review of tools and techniques. *Sci. Total Environ.* **2018**, *634*, 661–676. [CrossRef]
101. Li, B.; Tao, S. Influence of expanding ring roads on traffic noise in Beijing City. *Appl. Acoust.* **2004**, *65*, 243–249. [CrossRef]
102. Murphy, E.; King, E.A.; Rice, H.J. Estimating human exposure to transport noise in central Dublin, Ireland. *Environ. Int.* **2009**, *35*, 298–302. [CrossRef]
103. Phan, H.Y.T.; Yano, T.; Sato, T.; Nishimura, T. Characteristics of road traffic noise in Hanoi and Ho Chi Minh City, Vietnam. *Appl. Acoust.* **2010**, *71*, 479–485. [CrossRef]
104. Pamanikabud, P.; Tansatcha, M. 3D analysis and investigation of traffic noise impact from a new motorway on building and surrounding area. *Appl. Acoust.* **2010**, *71*, 1185–1193. [CrossRef]
105. Agarwal, S.; Swami, B.L. Comprehensive approach for the development of traffic noise prediction model for Jaipur city. *Environ. Monit. Assess.* **2011**, *172*, 113–120. [CrossRef] [PubMed]
106. Mehdi, M.R.; Kim, M.; Seong, J.C.; Arsalan, M.H. Spatio-temporal patterns of road traffic noise pollution in Karachi, Pakistan. *Environ. Int.* **2011**, *37*, 97–104. [CrossRef] [PubMed]
107. Gallo, M.; De Luca, G.; De Martinis, V. The effects of urban traffic plans on noise abatement: A case study. In *The Sustainable City IX—Urban Regeneration and Sustainability*; Marchettini, N., Brebbia, C.A., Pulselli, R., Bastianoni, S., Eds.; WIT Transactions on Ecology and Environment Series; WIT Press: Southampton, UK, 2014; Volume 191, pp. 583–594.
108. Bravo-Moncayo, L.; Pavon-Garcia, I.; Lucio-Naranjo, J.; Mosquera, R. Contingent valuation of road traffic noise: A case study in the urban area of Quito, Ecuador. *Case Stud. Transp. Policy* **2017**, *5*, 722–730. [CrossRef]
109. Muzet, A. Environmental noise, sleep and health. *Sleep Med. Rev.* **2007**, *11*, 135–142. [CrossRef]
110. Pirrera, S.; De Valck, E.; Cluydts, R. Nocturnal road traffic noise: A review on its assessment and consequences on sleep and health. *Environ. Int.* **2010**, *36*, 492–498. [CrossRef] [PubMed]
111. Paunovic, K.; Stansfeld, S.; Clark, C.; Belojevic, G. Epidemiological studies on noise and blood pressure in children: Observations and suggestions. *Environ. Int.* **2011**, *37*, 1030–1041. [CrossRef]

112. Recio, A.; Linares, C.; Banegas, J.R.; Diaz, J. Road traffic noise effects on cardiovascular, respiratory, and metabolic health: An integrative model of biological mechanisms. *Environ. Res.* **2016**, *146*, 359–370. [CrossRef]
113. Munzel, T.; Schmidt, F.P.; Steven, S.; Herzog, J.; Daibner, A.; Sorensen, M. Environmental Noise and the Cardiovascular System. *J. Am. Coll. Cardiol.* **2018**, *71*, 688–697. [CrossRef]
114. Sakhvidi, M.J.Z.; Sakhvidi, F.Z.; Mehrparvar, A.H.; Foraster, M.; Dadvand, P. Association between noise exposure and diabetes: A systematic review and meta-analysis. *Environ. Res.* **2018**, *166*, 647–657. [CrossRef]
115. Jafari, Z.; Kolb, B.E.; Mohajerani, M.H. Noise exposure accelerates the risk of cognitive impairment and Alzheimer's disease: Adulthood, gestational, and prenatal mechanistic evidence from animal studies. *Neurosci. Biobehav. Rev.* **2019**, in press. [CrossRef]
116. Khosravipour, M.; Khanlari, P. The association between road traffic noise and myocardial infarction: A systematic review and meta-analysis. *Sci. Total Environ.* **2020**, *731*, 139226. [CrossRef] [PubMed]
117. Murphy, E.; King, E.A. Scenario analysis and noise action planning: Modelling the impact of mitigation measures on population exposure. *Appl. Acoust.* **2011**, *72*, 487–494. [CrossRef]
118. Praticò, F.G.; Anfosso-Ledee, F. Trends and Issues in Mitigating Traffic Noise through Quiet Pavements. *Procedia Soc. Behav.* **2012**, *53*, 203–212. [CrossRef]
119. Garg, N.; Kumar, A.; Maji, S. Significance and implications of airborne sound insulation criteria in building elements for traffic noise abatement. *Appl. Acoust.* **2013**, *74*, 1429–1435. [CrossRef]
120. Jiang, L.; Kang, J. Combined acoustical and visual performance of noise barriers in mitigating the environmental impact of motorways. *Sci. Total Environ.* **2016**, *543*, 52–60. [CrossRef]
121. Ohiduzzaman, M.; Sirin, O.; Kassem, E.; Rochat, J.L. State-of-the-Art Review on Sustainable Design and Construction of Quieter Pavements—Part 1: Traffic Noise Measurement and Abatement Techniques. *Sustainability* **2016**, *8*, 742. [CrossRef]
122. Sirin, O. State-of-the-Art Review on Sustainable Design and Construction of Quieter Pavements—Part 2: Factors Affecting Tire-Pavement Noise and Prediction Models. *Sustainability* **2016**, *8*, 692. [CrossRef]
123. Thomas, P.; Wei, W.; Van Renterghem, T.; Botteldooren, D. Measurement-based auralization methodology for the assessment of noise mitigation measures. *J. Sound Vib.* **2016**, *379*, 232–244. [CrossRef]
124. Vaiktus, A.; Cygas, D.; Vorobjovas, V.; Andriejauskas, T. Traffic/Road Noise Mitigation under Modified Asphalt Pavements. *Transp. Res. Proc.* **2016**, *14*, 2698–2703.
125. Van Renterghem, T.; Botteldooren, D. Landscaping for road traffic noise abatement: Model validation. *Environ. Modell. Softw.* **2018**, *109*, 17–31. [CrossRef]
126. Horne, D.; Jashami, H.; Hurwitz, D.S.; Monsere, C.M.; Kothuri, S. Mitigating roadside noise pollution: A comparison between rounded and sinusoidal milled rumble strips. *Transp. Res. D* **2019**, *77*, 37–49. [CrossRef]
127. Kleiziene, R.; Senas, O.; Vaitkus, A.; Simanaviciene, R. Asphalt Pavement Acoustic Performance Model. *Sustainability* **2019**, *11*, 2938. [CrossRef]
128. Van Renterghem, T. Towards explaining the positive effect of vegetation on the perception of environmental noise. *Urban For. Urban Green.* **2019**, *40*, 133–144. [CrossRef]
129. Tester, B.; Kempton, A. RESOUND—EU research into reduction of engine source noise through understanding and novel design. *Air Space Eur.* **2001**, *3*, 250–251. [CrossRef]
130. Usuda, S.; Otsuke, M.; Nagata, M. Noise and vibration reduction of newly developed 3.0l direct injection diesel engine. *JSAE Rev.* **2002**, *23*, 285–289. [CrossRef]
131. Paun, F.; Gasser, S.; Leylekian, L. Design of materials for noise reduction in aircraft engines. *Aerosp. Sci. Technol.* **2003**, *7*, 63–72. [CrossRef]
132. Lu, M.-H.; Jen, M.U. Source identification and reduction of engine noise. *Noise Control Eng. J.* **2010**, *58*, 251–258. [CrossRef]
133. Borg, J.; Watanabe, A.; Tokuo, K. Mitigation of Noise and Vibration in the High-Pressure Fuel System of a Gasoline Direct Injection Engine. *Procedia Soc. Behav.* **2012**, *48*, 3170–3178. [CrossRef]
134. Mao, J.; Hao, Z.-Y.; Jing, G.-X.; Zheng, X.; Liu, C. Sound quality improvement for a four-cylinder diesel engine by the block structure optimization. *Appl. Acoust.* **2013**, *74*, 150–159. [CrossRef]
135. Ferrari, A.; Novara, C.; Paolucci, E.; Vento, O.; Violante, M.; Zhang, T. Design and rapid prototyping of a closed-loop control strategy of the injected mass for the reduction of $CO_2$, combustion noise and pollutant emissions in diesel engines. *Appl. Energy* **2018**, *232*, 358–367. [CrossRef]

136. Torregrosa, A.J.; Broatch, A.; Gil, A.; Gomez-Soriano, J. Numerical approach for assessing combustion noise in compression-ignited Diesel engines. *Appl. Acoust.* **2018**, *135*, 91–100. [CrossRef]
137. Qin, Y.; Tang, X.; Jia, T.; Duan, Z.; Zhang, J.; Li, Y.; Zheng, L. Noise and vibration suppression in hybrid electric vehicles: State of the art and challenges. *Renew. Sustain. Energy Rev.* **2020**, *124*, 109782. [CrossRef]
138. Litman, T.; Brenman, M. A New Social Equity Agenda for Sustainable Transportation. Presented at the 2012 Transportation Research Board Annual Meeting, Washington, DC, USA, 22–26 January 2012. Paper 12-3916.
139. Reckien, D.; Creutzig, F.; Blanca, F.; Lwasa, S.; Tovar-Restrepo, M.; McEvoy, D.; Satterthwaite, D. Climate change, equity and the Sustainable Development Goals: An urban perspective. *Environ. Urban* **2017**, *29*, 159–182. [CrossRef]
140. Henke, I.; Cartenì, A.; Molitierno, C.; Errico, A. Decision-Making in the Transport Sector: A Sustainable Evaluation Method for Road Infrastructure. *Sustainability* **2020**, *12*, 764. [CrossRef]
141. Jones, P.; Lucas, K. The social consequence of transport decision-making: Clarifying concepts, synthesising knowledge and assessing implications. *J. Transp. Geogr.* **2012**, *21*, 4–16. [CrossRef]
142. Martens, K. *Transport Justice. Defining Fair Transportation Systems*; Routledge: New York, NY, USA, 2017.
143. Beyazit, E. Evaluating social justice in transport: Lessons to be learned from the capability approach. *Transp. Rev.* **2011**, *31*, 117–134. [CrossRef]
144. Delbosc, A.; Currie, G. Using Lorenz curves to assess public transport equity. *J. Transp. Geogr.* **2011**, *19*, 1252–1259. [CrossRef]
145. Bertolaccini, K.; Lownes, N.E. Effects of scale and boundary selection in assessing equity of transit supply distribution. *Transp. Res. Rec.* **2013**, *2350*, 58–64. [CrossRef]
146. Welch, T.F. Equity in transport: The distribution of transit access and connectivity among affordable housing units. *Transp. Policy* **2013**, *30*, 283–293. [CrossRef]
147. Welch, T.F.; Mishra, S. A measure of equity for public transit connectivity. *J. Transp. Geogr.* **2013**, *33*, 29–41. [CrossRef]
148. Kaplan, S.; Popoks, D.; Prato, C.G.; Ceder, A. Using connectivity for measuring equity in transit provision. *J. Transp. Geogr.* **2014**, *37*, 82–92. [CrossRef]
149. Nahmias-Biran, B.-H.; Sharaby, N.; Shiftan, Y. Equity Aspects in Transportation Projects: Case Study of Transit Fare Change in Haifa. *Int. J. Sustain. Transp.* **2014**, *8*, 69–83. [CrossRef]
150. Gallo, M. Assessing the equality of external benefits in public transport investments: The impact of urban railways on real estate values. *Case Stud. Transp. Policy* **2020**, in press. [CrossRef]
151. Camporeale, R.; Caggiani, L.; Fonzone, A.; Ottomanelli, M. Better for everyone: An approach to multimodal network design considering equity. *Transp. Res. Proc.* **2016**, *19*, 303–315. [CrossRef]
152. Camporeale, R.; Caggiani, L.; Fonzone, A.; Ottomanelli, M. Quantifying the impacts of horizontal and vertical equity in transit route planning. *Transp. Plan. Technol.* **2017**, *40*, 28–44. [CrossRef]
153. Camporeale, R.; Caggiani, L.; Ottomanelli, M. Modeling horizontal and vertical equity in the public transport design problem: A case study. *Transp. Res. A* **2019**, *125*, 184–206. [CrossRef]
154. Caggiani, L.; Camporeale, R.; Ottomanelli, M. Facing equity in transportation Network Design Problem: A flexible constraints based model. *Transp. Policy* **2017**, *55*, 9–17. [CrossRef]
155. Gallo, M. Improving equity of urban transit systems with the adoption of origin-destination based taxi fares. *Soc. Econ. Plan. Sci.* **2018**, *64*, 38–55. [CrossRef]
156. Gallo, M.; D'Acierno, L. An Origin-Destination Based Parking Pricing Policy for Improving Equity in Urban Transportation. In *New Trends in Emerging Complex Real Life Problems*; Daniele, P., Scrimali, L., Eds.; AIRO Springer Series; Springer: Cham, Switzerland, 2018; Volume 1, pp. 247–255.
157. Camporeale, R.; Caggiani, L.; Fonzone, A.; Ottomanelli, M. Study of the accessibility inequalities of cordon-based pricing strategies using a multimodal Theil index. *Transp. Plan. Technol.* **2019**, *42*, 498–514. [CrossRef]
158. Jansson, J.O. Road pricing and parking policy. *Res. Transp. Econ.* **2010**, *29*, 346–353. [CrossRef]
159. Coria, J.; Bonilla, J.; Grundstrom, M.; Pleijel, H. Air pollution dynamics and the need for temporally differentiated road pricing. *Transp. Res. A* **2015**, *75*, 178–195. [CrossRef]
160. Munoz Miguel, J.P.; de Blas, C.S.; Garcia Sipols, A.E. A forecast air pollution model applied to a hypothetical urban road pricing scheme: An empirical study in Madrid. *Transp. Res. D* **2017**, *55*, 21–38. [CrossRef]
161. Coria, J.; Zhang, X.-B. Optimal environmental road pricing and daily commuting patterns. *Transp. Res. B* **2017**, *105*, 297–314. [CrossRef]

162. Zhong, S.; Bushell, M. Impact of the built environment on the vehicle emission effects of road pricing policies: A simulation case study. *Transp. Res. A* **2017**, *103*, 235–249. [CrossRef]
163. Cavallaro, F.; Giaretta, F.; Nocera, S. The potential of road pricing schemes to reduce carbon emissions. *Transp. Policy* **2018**, *67*, 85–92. [CrossRef]
164. Chang, T.-H.; Tseng, J.-S.; Hsieh, T.-H.; Hsu, Y.-T.; Lu, Y.-C. Green transportation implementation through distance-based road pricing. *Transp. Res. A* **2018**, *111*, 53–64. [CrossRef]
165. Lv, Y.; Wang, S.; Gao, Z.; Li, X.; Sun, W. Design of a heuristic environment-friendly road pricing scheme for traffic emission control under uncertainty. *J. Environ. Manag.* **2019**, *236*, 455–465. [CrossRef] [PubMed]
166. Rotaris, L.; Danielis, R.; Marcucci, E.; Massiani, J. The urban road pricing scheme to curb pollution in Milan, Italy: Description, impacts and preliminary cost–benefit analysis assessment. *Transp. Res. A* **2010**, *44*, 359–375. [CrossRef]
167. Invernizzi, G.; Ruprecht, A.; Mazza, R.; De Marco, M.; Sioutas, C.; Westerdahl, D. Measurement of black carbon concentration as an indicator of air quality benefits of traffic restriction policies within the ecopass zone in Milan, Italy. *Atmos. Environ.* **2011**, *45*, 3522–3527. [CrossRef]
168. Percoco, M. Is road pricing effective in abating pollution? Evidence from Milan. *Transp. Res. D* **2013**, *25*, 112–118. [CrossRef]
169. Beevers, S.D.; Carslaw, D.C. The impact of congestion charging on vehicle emissions in London. *Atmos. Environ.* **2005**, *39*, 1–5. [CrossRef]
170. Prud'homme, R.; Bocarejo, J.P. The London congestion charge: A tentative economic appraisal. *Transp. Policy* **2005**, *12*, 279–287. [CrossRef]
171. Santos, G.; Bhakar, J. The impact of the London congestion charging scheme on the generalised cost of car commuters to the city of London from a value of travel time savings perspective. *Transp. Policy* **2006**, *13*, 22–33. [CrossRef]
172. Quddus, M.A.; Bell, M.G.H.; Schmocker, J.-D.; Fonzone, A. The impact of the congestion charge on the retail business in London: An econometric analysis. *Transp. Policy* **2007**, *14*, 433–444. [CrossRef]
173. Atkinson, R.W.; Barratt, B.; Armstrong, B.; Andersen, H.R.; Beevers, S.D.; Mudway, I.S.; Green, D.; Derwent, R.G.; Wilkinson, P.; Tonne, C.; et al. The impact of the congestion charging scheme on ambient air pollution concentrations in London. *Atmos. Environ.* **2009**, *43*, 5493–5500. [CrossRef]
174. Green, C.P.; Heywood, J.S.; Navarro, M. Traffic accidents and the London congestion charge. *J. Public Econ.* **2016**, *133*, 11–22. [CrossRef]
175. Santos, G.; Behrendt, H.; Maconi, L.; Shirvani, T.; Teytellboym, A. Part I: Externalities and economic policies in road transport. *Res. Transp. Econ.* **2010**, *28*, 2–45. [CrossRef]
176. Proost, S.; Van Dender, K. The welfare impacts of alternative policies to address atmospheric pollution in urban road transport. *Reg. Sci. Urban Econ.* **2001**, *31*, 383–411. [CrossRef]
177. Parry, I.W.H.; Bento, A. Estimating the welfare effect of congestion taxes: The critical importance of other distortions within the transport system. *J. Urban Econ.* **2002**, *51*, 339–365. [CrossRef]
178. Verhoef, E.T. Second-best congestion pricing in general networks. Heuristic algorithms for finding second-best optimal toll levels and toll points. *Transp. Res. B* **2002**, *36*, 707–729. [CrossRef]
179. Manville, M. Parking Pricing. In *Parking Issues and Policies*; Emerald: Bingley, UK, 2014; pp. 137–155. [CrossRef]
180. Zong, F.; He, Y.; Yuan, Y. Dependence of Parking Pricing on Land Use and Time of Day. *Sustainability* **2015**, *7*, 9587–9607. [CrossRef]
181. Mei, Z.; Feng, C.; Kong, L.; Zhang, L.; Chen, J. Assessment of Different Parking Pricing Strategies: A Simulation-based Analysis. *Sustainability* **2020**, *12*, 2056. [CrossRef]
182. Parmar, J.; Das, P.; Dave, S.M. Study on demand and characteristics of parking system in urban areas: A review. *J. Traffic Transp. Eng.* **2020**, *7*, 111–124. [CrossRef]
183. D'Acierno, L.; Gallo, M.; Montella, B. Optimisation models for the urban parking pricing problem. *Transp. Policy* **2006**, *13*, 34–48. [CrossRef]
184. Santos, G. Road fuel taxes in Europe: Do they internalize road transport externalities? *Transp. Policy* **2017**, *53*, 120–134. [CrossRef]
185. Steinsland, C.; Fridstrom, L.; Madslien, A.; Minken, H. The climate, economic and equity effects of fuel tax, road toll and commuter tax credit. *Transp. Policy* **2018**, *72*, 225–241. [CrossRef]

186. Sterner, T. Fuel taxes: An important instrument for climate policy. *Energy Policy* **2007**, *35*, 3194–3202. [CrossRef]
187. Montag, J. The simple economics of motor vehicle pollution: A case for fuel tax. *Energy Policy* **2015**, *85*, 138–149. [CrossRef]
188. Fukui, H.; Miyoshi, C. The impact of aviation fuel tax on fuel consumption and carbon emissions: The case of the US airline industry. *Transp. Res. D* **2017**, *50*, 234–253. [CrossRef]
189. Givord, P.; Grislain-Letremy, C.; Naegele, H. How do fuel taxes impact new car purchases? An evaluation using French consumer-level data. *Energy Econ.* **2018**, *74*, 76–96. [CrossRef]
190. Storchmann, K.-H. The impact of fuel taxes on public transport—An empirical assessment for Germany. *Transp. Policy* **2001**, *8*, 19–28. [CrossRef]
191. Kavalec, C.; Woods, J. Toward marginal cost pricing of accident risk: The energy, travel, and welfare impacts of pay-at-the-pump auto insurance. *Energy Policy* **1999**, *27*, 331–342. [CrossRef]
192. Gallo, M. A fuel surcharge policy for reducing road traffic greenhouse gas emissions. *Transp. Policy* **2011**, *18*, 413–424. [CrossRef]
193. Mandell, S.; Proost, S. Why truck distance taxes are contagious and drive fuel taxes to the bottom. *J. Urban Econ.* **2016**, *93*, 1–17. [CrossRef]
194. Ewing, G.O.; Sarigollu, E. Car fuel-type choice under travel demand management and economic incentives. *Transp. Res. D* **1998**, *3*, 429–444. [CrossRef]
195. Rudolph, C. How may incentives for electric cars affect purchase decisions? *Transp. Policy* **2016**, *52*, 113–120. [CrossRef]
196. Hardman, S.; Chandan, A.; Tal, G.; Turrentine, T. The effectiveness of financial purchase incentives for battery electric vehicles—A review of the evidence. *Renew. Sustain. Energy Rev.* **2017**, *80*, 1100–1111. [CrossRef]
197. Zhang, X.; Bai, X. Incentive policies from 2006 to 2016 and new energy vehicle adoption in 2010–2020 in China. *Renew. Sustain. Energy Rev.* **2017**, *70*, 24–43. [CrossRef]
198. Ma, S.-C.; Xu, J.-H.; Fan, Y. Willingness to pay and preferences for alternative incentives to EV purchase subsidies: An empirical study in China. *Energy Econ.* **2019**, *81*, 197–215. [CrossRef]
199. Munzel, C.; Plotz, P.; Sprei, F.; Gnann, T. How large is the effect of financial incentives on electric vehicle sales?—A global review and European analysis. *Energy Econ.* **2019**, *84*. [CrossRef]
200. Deuten, S.; Gomez Vilchez, J.J.; Thiel, C. Analysis and testing of electric car incentive scenarios in the Netherlands and Norway. *Technol. Forecast. Soc.* **2020**, *151*, 119847. [CrossRef]
201. Puerto Rico, J.A.; Mercedes, S.S.P.; Sauer, I.L. Genesis and consolidation of the Brazilian bioethanol: A review of policies and incentive mechanisms. *Renew. Sustain. Energy Rev.* **2010**, *14*, 1874–1887. [CrossRef]
202. Marin, G.; Zoboli, R. Effectiveness of car scrappage schemes: Counterfactual-based evidence on the Italian experience. *Econ. Transp.* **2020**, *21*. [CrossRef]
203. Mattioli, G.; Roberts, C.; Steinberger, J.K.; Brown, A. The political economy of car dependence: A systems of provision approach. *Energy Res. Soc. Sci.* **2020**, *66*. [CrossRef]
204. Vikerman, R. Transit investment and economic development. *Res. Transp. Econ.* **2008**, *23*, 107–115. [CrossRef]
205. Beaudin, J.; Farzin, Y.H.; Lawell, C.-Y.C.L. Public transit investment and sustainable transportation: A review of studies of transit's impact on traffic congestion and air quality. *Res. Transp. Econ.* **2015**, *52*, 15–22. [CrossRef]
206. Daraio, C.; Diana, M.; Di Costa, F.; Leporelli, C.; Matteucci, G.; Nastasi, A. Efficiency and effectiveness in the urban public transport sector: A critical review with directions for future research. *Eur. J. Oper. Res.* **2016**, *248*, 1–20. [CrossRef]
207. Kwan, S.C.; Hashim, J.H. A review on co-benefits of mass public transportation in climate change mitigation. *Sustain. Cities Soc.* **2016**, *22*, 11–18. [CrossRef]
208. Murren, C.; Weisbrod, G. Workshop 8 report: The wider economic, social and environmental impacts of public transport investment. *Res. Transp. Econ.* **2016**, *59*, 397–400.
209. Beaudoin, J.; Lawell, C.-Y.C.L. The effects of public transit supply on the demand for automobile travel. *J. Environ. Econ. Manag.* **2018**, *88*, 447–467. [CrossRef]
210. Bork, R. Public transport and urban pollution. *Reg. Sci. Urban Econ.* **2019**, *77*, 356–366. [CrossRef]
211. Huang, X.; Cao, X.; Yin, J.; Cao, X. Can metro transit reduce driving? Evidence from Xi'an, China. *Transp. Policy* **2019**, *81*, 350–359. [CrossRef]
212. Sun, C.; Zhang, W.; Fang, X.; Gao, X.; Xu, M. Urban public transport and air quality: Empirical study of China cities. *Energy Policy* **2019**, *135*. [CrossRef]

213. Papagni, E.; Lepore, A.; Felice, E.; Baraldi, A.L.; Alfano, M.R. Public investment and growth: Lessons learned from 60-years experience in Southern Italy. *J. Policy Model.* **2020**, in press. [CrossRef]
214. Gallo, M.; Amo Guevara, A. A Model for Estimating the Impact of National Transport Investments on the Rail Modal Share and Greenhouse Gas Emissions. In Proceedings of the 2019 IEEE International Conference on Environmental and Electrical Engineering and 2019 IEEE Industrial and Commercial Power Systems Europe (EEEIC/I&CPS Europe), Genova, Italy, 10–14 June 2019; pp. 369–373.
215. Schulze, H.; Kobmann, I. The role of safety research in road safety management. *Saf. Sci.* **2010**, *48*, 1160–1166. [CrossRef]
216. Wang, C.; Quddus, M.A.; Ison, S.G. The effect of traffic and road characteristics on road safety: A review and future research direction. *Saf. Sci.* **2013**, *57*, 264–275. [CrossRef]
217. Hagenzieker, M.P.; Commandeur, J.J.F.; Bijleveld, F.D. The history of road safety research: A quantitative approach. *Transp. Res. F* **2014**, *25*, 150–162. [CrossRef]
218. Mooren, L.; Grzebieta, R.; Williamson, A.; olivier, J.; Friswell, R. Safety management for heavy vehicle transport: A review of the literature. *Saf. Sci.* **2014**, *62*, 79–89. [CrossRef]
219. Wegman, F.; Berg, H.-Y.; Cameron, I.; Thompson, C.; Siegrist, S.; Weijermars, W. Evidence-based and data-driven road safety management. *IATSS Res.* **2015**, *39*, 19–25. [CrossRef]
220. Gichaga, F.J. The impact of road improvements on road safety and related characteristics. *IATSS Res.* **2017**, *40*, 72–75. [CrossRef]
221. Masilkova, M. Health and social consequences of road traffic accidents. *Kontakt* **2017**, *19*, e43–e47. [CrossRef]
222. Wegman, F. The future of road safety: A worldwide perspective. *IATSS Res.* **2017**, *40*, 66–71. [CrossRef]
223. Tesic, M.; Hermans, E.; Lipovac, K.; Pesic, D. Identifying the most significant indicators of the total road safety performance index. *Accid. Anal. Prev.* **2018**, *113*, 263–278. [CrossRef] [PubMed]
224. Shen, Y.; Hermans, E.; Bao, Q.; Brijs, T.; Wets, G. Towards better road safety management: Lessons learned from inter-national benchmarking. *Accid. Anal. Prev.* **2020**, *138*. [CrossRef]
225. Ziakopoulos, A.; Yannis, G. A review of spatial approaches in road safety. *Accid. Anal. Prev.* **2020**, *135*. [CrossRef]
226. Andreev, P.; Salomon, I.; Pliskin, N. Review: State of teleactivities. *Transp. Res. C* **2010**, *18*, 3–20. [CrossRef]
227. Falk, M.; Hagsten, E. E-commerce trends and impacts across Europe. *Int. J. Prod. Econ.* **2015**, *170*, 357–369. [CrossRef]
228. Mansky, C.F.; Salomon, I. The demand for teleshopping: An application of discrete choice models. *Reg. Sci. Urban Econ.* **1987**, *17*, 109–121. [CrossRef]
229. Salomon, I.; Koppelman, F. A framework for studying teleshopping versus store shopping. *Transp. Res. A* **1988**, *22*, 247–255. [CrossRef]
230. Nagurney, A.; Dong, J.; Mokhtarian, P.L. Teleshopping versus shopping: A multicriteria network equilibrium framework. *Math. Comput. Model.* **2001**, *34*, 783–798. [CrossRef]
231. Nagurney, A.; Dong, J.; Mokhtarian, P.L. Multicriteria Network Equilibrium Modeling with Variable Weights for Decision-Making in the Information Age with Applications to Telecommuting and Teleshopping. *J. Econ. Dyn. Control* **2002**, *26*, 1629–1650. [CrossRef]
232. Shao, J.; Yang, H.; Xing, X.; Yang, L. E-commerce and traffic congestion: An economic and policy analysis. *Transp. Res. B* **2016**, *83*, 91–103. [CrossRef]
233. Cárdenas, I.; Beckers, J.; Vanelslander, T. E-commerce last-mile in Belgium: Developing an external cost delivery index. *Res. Transp. Bus. Manag.* **2017**, *24*, 123–129. [CrossRef]
234. Hidayatno, A.; Destyanto, A.R.; Fadhil, M. Model Conceptualization on E-Commerce Growth Impact to Emissions Generated from Urban Logistics Transportation: A Case Study of Jakarta. *Energy Procedia* **2019**, *156*, 144–148. [CrossRef]
235. Zhao, Y.-B.; Wu, G.-Z.; Gong, Y.-X.; Yang, M.-Z.; Ni, H.-G. Environmental benefits of electronic commerce over the conventional retail trade? A case study in Shenzhen, China. *Sci. Total Environ.* **2019**, *679*, 378–386. [CrossRef]
236. Helminen, V.; Ristimaki, M. Relationships between commuting distance, frequency and telework in Finland. *J. Transp. Geogr.* **2007**, *15*, 331–342. [CrossRef]
237. Van Lier, T.; De Witte, A.; Macharis, C. The Impact of Telework on Transport Externalities: The Case of Brussels Capital Region. *Procedia Soc. Behav.* **2012**, *54*, 240–250. [CrossRef]

238. Moeckel, R. Working from Home: Modeling the Impact of Telework on Transportation and Land Use. *Transp. Res. Proc.* **2017**, *26*, 207–214. [CrossRef]
239. Giovanis, E. The relationship between teleworking, traffic and air pollution. *Atmos. Pollut. Res.* **2018**, *9*, 1–14. [CrossRef]
240. European Commission. State of the Art on Alternative Fuels Transport Systems in the European Union. Final Report. Available online: https://ec.europa.eu/transport/sites/transport/files/themes/urban/studies/doc/2015-07-alter-fuels-transport-syst-in-eu.pdf (accessed on 30 May 2020).
241. European Academies Science Advisory Council. Decarbonisation of Transport: Options and Challenges. Available online: https://easac.eu/fileadmin/PDF_s/reports_statements/Decarbonisation_of_Tansport/EASAC_Decarbonisation_of_Transport_FINAL_March_2019.pdf (accessed on 30 May 2020).
242. Franke, T.; Krems, J.F. What drives range preferences in electric vehicle users? *Transp. Policy* **2013**, *30*, 56–62. [CrossRef]
243. Shirouzu, N.; Lienert, P. Exclusive: Tesla's Secret Batteries Aim to Rework the Math for Electric Cars and the Grid. Available online: https://www.reuters.com/article/us-autos-tesla-batteries-exclusive/exclusive-teslas-secret-batteries-aim-to-rework-the-math-for-electric-cars-and-the-grid-idUSKBN22Q1WC (accessed on 30 May 2020).
244. Sakhdari, B.; Azad, N.L. An optimal energy management system for battery electric vehicles. In Proceedings of the IFAC Workshop Engine Powertrain Control, Columbus, OH, USA, 23–26 August 2015; pp. 86–92.
245. Xu, G.; Xu, K.; Zheng, C.; Zhang, X.; Zahid, T. Fully Electrified Regenerative Braking Control for Deep Energy Recovery and Maintaining Safety of Electric Vehicles. *IEEE Trans. Veh. Technol.* **2016**, *65*, 1186–1198. [CrossRef]
246. Naseri, F.; Farjah, E.; Ghanbari, T. An efficient regenerative braking system based on battery/supercapacitor for electric, hybrid, and plug-in hybrid electric vehicles with BLDC motor. *IEEE Trans. Veh. Technol.* **2017**, *66*, 3724–3738. [CrossRef]
247. Sarker, M.R.; Pandzic, H.; Ortega-Vazquez, M.A. Optimal operation and services scheduling for an electric vehicle battery swapping station. *IEEE Trans. Power Syst.* **2015**, *30*, 901–910. [CrossRef]
248. Anjos, M.F.; Gendron, B.; Joyce-Moniz, M. Increasing electric vehicle adoption through the optimal deployment of fast-charging stations for local and long-distance travel. *Eur. J. Oper. Res.* **2020**, *285*, 263–278. [CrossRef]
249. Cui, S.; Zhao, H.; Wen, H.; Zhang, C. Locating multiple size and multiple type of charging station for battery electricity vehicles. *Sustainability* **2018**, *10*, 3267. [CrossRef]
250. Das, H.S.; Rahman, M.M.; Li, S.; Tan, C.W. Electric vehicles standards, charging infrastructure, and impact on grid integration: A technological review. *Renew. Sustain. Energy Rev.* **2020**, *120*, 109618. [CrossRef]
251. Spring, N. The smart grid and generation. *Power Eng.* **2009**, *113*, 44–50.
252. Guille, C.; Gross, G. A conceptual framework for the vehicle-to-grid (V2G) implementation. *Energy Policy* **2009**, *37*, 4379–4390. [CrossRef]
253. Wu, H.H.; Gilchrist, A.; Sealy, K.; Israelsen, P.; Muhs, J. A review on inductive charging for electric vehicles. In Proceedings of the IEEE International Electric Machines and Drives Conference, Niagara Falls, ON, Canada, 15–18 May 2011; pp. 143–147.
254. eRoadArlanda: The Technology. Available online: https://eroadarlanda.com/the-technology/ (accessed on 30 May 2020).
255. Luo, S.; Ma, F.; Mehra, R.K.; Huang, Z. Deep insights of HCNG engine research in China. *Fuel* **2020**, *263*, 116612. [CrossRef]
256. Brzezinska, D.; Markowski, A.S. Experimental investigation and CFD modelling of the internal car park environment in case of accidental LPG release. *Process. Saf. Environ.* **2017**, *110*, 5–14. [CrossRef]
257. Nasution, T.H.; Nasution, R.Y.; Putri, K.A.; Nasution, C.F. Automatic regulator design for Liquified Petroleum Gas. In Proceedings of the International Conference on Information Technology and Engineering Management, Belitung, Indonesia, 27–29 June 2019.
258. Brzezińska, D. LPG Cars in a Car Park Environment—How to Make it Safe. *Int. J. Environ. Res. Pub. Health* **2019**, *16*, 1062. [CrossRef] [PubMed]
259. Alvarez-Meaza, I.; Zarrabeitia-Bilbao, E.; Rio-Belver, R.M.; Garechana-Anacabe, G. Fuel-Cell Electric Vehicles: Plotting a Scientific and Technological Knowledge Map. *Sustainability* **2020**, *12*, 2334. [CrossRef]

260. Offer, G.J.; Howey, D.; Contestabile, M.; Clague, R.; Brandon, N.P. Comparative analysis of battery electric, hydrogen fuel cell and hybrid vehicles in a future sustainable road transport system. *Energy Policy* **2010**, *38*, 24–29. [CrossRef]
261. Fathabadi, H. Fuel cell hybrid electric vehicle (FCHEV): Novel fuel cell/SC hybrid power generation system. *Energy Convers. Manag.* **2018**, *156*, 192–201. [CrossRef]
262. Zhou, D.; Ravey, A.; Al-Durra, A.; Gao, F. A comparative study of extremum seeking methods applied to online energy management strategy of fuel cell hybrid electric vehicles. *Energy Convers. Manag.* **2017**, *151*, 778–790. [CrossRef]
263. Zhou, Y.; Ravey, A.; Péra, M.-C. Multi-objective energy management for fuel cell electric vehicles using online-learning enhanced Markov speed predictor. *Energy Convers. Manag.* **2020**, *213*, 112821. [CrossRef]
264. Koubaa, R.; Bacha, S.; Smaoui, M.; Krichen, L. Robust optimization based energy management of a fuel cell/ultra-capacitor hybrid electric vehicle under uncertainty. *Energy* **2020**, *200*, 117530. [CrossRef]
265. International Association for Natural Gas Vehicles. Current Natural Gas Vehicle Statistics. Available online: https://www.iangv.org/current-ngv-stats/ (accessed on 30 May 2020).
266. European Alternative Fuels Observatory. Available online: https://www.eafo.eu/ (accessed on 30 May 2020).
267. International Energy Agency. Electric Car Stock by Region and Technology, 2013–2019. Available online: https://www.iea.org/data-and-statistics/charts/electric-car-stock-by-region-and-technology-2013-2019 (accessed on 30 May 2020).
268. International Energy Agency. Global EV Outlook. 2020. Available online: https://www.iea.org/reports/global-ev-outlook-2020 (accessed on 30 May 2020).
269. International Energy Agency. Advanced Fuel Cells Technology Collaboration Programme. Report on Mobile Fuel Cell Application: Tracking Market Trends. Available online: https://www.ieafuelcell.com/fileadmin/publications/2020_AFCTCP_Mobile_FC_Application_Tracking_Market_Trends_2020.pdf (accessed on 30 May 2020).
270. U.S. Department of Energy. Alternative Fuels Data Center. Available online: https://afdc.energy.gov/data/ (accessed on 30 May 2020).
271. World LPG Association. A Country-by-Country Analysis of Why and How Governments Encourage Autogas and What Works. Available online: https://www.wlpga.org/wp-content/uploads/2019/09/Autogas-Incentive-Policies-2019-1.pdf (accessed on 30 May 2020).
272. Meijkamp, R. Changing consumer behaviour through eco-efficient services: An empirical study of car sharing in the Netherlands. *Bus. Strategy Environ.* **1998**, *7*, 234–244. [CrossRef]
273. Ramos, É.M.S.; Bergstad, C.J.; Chicco, A.; Diana, M. Mobility styles and car sharing use in Europe: Attitudes, behaviours, motives and sustainability. *Eur. Transp. Res. Rev.* **2020**, *12*, 13. [CrossRef]
274. Rodenbach, J.; Mathis, J.; Chicco, A.; Diana, M. Car Sharing in Europe: A Multidimensional Classification and Inventory. Available online: http://stars-h2020.eu/wp-content/uploads/2019/06/STARS-D2.1.pdf (accessed on 3 June 2020).
275. Wang, H.; Li, Z.; Zhu, X.; Liu, Z. A full service model for vehicle scheduling in one-way electric vehicle car-sharing systems. *Lect. Notes Comput. Sci.* **2015**, *9502*, 25–36.
276. Lai, K.; Chen, T.; Natarajan, B. Optimal scheduling of electric vehicles car-sharing service with multi-temporal and multi-task operation. *Energy* **2020**, *204*, 117929. [CrossRef]
277. Illgen, S.; Höck, M. Electric vehicles in car sharing networks—Challenges and simulation model analysis. *Transp. Res. D Transp. Environ.* **2018**, *63*, 377–387. [CrossRef]
278. Clemente, M.; Fanti, M.P.; Iacobellis, G.; Nolich, M.; Ukovich, W. A Decision Support System for User-Based Vehicle Relocation in Car Sharing Systems. *IEEE Trans. Syst. Man Cybern. Syst.* **2018**, *48*, 1283–1296. [CrossRef]
279. Brandstätter, G.; Kahr, M.; Leitner, M. Determining optimal locations for charging stations of electric car-sharing systems under stochastic demand. *Transp. Res. B Meth.* **2017**, *104*, 17–35. [CrossRef]
280. Lee, D.; Quadrifoglio, L.; Teulada, E.S.D.; Meloni, I. Discovering Relationships between Factors of Round-trip Car Sharing by Using Association Rules Approach. *Procedia Eng.* **2016**, *161*, 1282–1288. [CrossRef]
281. Wu, C.; Le Vine, S.; Clark, M.; Gifford, K.; Polak, J. Factors associated with round-trip carsharing frequency and driving-mileage impacts in London. *Int. J. Sustain. Transp.* **2020**, *14*, 177–186. [CrossRef]
282. Hui, Y.; Ding, M.; Zheng, K.; Lou, D. Observing trip chain characteristics of round-trip carsharing users in China: A case study based on GPS data in Hangzhou City. *Sustainability* **2017**, *9*, 949. [CrossRef]

283. Namazu, M.; Dowlatabadi, H. Vehicle ownership reduction: A comparison of one-way and two-way carsharing systems. *Transp. Policy* **2018**, *64*, 38–50. [CrossRef]
284. Bruglieri, M.; Colorni, A.; Luè, A. The relocation problem for the one-way electric vehicle sharing. *Networks* **2014**, *64*, 292–305. [CrossRef]
285. Alfian, G.; Rhee, J.; Kang, Y.-S.; Yoon, B. Performance comparison of reservation based and instant access one-way car sharing service through discrete event simulation. *Sustainability* **2015**, *7*, 12465–12489. [CrossRef]
286. Alfian, G.; Rhee, J.; Ijaz, M.F.; Syafrudin, M.; Fitriyani, N.L. Performance analysis of a forecasting relocation model for one-way carsharing. *Appl. Sci.* **2017**, *7*, 598. [CrossRef]
287. Cepolina, E.M.; Farina, A.; Holloway, C.; Tyler, N. Innovative strategies for urban car-sharing systems and a simulator to assess their performance. *Transp. Plan. Technol.* **2015**, *38*, 375–391. [CrossRef]
288. Zakaria, R.; Dib, M.; Moalic, L.; Caminada, A. Insights on car relocation operations in one-way carsharing systems. *Int. J. Adv. Comput. Sci. App.* **2018**, *9*, 281–290. [CrossRef]
289. Di Febbraro, A.; Sacco, N.; Saeednia, M. One-Way Car-Sharing Profit Maximization by Means of User-Based Vehicle Relocation. *IEEE Trans. Intell. Transp.* **2019**, *20*, 628–641. [CrossRef]
290. Kim, K.H.; Lee, Y.H. Vehicle-relocation optimization for one-way carsharing. *Int. J. Ind. Eng. Theory* **2017**, *24*, 468–482.
291. Boyacı, B.; Zografos, K.G.; Geroliminis, N. An integrated optimization-simulation framework for vehicle and personnel relocations of electric carsharing systems with reservations. *Transp. Res. Part. B Meth.* **2017**, *95*, 214–237. [CrossRef]
292. Gambella, C.; Malaguti, E.; Masini, F.; Vigo, D. Optimizing relocation operations in electric car-sharing. *Omega* **2018**, *81*, 234–245. [CrossRef]
293. Lemme, R.F.F.; Arruda, E.F.; Bahiense, L. Optimization model to assess electric vehicles as an alternative for fleet composition in station-based car sharing systems. *Transp. Res. D Transp. Environ.* **2019**, *67*, 173–196. [CrossRef]
294. Xue, Y.; Zhang, Y.; Chen, Y. An evaluation framework for the planning of electric car-sharing systems: A combination model of AHP-CBA-VD. *Sustainability* **2019**, *11*, 5627. [CrossRef]
295. Liu, A.; Zhao, Y.; Meng, X.; Zhang, Y. A three-phase fuzzy multi-criteria decision model for charging station location of the sharing electric vehicle. *Int. J. Prod. Econ.* **2020**, *225*, 107572. [CrossRef]
296. Schmöller, S.; Weikl, S.; Müller, J.; Bogenberger, K. Empirical analysis of free-floating carsharing usage: The munich and berlin case. *Transp. Res. C Emerg. Technol.* **2015**, *56*, 34–51. [CrossRef]
297. Ampudia-Renuncio, M.; Guirao, B.; Molina-Sanchez, R.; Bragança, L. Electric free-floating carsharing for sustainable cities: Characterization of frequent trip profiles using acquired rental data. *Sustainability* **2020**, *12*, 1248. [CrossRef]
298. Ampudia-Renuncio, M.; Guirao, B.; Molina-Sánchez, R.; Engel de Álvarez, C. Understanding the spatial distribution of free-floating carsharing in cities: Analysis of the new Madrid experience through a web-based platform. *Cities* **2020**, *98*, 102593. [CrossRef]
299. Müller, J.; Correia, G.H.A.; Bogenberger, K. An explanatory model approach for the spatial distribution of free-floating carsharing bookings: A case-study of German cities. *Sustainability* **2017**, *9*, 1290. [CrossRef]
300. Weikl, S.; Bogenberger, K. A practice-ready relocation model for free-floating carsharing systems with electric vehicles—Mesoscopic approach and field trial results. *Transp. Res. C Emerg. Technol.* **2015**, *57*, 206–223. [CrossRef]
301. Molnar, G.; Correia, G.H.D.A. Long-term vehicle reservations in one-way free-floating carsharing systems: A variable quality of service model. *Transp. Res. C Emerg. Technol.* **2019**, *98*, 298–322. [CrossRef]
302. Folkestad, C.A.; Hansen, N.; Fagerholt, K.; Andersson, H.; Pantuso, G. Optimal charging and repositioning of electric vehicles in a free-floating carsharing system. *Comput. Oper. Res.* **2020**, *113*, 104771. [CrossRef]
303. Dandl, F.; Bogenberger, K. Comparing Future Autonomous Electric Taxis with an Existing Free-Floating Carsharing System. *IEEE Trans. Intell. Transp.* **2019**, *20*, 2037–2047. [CrossRef]
304. Kaspi, M.; Raviv, T.; Tzur, M. Parking reservation policies in one-way vehicle sharing systems. *Transp. Res. B Meth.* **2014**, *62*, 35–50. [CrossRef]
305. Kaspi, M.; Raviv, T.; Tzur, M.; Galili, H. Regulating vehicle sharing systems through parking reservation policies: Analysis and performance bounds. *Eur. J. Oper. Res.* **2016**, *251*, 969–987. [CrossRef]
306. Hampshire, R.C.; Sinha, S. A simulation study of Peer-to-Peer carsharing. In Proceedings of the IEEE Forum on Integrated and Sustainable Transportation Systems, Vienna, Austria, 29 June–1 July 2011; pp. 159–163.

307. Shaheen, S.; Martin, E.; Hoffman-Stapleton, M. Shared mobility and urban form impacts: A case study of peer-to-peer (P2P) carsharing in the US. *J. Urban Des.* **2019**, *28*, 1–18. [CrossRef]
308. Dill, J.; McNeil, N.; Howland, S. Effects of peer-to-peer carsharing on vehicle owners' travel behavior. *Transp. Res. C Emerg. Technol.* **2019**, *101*, 70–78. [CrossRef]
309. Saranti, P.G.; Chondrogianni, D.; Karatzas, S. Autonomous vehicles and blockchain technology are shaping the future of transportation. *Adv. Intell. Syst.* **2019**, *879*, 797–803.
310. Pham, T.T.; Kuo, T.-C.; Tseng, M.-L.; Tan, R.R.; Tan, K.; Ika, D.S.; Lin, C.J. Industry 4.0 to accelerate the circular economy: A case study of electric scooter sharing. *Sustainability* **2019**, *11*, 6661. [CrossRef]
311. Eccarius, T.; Lu, C.-C. Adoption intentions for micro-mobility—Insights from electric scooter sharing in Taiwan. *Transp. Res. D Transp. Environ.* **2020**, *84*, 102327. [CrossRef]
312. James, O.; Swiderski, J.I.; Hicks, J.; Teoman, D.; Buehler, R. Pedestrians and e-scooters: An initial look at e-scooter parking and perceptions by riders and non-riders. *Sustainability* **2019**, *11*, 5591. [CrossRef]
313. Zagorskas, J.; Burinskiene, M. Challenges caused by increased use of E-powered personal mobility vehicles in European cities. *Sustainability* **2020**, *12*, 273. [CrossRef]
314. Turoń, K.; Czech, P. The concept of rules and recommendations for riding shared and private e-scooters in the road network in the light of global problems. *Adv. Intell. Syst.* **2020**, *1083*, 275–284.
315. European Union. Directive 2010/40/EU of the European Parliament and of the Council of 7 July 2010. Available online: https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:207:0001:0013:EN:PDF (accessed on 8 June 2020).
316. Perallos, A.; Hernandez-Jayo, U.; Onieva, E.; García-Zuazola, I.J. *Intelligent Transport Systems: Technologies and Applications*; John Wiley: New York, NY, USA, 2015.
317. European Commission. Evaluation of the ITS Directive 2010/40/EU—Analysis of Responses to the Open Public Consultation. Available online: https://ec.europa.eu/transport/sites/transport/files/2017-evaluation-its-directive-analysis.pdf (accessed on 8 June 2020).
318. Ben-Elia, E.; Avineri, E. Response to travel information: A behavioural review. *Transp. Rev.* **2015**, *35*, 352–377. [CrossRef]
319. Dell'Orco, M.; Marinelli, M. Fuzzy data fusion for updating information in modeling drivers' choice behavior. *Lect. Notes Comput. Sci.* **2009**, *5755*, 1075–1084.
320. Di Pace, R.; Marinelli, M.; Bifulco, G.N.; Dell'Orco, M. Modeling risk perception in ATIS context through fuzzy logic. *Procedia Soc. Behav.* **2011**, *20*, 916–926. [CrossRef]
321. Marinelli, M.; Caggiani, L.; Ottomanelli, M. Managing the uncertainty of data fusion from different sources in modelling route choice behaviour. In Proceedings of the 18th IEEE International Conference on Intelligent Transportation Systems, Gran Canaria, Spain, 15–18 September 2015; pp. 202–207.
322. Zhong, S.; Zhou, L.; Ma, S.; Jia, N. Effects of different factors on drivers' guidance compliance behaviors under road condition information shown on VMS. *Transp. Res. A Policy Pract.* **2012**, *46*, 1490–1505. [CrossRef]
323. Yan, X.D.; Wu, J.W. Effectiveness of variable message signs on driving behavior based on a driving simulation experiment. *Discret. Dyn. Nat. Soc.* **2014**, *2014*, 206805. [CrossRef]
324. Chang, A.; Wang, J.; Jin, Y. Driver compliance model under dynamic travel information with ATIS. *Adv. Intell. Syst.* **2017**, *454*, 201–212.
325. Dell'Orco, M.; Marinelli, M. Modeling the dynamic effect of information on drivers' choice behavior in the context of an Advanced Traveler Information System. *Transp. Res. C Emerg Tehnol.* **2017**, *85*, 168–183. [CrossRef]
326. Tu, Q.; Cheng, L.; Li, D.; Ma, J.; Sun, C. Stochastic transportation network considering ATIS with the information of environmental cost. *Sustainability* **2018**, *10*, 3861. [CrossRef]
327. Rehrl, K.; Brunauer, R.; Gröchenig, S. Collecting floating car data with smartphones: Results from a field trial in Austria. *J. Locat. Based Serv.* **2016**, *10*, 16–30. [CrossRef]
328. Marinelli, M.; Palmisano, G.; Astarita, V.; Ottomanelli, M.; Dell'Orco, M. A Fuzzy set-based method to identify the car position in a road lane at intersections by smartphone GPS data. *Transp. Res. Proc.* **2017**, *27*, 444–451. [CrossRef]
329. He, Z.; Qi, G.; Lu, L.; Chen, Y. Network-wide identification of turn-level intersection congestion using only low-frequency probe vehicle data. *Transp. Res. C Emerg. Tehnol.* **2019**, *108*, 320–339. [CrossRef]
330. Chen, D.; Yan, X.; Liu, F.; Liu, X.; Wang, L.; Zhang, J. Evaluating and diagnosing road intersection operation performance using floating car data. *Sensors* **2019**, *19*, 2256. [CrossRef]

331. Fang, W.; Chen, H.; Hu, R. A Novel Approach to Identify Intersection Information via Trajectory Big Data Analysis in Urban Environments. *Smart Innov. Syst. Technol.* **2020**, *156*, 189–199.
332. Kieć, M.; Ambros, J.; Bąk, R.; Gogolín, O. Evaluation of safety effect of turbo-roundabout lane dividers using floating car data and video observation. *Accid. Anal. Prev.* **2019**, *125*, 302–310. [CrossRef] [PubMed]
333. Fusco, G.; Colombaroni, C.; Isaenko, N. Short-term speed predictions exploiting big data on large urban road networks. *Transp. Res. C Emerg. Tehnol.* **2016**, *73*, 183–201. [CrossRef]
334. Rempe, F.; Franeck, P.; Fastenrath, U.; Bogenberger, K. A phase-based smoothing method for accurate traffic speed estimation with floating car data. *Transp. Res. C Emerg. Tehnol.* **2017**, *85*, 644–663. [CrossRef]
335. Rahmani, M.; Koutsopoulos, H.N.; Jenelius, E. Travel time estimation from sparse floating car data with consistent path inference: A fixed point approach. *Transp. Res. C Emerg. Tehnol.* **2017**, *85*, 628–643. [CrossRef]
336. He, Z.; Zheng, L. Visualizing traffic dynamics based on floating car data. *J. Transp. Eng. A Syst.* **2017**, *143*, 04017005. [CrossRef]
337. Klunder, G.A.; Taale, H.; Kester, L.; Hoogendoorn, S. Improvement of Network Performance by In-Vehicle Routing Using Floating Car Data. *J. Adv. Transp.* **2017**, *2017*, 8483750. [CrossRef]
338. Astarita, V.; Giofrè, V.P.; Guido, G.; Vitale, A. The use of adaptive traffic signal systems based on floating car data. *Wirel. Comm. Mob. Comp.* **2017**, *2017*, 4617451. [CrossRef]
339. Astarita, V.; Giofrè, V.P.; Guido, G.; Vitale, A. A single intersection cooperative-competitive paradigm in real time traffic signal settings based on floating car data. *Energies* **2019**, *12*, 409. [CrossRef]
340. Astarita, V.; Giofré, V.P.; Festa, D.C.; Guido, G.; Vitale, A. Floating car data adaptive traffic signals: A description of the first real-time experiment with "connected" vehicles. *Electronics* **2020**, *9*, 114. [CrossRef]
341. Gao, K.; Huang, S.; Xie, J.; Xiong, N.N.; Du, R. A review of research on intersection control based on connected vehicles and data-driven intelligent approaches. *Electronics* **2020**, *9*, 885. [CrossRef]
342. Xu, C.; Wang, X.; Yang, H.; Xie, K.; Chen, X. Exploring the impacts of speed variances on safety performance of urban elevated expressways using GPS data. *Accid. Anal. Prev.* **2019**, *123*, 29–38. [CrossRef] [PubMed]
343. Colombaroni, C.; Fusco, G.; Isaenko, N. Analysis of Road Safety Speed from Floating Car Data. *Transp. Res. Proc.* **2020**, *45*, 898–905. [CrossRef]
344. Gallelli, V.; Vaiana, R. Safety improvements by converting a standard roundabout with unbalanced flow distribution into an egg turbo roundabout: Simulation approach to a case study. *Sustainability* **2019**, *11*, 466. [CrossRef]
345. Song, G.; Zhang, F.; Liu, J.; Yu, L.; Gao, Y.; Yu, L. Floating car data-based method for detecting flooding incident under grade separation bridges in Beijing. *IET Intell. Transp. Syst.* **2015**, *9*, 817–823. [CrossRef]
346. Houbraken, M.; Logghe, S.; Schreuder, M.; Audenaert, P.; Colle, D.; Pickavet, M. Automated Incident Detection Using Real-Time Floating Car Data. *J. Adv. Transp.* **2017**, *2017*, 8241545. [CrossRef]
347. Carrese, S.; Cipriani, E.; Mannini, L.; Nigro, M. Dynamic demand estimation and prediction for traffic urban networks adopting new data sources. *Transp. Res. C Emerg. Tehnol.* **2017**, *81*, 83–98. [CrossRef]
348. Nigro, M.; Cipriani, E.; del Giudice, A. Exploiting floating car data for time-dependent Origin–Destination matrices estimation. *J. Intell. Transp. Syst.* **2018**, *22*, 159–174. [CrossRef]
349. Bauer, D.; Richter, G.; Asamer, J.; Heilmann, B.; Lenz, G.; Kölbl, R. Quasi-Dynamic Estimation of OD Flows from Traffic Counts Without Prior OD Matrix. *IEEE Trans. Intell. Transp. Syst.* **2018**, *19*, 2025–2034. [CrossRef]
350. Fusco, G.; Bracci, A.; Caligiuri, T.; Colombaroni, C.; Isaenko, N. Experimental analyses and clustering of travel choice behaviours by floating car big data in a large urban area. *IET Intell. Transp. Syst.* **2018**, *12*, 270–278. [CrossRef]
351. Vanajakshi, L.; Subramanian, S.C.; Sivanandan, R. Travel time prediction under heterogeneous traffic conditions using global positioning system data from buses. *IET Intell. Transp. Syst.* **2009**, *3*, 1–9. [CrossRef]
352. Gurmu, Z.K.; Fan, W.D. Artificial neural network travel time prediction model for buses using only GPS data. *J. Public Transp.* **2014**, *17*, 45–65. [CrossRef]
353. Kodali, S.; Koppineni, A.; Chaitanya, K.; Siddharth, K.; Vanajakshi, L. Development of a telematics based advanced public transportation system. *Eur. Transp.* **2015**, *58*, 2.
354. Kumar, B.A.; Vanajakshi, L.; Subramanian, S.C. Pattern-based time-discretized method for bus travel time prediction. *J. Transp. Eng.* **2017**, *143*, 04017012. [CrossRef]
355. Kumar, B.A.; Vanajakshi, L.; Subramanian, S.C. Bus travel time prediction using a time-space discretization approach. *Transp. Res. C Emerg. Tehnol.* **2017**, *79*, 308–332. [CrossRef]

356. Canca, D.; Zarzo, A.; González-R, P.L.; Barrena, E.; Algaba, E. A methodology for schedule-based paths recommendation in multimodal public transportation networks. *J. Adv. Transp.* **2013**, *47*, 319–335. [CrossRef]
357. Toledo, T.; Cats, O.; Burghout, W.; Koutsopoulos, H.N. Mesoscopic simulation for transit operations. *Transp. Res. C Emerg. Tehnol.* **2010**, *18*, 896–908. [CrossRef]
358. Colombaroni, C.; Fusco, G.; Isaenko, N. A Simulation-Optimization Method for Signal Synchronization with Bus Priority and Driver Speed Advisory to Connected Vehicles. *Transp. Res. Proc.* **2020**, *45*, 890–897. [CrossRef]
359. European Union. C-ITS Platform—Final Report. Available online: https://ec.europa.eu/transport/sites/transport/files/themes/its/doc/c-its-platform-final-report-january-2016.pdf (accessed on 8 June 2020).
360. Sae International. Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles. Available online: https://www.sae.org/standards/content/j3016_201806/ (accessed on 8 June 2020).
361. Botte, M.; Pariota, L.; D'Acierno, L.; Bifulco, G.N. An overview of cooperative driving in the European Union: Policies and practices. *Electronics* **2019**, *8*, 616. [CrossRef]
362. Javed, M.A.; Zeadally, S.; Hamida, E.B. Data analytics for Cooperative Intelligent Transport Systems. *Veh. Commun.* **2019**, *15*, 63–72.
363. Javed, M.A.; Hamida, E.B. On the Interrelation of Security, QoS, and Safety in Cooperative ITS. *IEEE Trans. Intell. Transp.* **2017**, *18*, 1943–1957. [CrossRef]
364. Ehlers, U.C.; Ryeng, E.O.; McCormack, E.; Khan, F.; Ehlers, S. Assessing the safety effects of cooperative intelligent transport systems: A bowtie analysis approach. *Accid. Anal. Prev.* **2017**, *99*, 125–141. [CrossRef] [PubMed]
365. Edwards, S.; Hill, G.; Goodman, P.; Blythe, P.; Mitchell, P.; Huebner, Y. Quantifying the impact of a real world cooperative-ITS deployment across multiple cities. *Transp. Res. A Policy Pract.* **2018**, *115*, 102–113. [CrossRef]
366. Meng, X.; Roberts, S.; Cui, Y.; Gao, Y.; Chen, Q.; Xu, C.; He, Q.; Sharples, S.; Bhatia, P. Required navigation performance for connected and autonomous vehicles: Where are we now and where are we going? *Transp. Plan. Technol.* **2018**, *41*, 104–118. [CrossRef]
367. Mertens, J.C.; Knies, C.; Diermeyer, F.; Escherle, S.; Kraus, S. The need for cooperative automated driving. *Electronics* **2020**, *9*, 754. [CrossRef]
368. Zambrano-Martinez, J.L.; Calafate, C.T.; Soler, D.; Lemus-Zúñiga, L.G.; Cano, J.C.; Manzoni, P.; Gayraud, T.A. Centralized Route-Management Solution for Autonomous Vehicles in Urban Areas. *Electronics* **2019**, *8*, 722. [CrossRef]
369. Mai, T.; Jiang, R.; Chung, E. A Cooperative Intelligent Transport Systems (C-ITS)-based lane-changing advisory for weaving sections. *J. Adv. Transp.* **2016**, *50*, 752–768. [CrossRef]
370. Zhang, C.; Sabar, N.R.; Chung, E.; Bhaskar, A.; Guo, X. Optimisation of lane-changing advisory at the motorway lane drop bottleneck. *Transp. Res. C Emerg. Tehnol.* **2019**, *106*, 303–316. [CrossRef]
371. Chen, L.; Englund, C. Cooperative Intersection Management: A Survey. *IEEE Trans. Intell. Transp.* **2016**, *17*, 570–586. [CrossRef]
372. Hasenjager, M.; Heckmann, M.; Wersing, H. A Survey of Personalization for Advanced Driver Assistance Systems. *IEEE Trans. Intell. Veh.* **2020**, *5*, 335–344. [CrossRef]
373. Arena, F.; Pau, G. An overview of vehicular communications. *Future Internet* **2019**, *11*, 27. [CrossRef]
374. Aramrattana, M.; Larsson, T.; Jansson, J.; Nåbo, A. A simulation framework for cooperative intelligent transport systems testing and evaluation. *Transp. Res. F Traffic Psychol. Behav.* **2019**, *61*, 268–280. [CrossRef]
375. Aramrattana, M.; Andersson, A.; Reichenberg, F.; Mellegård, N.; Burden, H. Testing cooperative intelligent transport systems in distributed simulators. *Transp. Res. F Traffic Psychol. Behav.* **2019**, *65*, 206–216. [CrossRef]