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HOW POLICY MAKERS CAN OVERCOME COMPETING VALUES IN THE PURSUIT OF SOLUTIONS TO SOCIETAL PROBLEMS - LIGHT ELECTRIC VEHICLES IN THE DUTCH MOBILITY SECTOR FROM AN INSTITUTIONAL LOGICS PERSPECTIVE

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Abstract

The Dutch mobility system is in transition. Due to the urgent need for low-carbon alternative transportation methods, various new vehicle types are being developed, to get people 'out of their car', often stimulated by policy makers. These new vehicle types are often in the form of light and electric powered vehicles, shortly LEV's. The current regulation system around the admission of these new vehicle types is delegated by the ministry of infrastructure and water management to independent agencies. These agencies primarily focus on safety, whereas other actors, like the ministry, innovators or companies, might strive for different or more values like sustainability, liveability or economic benefits. This research uses the concepts of institutional logics to capture the various values strived for by actors involved in the development and implementation of LEV's in the Dutch mobility sector. By means of a qualitative research, interviews are conducted with these actors, which resulted in the distinction of three institutional logic types: the automobile logic, the society logic and the regulation logic.

This research describes how the infrastructure and regulation mechanisms are influenced by the car-dependent automobile logic, and how this makes it difficult for LEV's to substitute the car. It is observed that actors aiming at the implementation of LEV's have a variety of social values like safety, liveability, and sustainability institutionalized in the society logic. The regulation logic has to balance between on the one hand, secure the safety and performance of the current infrastructure system, but on the other hand transition in line with the call for urgency towards more holistic views on mobility. The holistic view of the society logic creates tensions with both the automobile logic with its economic focus, and the regulation logic with its primary focus on safety.

These insights in the Dutch mobility system and the actors and values embedded within can be used by policy makers to guide them in the stimulation of the development of solutions to various societal problems in the mobility sector, with a main focus on LEV's.

Preface

This master's thesis was written for the master's program Innovation Sciences at Utrecht University. I wrote this thesis during an internship at the ministry of infrastructure and water management. This internship started in November 2020, and this thesis was finished in July 2021. The research process was sometimes difficult. Due to the corona crisis, I did not get the opportunity to really participate in the working culture at the ministry and I did almost all of my work in my student room, by myself. However, I would like to thank Arjan van Vliet for the opportunity to participate with various projects at the ministry and his flexibility and excellent supervision. I would also like to thank Rik Braams for assisting me in my research progress and challenging me with to-the-point questions. Furthermore I would like to thank all other colleagues from the ministry. Although we haven't met in person up to this point, and only worked together through digital connections, I want to thank everyone for including me in the innovation unit and guiding me when needed. The internship taught me much an more about the mobility sector and really inspired me to stay active in the mobility sector in my future career. Lastly, I would also like to thank Joeri Wesseling as my supervisor from Utrecht University for his excellent feedback and flexibility during these unpredictable times.

I hope you enjoy the read,

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Table of contents

Abstract 1
Preface 2
Introduction 4
1.1 Problem definition 5
1.2 Research questions 6
Theory 7
2.1 Regime theory 7
2.2 Institutional logics 8
2.3 Conflicting institutional logics 8
2.4 Ideal type logics 9
Methods 11
3.1 Phase 1: Defining field logics 11
3.2 Phase 2: Case study 13
3.3 Interviews 13
Results 15
4.1 Automobile logic – Car as 'standard' 15
4.2 Society logic – Social values 17
4.3 Regulation logic – Balancing in between 18
4.4 Tensions around the car 'lock-in' 19
4.5 Tensions around safety 21
4.5.1 Safety on the political agenda 21
4.6 Tensions regarding roles and communication 22
4.6.2.1 Expectations 22
4.6.2.2 Communication 23
Conclusion 25
Discussion 28
6.1 Policy recommendations 28
6.1.1 LEV as ideal type solution 28
6.1.2 Infrastructure and urban planning 28
6.1.3 Clear role division and communication 29
6.2 Theoretical relevance and limitations 30
References 32
Appendix A: List of respondents 35
Appendix B: Interview Guide 36
Appendix C: Informed Consent Form 38

Introduction

Originally innovation policy's goal has been to bring new ideas to the market, support diffusion of innovation and foster economic growth. In the past few decades however, a diverse set of goals to tackle societal problems has gained greater importance, such as tackling environmental, demographic or public-health related problems (Mazzucato, 2017). Innovation scholars and innovation policy scholars in particular have acknowledged the importance of innovation in the chase of solutions to these problems. The concept of mission-oriented innovation policy defines this pursuit of solutions to these societal problems as missions with innovation as a tool to achieve the required solutions (Mazzucato, 2017). Such a mission is defined by Hekkert et al. (2020) as '*an urgent strategic goal that requires transformative change directed towards overcoming a wicked societal problem*'.

The notion of transformation is crucial here. Because these societal challenges and missions have gained importance over the past few years, transformations are needed to overcome the path dependency of many development processes that are bound to their traditions that have grown over decades. This often comes paired with the destruction of established ways of acting in order to change the direction of innovation. In order to do this, legitimacy is needed, for this change in direction often comes paired with contradictory values between different actors. The missions chased by policy makers are often not in line with the missions of other actors. A famous example, also defined by Unruh (2000), is the way in which many industries are dependent on - and therefore 'locked-in' to - the use of carbon, which inhibits the diffusion of carbon-saving technologies stimulated by policy makers. But also many other conflicting values are being faced in the pursuit of these missions. In order to gain legitimacy in these transitions it is important to have knowledge about the different values involved with various actors within a system. With this knowledge, policy makers can take concrete actions to overcome contradictory values when pursuing their missions. This research will make a contribution to this knowledge by examining the different values chased in a specific sector, in this case the Dutch mobility sector, and provide concrete suggestions on how policy makers should deal with contradictory values in order to fulfil their missions.

This study captures and defines these values with the use of the theory institutional logics. Building on the Multi-level perspective by Geels (2002) on how innovations arise in regimes by development in closed environments called niches and pressure from the landscape level, they describe regimes as follows: '*the so-called 'grammar' of the system, i.e. the highly institutionalized, yet not necessarily coherent formal and informal rules that mutually construct and are constructed by actors in a system*' (Fuenfschilling & Truffer, 2014). In a regime, actors' decisions and actions are determined by their values, beliefs and problem perceptions, which are formed by institutional logics. Institutional logics

can be seen as deeply structured rules that guide the perceptions and actions of actors within the regime. The regime in a system can be qualified as 'strong' on the one hand or 'weak' on the other hand. A strong regime is characterized by one established dominant field logic that determines the course of development of the socio-technical system. On the other hand, a weak regime is characterized by a set of multiple institutional logics that might compete and bring unbalance to the system (Geels 2002; Fuenfschilling & Truffer 2014). Understanding how institutional logics are configured in a specific sector or regime is crucial for actors, especially policy makers, that try to influence or even change the direction of innovation in the system. This research will contribute to this understanding by analysing institutional logics in the Dutch mobility sector.

1.1 Problem definition

As mentioned before, this research will focus on the Dutch mobility sector. Innovation in this sector arises in many forms. Besides the development of completely new vehicles on road, water, air or rail, also the development of new vehicle systems occur that change the way in which a vehicle is used or manufactured. These innovations vary from systems to make cars ride more autonomously or systems to make vehicles more aware of their environment by implementing sensors and numerous other innovations.

Innovation in mobility has the potential to contribute to a diverse set of values by creating a more safe, user friendly, efficient, sustainable and economically beneficial infrastructure system. Because these innovations, when adopted, are almost always directly used in a complex system of different vehicles and users, policy should make a balancing between the benefits and potential threats of these innovations in the infrastructure system. When making such a judgement call, policy has to weigh these benefits and threats and make a decision on whether to admit the novel vehicle or vehicle system to enter the market and thereby, enter the infrastructure system.

The decision whether to admit a novel vehicle can be linked to different goals and missions that the government has made for the mobility sector. Similar to mission-oriented innovations, these goals and missions aim to tackle societal problems. For instance, the Dutch government has embraced 'Vision Zero' to reduce fatal traffic accidents in 2050 to zero. Next to this, the Dutch government has sustainability goals such as the ambition that by 2030, all new cars will be emission-free. Also the government should strive for economic prosperity and a healthy living environment for all citizens. Innovation has the potential to achieve these goals, but when innovations might achieve one or more goals at the expense of others, the afore mentioned 'judgement call' becomes very difficult.

In general, the judgement on the safety aspects of these technologies is done by an independent agency such as the RDW, often assisted by organizations like SWOV (Dutch foundation for scientific

research on traffic safety). These organizations examine and test road vehicles on safety and report to the government afterwards. This report is often in the form of an urgent advice. The problem that this research addresses is the lack of a proper reference framework to weigh and balance this urgent advice with the other values and goals that the government is striving. The institutionalized way in which safety is currently valued by a third party leaves little room for other values when a novel vehicle of vehicle system is labelled as unsafe. The reasons for this can vary from ethical; it is unethical to lose on safety to increase other values, economical; it is too costly to lose on safety to increase other values, to politically sensitive; for instance when a major incident occurred with a similar vehicle or vehicle system. These various tensions between different values will be addressed in this research.

This research will examine what different values are present in the Dutch mobility sector, and how these values are imbedded in field specific institutional logics. By doing this, the configuration of these logics can be analysed over time with regard to solutions to various societal problems. The focus of this study will be on the comparison between safety and sustainability, but in order to analyse this, a broader overview of the sector with its values and institutional logics will be created and analysed.

The way in which safety and possibly other values are institutionalized in the mobility sector differs per vehicle type, also called modalities. This research will focus on a controversial type of mobility, namely Light Electric Vehicles (LEV's), which will be further explained in the case description in the method section.

1.2 Research questions

The findings of this research will be structured and formulated by answering the following research questions:

In what way does the configuration of institutional logics in the Dutch mobility sector influence the implementation of alternative vehicles (LEV's) as a solution to societal problems?

Sub a: Which institutional logics are present in the Dutch mobility sector and how have they come into being?

Sub b: What conflicts can be identified between competing institutional logics in the mobility sector?

Sub c: In what way do these conflicts boost or hinder the implementation of alternative vehicles (LEV's) as a solution to societal problems?

Theory

2.1 Regime theory

Innovation is an outcome of socio-technical interaction. It does not simply occur, it is a product or process as a result of various actors competing and collaborating in a shared environment. According to the Multi-Level Perspective (MLP) there are three levels that can be distinguished in such a socio-technical system. The three levels distinguished by Geels (2002) are regimes, niches and the landscape. Each level will be shortly be explained.

Regimes are the structured systems with semi-coherent sets of rules that different social actors follow when carrying out their activities, such as producing, using, regulating etc. Various actors e.g. producers, users, regulators or policy makers are linked in social interactions with certain formal and informal rules. Because of these rules, innovation within regimes is often of the incremental kind for radical innovation often occurs hand in hand with disruption of the established institutions. Therefore, radical innovation on the other hand enters these regimes from niches, which are isolated from the institutionalized rules of the game within the regime (Geels, 2002). The third level of the MLP is the landscape level, which can exert force on the regime level to make space for the absorption of the innovation from the niche level to the regime level.

Regimes are structured systems with numerous kinds of institutions that shape the way in which different actors interact with each other. Although MLP-theory suggests that institutions within a regime are rather rigid and stable and mainly change due to radical innovation from niches and external forces from the landscape level (Geels, 2002), other researchers have highlighted the potential of organizations within a regime to enforce institutional change within that regime (DiMaggio and Powell 1983; Lawrence and Suddaby 2006; Battilana et al. 2009). The theory of institutional work (Lawrence and Suddaby, 2006) explains how, as mentioned before, actors follow the rules of the institutions in their regime, but also how their interaction can create new institutions or disrupt existing institutions. These strands of literature are in some way contradictory in the way in which institutions are defined as flexible. By defining the different values and missions that are pursued in a sector, this study will show in what way institutions might determine the actions of actors and, on the other hand, show how actors, such as policy makers, can gain legitimacy to overcome contradictory values that are faced when pursuing their missions. This will be done by using the theory on institutional logics, which is further described in the next section.

2.2 Institutional logics

The way in which institutions influence actors within a regime and vice versa is structured in what scholars call 'institutional logics'. These institutional logics determine what interests are to be pursued by the different actors within the regime and are embedded in institutional sectors. Traditionally, scholars have made a distinction between seven kinds of institutional sectors i.e. the family, the community, the religion, the professions, the state, the corporation, and the market (Thornton et al. 2012). These institutional sectors can be seen as the sources that determine the 'rules of the game' present in a regime.

Institutional logics can be translated into more concrete field logics. Field logics are *'used as guiding principles that offer specific rationalities, set the rules of the game, allocate power and status and steer attention towards specific problems and solutions'* (Fuenfschilling and Truffer, 2014). These field logics are sector-specific and different actors within a sector can chase different field logics, for each actor has its own values, embedded in their institutional logics. Each actor translates these values to specific and individual goals and sector-specific values that determine its actions. Therefore different field logics can be present in one sector.

2.3 Conflicting institutional logics

There have been many studies on multiple or even conflicting logics present in one sector or field. Kieft et al. (2020) have studied multiple conflicting field logics in relation to Dutch energy-efficiency. They state that perceptions of problems and solutions differ between actors in the field when actors are guided by more than one institutional logic. This can cause and confusion within the field, especially for decision making actors dealing with competing and possibly misunderstood priorities. Baur (2020) also found this in his study on farmers that are pulled towards conflicting management paradigms. This study focused on the conflict between sustainable and safe food production, in which farmers are trapped. Higgins et al. (2016) also mention this by stating that multiple logics can cause confusion for individuals dealing with competing and possible misunderstood priorities. Also Dunn & Jones (2010) highlighted the presence of multiple logics in the field of medical education: care and science. Their study shows that different groups with various interests support distinct institutional logics. They observed that these interests may fluctuate over time and thereby create dynamic tensions when it comes to decision making.

Thornton (2002) states that multiple institutional logics, especially competing logics create a tension, which comes paired with new opportunities for institutional change. These tensions can be seen as an obstacle or hindering force when it comes to stimulating solutions to various (sector-specific) problems. However, many scholars have highlighted the possibilities that come paired with the

presence of multiple institutional logics, and mainly the shift from one dominant logic to another. As stated, the pursuit of missions and solutions to global threats often comes paired with transformation and institutional change. Reay and Hinings (2009) state that it is the dominant logic that guides behaviour, and institutional change is usually associated with a new logic for the field. Therefore, the concepts of institutional logics and institutional change are tightly connected. Baur (2020) supports this theory by stating that understanding the way in which institutional logics overlap or diverge may lead to opportunities for promoting transformation in response to (global) threats.

Next to shifting between multiple present institutional logics, also the emergence of a novel institutional logic may create room for innovation and change. This emergence can be interpreted as an external force from the landscape level on a regime (Fuenfschilling and Truffer, 2014).

2.4 Ideal type logics

Fuenfschilling & Truffer (2014) have made contributions to the theory on transition dynamics by identifying and analysing different types of institutional logics present in a socio-technical regime. Their analysis describes how these logics can compete and how different actors and their values and missions create tensions and even shifts from one logic to another. In doing so, different logics can be dominant over time in a specific sector. These logics are identified as ideal type logics, which are not describing the actual situation in a particular sector, but are an analytical construct to describe and compare all possible occurrences of distinct characterization and meaning schemes (Thornton & Ocasio, 2008). For analytic purposes, these ideal type logics describe the most extreme situations in the field, however in practice, actors can be guided by elements of multiple logics.

The characterization of the ideal type logics in the Australian water sector by Fuenfschilling & Truffer (2014) is done by describing different sub-elements of each ideal type logic. For each ideal type logic the sub-elements (a) sector logic, (b) values, (c) mission, (d) technologies, (e) main actors, (f) expertise, (g) organization form, and (h) funding are defined and categorized. In their analysis, not every ideal type logic has only one value, mission, technology etc. In this case, the sub-element sector logic can be seen as the dominant sectoral field that influences the corresponding ideal type logic e.g. the state, community or market.

From the identified sub-elements, a limited set of ideal type logics is derived, after which the sub-elements are categorized into the different logic types. This creates an overview that can assist in the reasoning on how institutions shape actors' actions and vice versa, and creates insights in conflicting values and missions within a sector. Also Kieft et al. (2020) used ideal type logics in their research on conflicting institutional logics in relation to Dutch energy-efficiency. The identified ideal type logics provide an overview of the field and all the associated missions, values and beliefs, which can be

compared to empirical data to see how well they match. This research method is referred to as pattern matching (Reay and Jones, 2016).

Kieft et al (2020) and Fuenfschilling & Truffer (2014) use different categories for the classification and explanation of the different logics. As stated by Reay and Jones (2016): *"Institutional orders and elemental categories may vary depending on the researcher's interest and the context of their study".* The next section will elaborate on how the institutional logics in the Dutch mobility sector will be defined for this research and how the research questions will be answered.

Methods

This research was conducted in two phases. During the first phase the different values, strived for in de Dutch mobility sector were defined and linked to specific institutional logics. During the second phase of this research, these institutional logics were applied to the case of the admission of Light Electric Vehicles.

3.1 Phase 1: Defining field logics

The goal of this first phase was to define the different values that are strived for in the Dutch mobility sector and highlight the tensions that come paired with conflicting values embedded in their institutional logics. As mentioned in the previous section, these values can be seen in the potential contributions or limitations innovations - in this case Light Electric Vehicles - have to the solution of a societal problem. As such, an innovation might have economic, sustainable, safety or health contributions or limitations to the infrastructure or to users of the infrastructure system. This part of the research will result in an overview of the different values and the different actors present in the sector.

To be able to answer what influence the configuration of different institutional logics has on the implementation of solutions to societal problems, it is important to include the development of the different values and institutional field logics in history. This was done by first identifying the various values and missions present in the sector, and by categorizing these findings in different ideal type logics, following the pattern matching approach (Reay and Jones, 2016). As stated before these ideal type logics are an analytical construct to describe and compare all possible occurrences of distinct characterization and meaning schemes (Thornton & Ocasio, 2008). In practice, actors can be influenced by a combination of beliefs and values embedded in multiple ideal type logics. During this phase of the research the different present ideal type logics were identified.

These ideal type logics were identified with interviews combined with a document analysis. Exploratory interviews were conducted, mainly with experts on the Dutch mobility sector from the ministry of Infrastructure and Water management. Next to this, scientific articles on the mobility sector and grey literature like policy reports, safety reports from independent agencies (like RDW, SWOV), news articles and a variety of other documents were analysed. From this research, the different values present in the Dutch mobility sector were defined and categorized under the different ideal type logics resulting from these values.

This research focusses on how policy makers can overcome contradictory values and conflicting institutional logics in the pursuit of solutions to various societal problems, in the form of alternative

modes of personal transport. The to be identified institutional field logics were categorized by means of the sub-elements used by Fuenfschilling & Truffer (2014). Identifying these sub-elements creates insights in how these values are operationalized in the field. Besides it can be used to differentiate between the various ideal type logics present in the sector. These sub-elements and the potential conflicts between them, will have an impact on the implementation of solutions to societal problems. This last element is crucial to form the bridge between studying the configuration of institutional logics in the Dutch mobility sector, and answering the research question. These sub-elements with the additional practical impact form the basis of the categorization of the various ideal type logics (figure 1). They give insights in which actors perform what actions and for what purpose, and what impact these elements have on the pursuit of solutions to various societal problems. Especially for what purpose actors perform their actions is crucial in this study. Knowing the underlying reasons for the believes and actions of actors makes it possible to differentiate between the institutional logics in this sector.

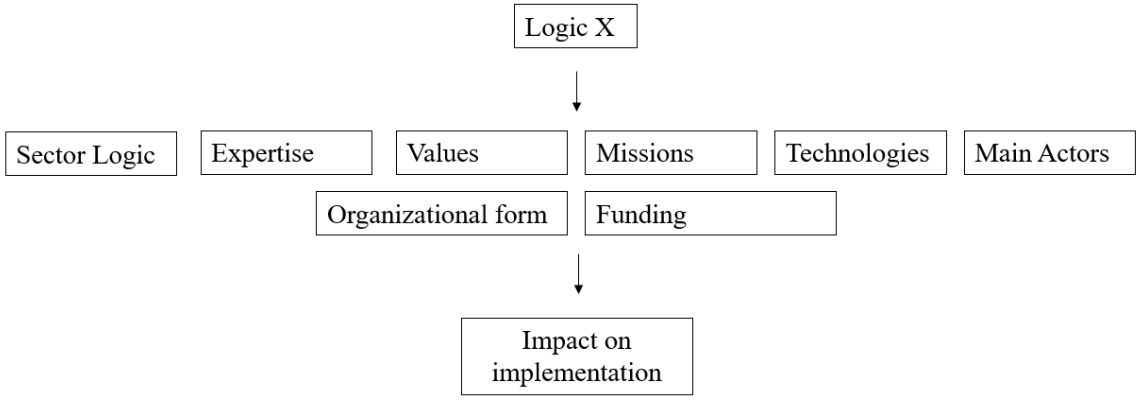

Figure 1: Sub-elements of institutional field logics

When the existence and historical development of these field logics were defined, the current configuration of the field logics was analysed. Configuration in this sense means if and how the different field logics have an influence on one another and in what way these logics diverge and create tensions in the sector. The previously mentioned literature study formed the basis of this research. This was elaborated with interviews with different organizations and individuals engaged with innovation within the Dutch mobility sector. An overview of the interviewed respondents is listed in Appendix A. Because phase 1 of this research gave insights in what actors are involved in the sector, the list of interviewees was elaborated during phase 1 by means of snowballing. More information on the interviews is given in section 3.3.

To give more context to the current status of the configuration of field logics in the Dutch Mobility sector, the identified ideal type logics were applied to the case of Light Electric Vehicles. This was done during the second phase of this research which is described below.

3.2 Phase 2: Case study

During this phase the defined field logics were applied to a particular case. This resulted in practical insights in how the field logics are configured in a particular modality, and gave the possibility to formulate concrete suggestions on how policy makers can interfere in this configuration to stimulate the diffusion of solutions to various societal problems. This research analysed Electric Vehicles (LEV's). LEV's are vehicles powered by electricity and with a mass generally below 50 kilograms. LEV's appear in a large variety of vehicle types such as scooters, steps or bicycles. These vehicles have the potential to be sustainable substitutes for heavy and more polluting vehicles at short distances such as motorcycles or cars. Because of the big variety and fast development of these vehicles, the current regulatory system divides these vehicles into different categories. New vehicles are not always automatically categorized properly, which can result in flaws in the safety assessment. Two consequences can be distinguished here: (a) the vehicle is admitted on the road although it is not properly classified as safe, which was for example the case with the Stint, which will also be further analysed in this case study, and (b) the development and diffusion of the vehicle is hindered due to a too strict safety assessment. This study gave a more elaborate and in depth view on the configuration of the logics defined in phase 1, with regard to this particular case. Respondents from the ministry of Infrastructure and Water management and from RDW were interviewed for this case, elaborated with other actors identified during phase 1 and this case study.

3.3 Interviews

The interviews that were performed in this research were of a semi-structured form and potentially case-specific (whether or not the interviewee is an expert on a particular case). These interviews were recorded and described. The interviews were analysed with a first round of open coding or initial coding, after which the coded fragments were grouped into categories following the method of focused coding (Charmaz & Belgrave, 2007). These categories were in line with the identified sub-elements of the ideal type logics described by Fuenfschilling & Truffer (2014), starting with the main values, actor positions and actions of the various actor types.

The interviews conducted in phase one were conducted, as stated previously, with experts on the mobility sector from the ministry of Infrastructure and water management. By means of snowballing, the networks of these professionals were used to identify and interview different actors active in the sector. In total, 15 interviews were conducted. Five of these interviews were conducted with ministry

officials, three with admission and safety authorities, four with innovators and developers of LEV's, two with scholars with expertise on safety and urban planning and one with the association of insurers. The total overview of respondents can be found in appendix A. This created a broad perspective on the multiple and potentially conflicting values, missions and other institutions that shape the actions of the actors active in the production, stimulation or admission of LEV's.

The interviews conducted in phase two were case specific and used the insights from phase one to conduct more in-depth interviews about LEV's with experts in the field. Most respondents in phase two answered both general questions on innovation and mobility and specific questions on LEV's. Whether or not an interviewee answered questions on the particular case of LEV's is also noted in Appendix A. Appendix B provides an interview guide that was used for the interviews.

Results

This results section will first describe three institutional logics that can be distinguished in the Dutch mobility sector when regarding Light Electric Vehicles as alternative mode of personal transport. These logics are the automobile logic, the society logic and the regulation logic, which are summarized in tables 1, 2 and 3 respectively. These different institutional logics interact and influence each other, which creates tensions between various actors. These tensions and their effects on the implementation of LEV's will be described after the reconstruction of the institutional logics.

4.1 Automobile logic – Car as 'standard'

The automobile logic can be seen as the highly institutionalized prevailing field logic. This institutional logic resolves around by the 'business-as-usual' way of thinking about the Dutch mobility sector, in which the car is taking a very dominant position as standard transportation method for personal transportation. Table 1 shows the various sub-elements of institutionalization for the automobile logic.

The automobile logic has grown and created its strong position since the appearance of the car on the Dutch market as a form of personal transport in the twentieth century. At the time, the institutional *sector logics* of the market and the corporation gained importance. This resulted in market-oriented sectors with less influence of the state (Fuenfschilling and Truffer, 2014; Thornton et al., 2005). The dominance of the market in the Dutch mobility sector has created as strong and dominant position for the car in which many firms operate and many consumers are involved. The *values* of these companies are originally mainly economic, which results in the *missions* of generating profit and creating an efficient infrastructure. For the mobility sector, this resulted in a situation where the street was no longer a place for 'everyone' to meet other people, but turned into a place where a person does not want to be, but needs to be in order to arrive at another destination. An example of this is the notion of 'stroomstraten' by the municipality of Amsterdam, which are described as streets that have a lot of traffic and little functions (Gemeente Amsterdam, 2013). These developments created the current situation in which the car has a position as most frequently used transportation mode for personal transport (CBS, 2021).

The way in which the automobile logic is institutionalized has major effects on how the Dutch infrastructure is organized and has been constructed over time. One effect is the lock-in of the car as a personal transportation method. This was also found by Geels (2012), who did a multi-level perspective analysis on the mobility sector and low-carbon transitions. It was found that the physical landscape and the infrastructure system has been shaped around the car. He mentions other reasons for the stabilization of the so-called car-regime as well. For example the importance of various social

and cultural elements of car dependency, like the feeling of freedom incorporated in personal car use, and the preference for efficiency in terms of speed and time saving (Sachs, 1992).

The dominance of the automobile market can be seen by the influence of the *main actors*, which are the car and fuel industries and their consumers: car users. Multiple respondents mention the strong lobby behind the industry, which has a major influence in the political scene and also has an influence on the ministry of infrastructure and water management, aiming and directing at the big industries in order to achieve their policy goals (int01; int09; int11). But also the other way around, governance is often aimed at the automobile sector (Geels, 2012). This resulted in a broader spectrum of more social values, such as sustainability, accepted by the car and fuel industry due to governmental influence (int02; int06). This results in adaptations in car technologies, such as electric cars, as an sustainable alternative, with a main focus on cars as *technologies*. The importance of the automobile sector on policy makers has been recognized by other scholars as well. Orsato & Wells (2007), for example, mention the power the industry has when bargaining concessions for new to be established factories because of the jobs it creates. These main actors from the industry mainly act from an economic *expertise* in order to achieve their goals, and get their main *funding* from consumers, thereby acting by the *organizational form* of private firms (int02).

Automobile logic	
Sector Logic	corporation, market
Values	profit (market), efficiency (car user)
Mission	generate profit and create a fast and efficient infrastructure
Technologies	cars
Main actors	car/fuel industry, market leaders, car users
Expertise	economic
Organizational form	private firm
Funding	consumer

Table 1 – Sub-elements of the automobile logic

This lock-in of the car, both from a personal consumer and an industrial perspective, creates tensions with the values and missions of the government that try to get people 'out of the car' in order to gain safety, sustainability and other more social values. How these values are institutionalized and

embedded in the society logic, and how this creates tensions with the automobile logic will be described in the following sections.

4.2 Society logic – Social values

Over the last decades, the ministry of infrastructure and water management has included more social elements to their policy ambitions. As can be seen by the following passage from the policy agenda of the ministry:

"Also upcoming fiscal year, a safe and accessible Netherlands, and a healthy and sustainable environment are at the center of attention in the policy of the ministry of Infrastructure and Water Management" – Beleidsagenda IENW, 2020

This transition is mainly caused by the global urgency on sustainability and health, which are defined in the SDG's (Sustainable Development Goals) by the United Nations (United Nations, 2018). This social awareness has increased the importance of the institutional *sector logic* of the community, resulting in a broader range of social *values* like safety, sustainability, livability, inclusivity and efficiency (int01; int02; int03; int05; int10; int11). There is in some way a consensus that the car, as a way of personal transport, is a poor fit in these ministry ambitions. Various reasons are given for this in the interviews. First of all, the car claims to much space in the environment, both on the road while driving, and maybe even more when it is parked and is not being used, which is the case for most of the time (int02; int08; int09). Secondly, the car emits CO2 and particulate matter, which is bad for the health status of people. And third, the car is occasionally labelled as un-safe due to the weight and relative high driving speed (int01; int08). This results in a call for change, both from the ministry, but also other visionaries and scholars who are concerned about the impact of the car in the Dutch mobility system.

This call for change is answered by mainly start-ups that create smart and sustainable solutions for the mobility sector, which are more in line with the contemporary policy ambitions (int07; int09). Examples of these initiatives are shared mobility platforms, or alternative transportation methods. These alternatives are often electric and labelled as LEV's. These vehicles can be substitutions for cars as a personal transportation method and have the potential to contribute to the *mission* from the society logic, which includes all of the aforementioned values to make safe, sustainable and affordable mobility available for all people. The *main actors* of the society logic, which are the parties that try to realize more socially aware mobility act from a transdisciplinary *expertise*. This can best be seen by the balancing the ministry has to make between maintaining the current infrastructural system, and also create room for alternative vehicles (int10; int11). LEV's and alternatives for cars are often developed through an *organizational form* of start-up initiatives that answer the call for more social

mobility and try to compete with the established car industry. Similar to the automobile logic, funding for the development of these car-substitutes is coming from consumers. However, these start-ups are more dependent on subsidies from the ministry (int01; int11).

The mission to get people out of their car and create room for LEV's is a complex challenge, and is also influenced by the so-called regulation logic. This third and final logic will be explained in the next section.

Society logic	
Sector Logic	community, state
Values	safety, sustainability, liveability, efficiency
Mission	make safe, sustainable and affordable mobility available for all people
Technologies	car-substitutes
Main actors	ministry, start-ups
Expertise	transdisciplinary
Organizational form	start-up initiatives
Funding	consumer, subsidy

Table 2 – Sub-elemements of the society logic

4.3 Regulation logic – Balancing in between

The third distinguishable logic is the regulation logic. How the regulation logic is institutionalized in the Dutch mobility sector can best be seen in the way in which new vehicles are evaluated by independent agencies like RDW. Also an actor like SWOV is strongly involved in the regulation logic. These *main actors* are independent agencies commissioned by the ministry. Their task is to generate knowledge (SWOV) and evaluate and decide whether to admit new vehicles on the road (RDW) with the use of their technological *expertise*. Because these actors are commissioned by the ministry, they also get their *funding* from the government, and act both upon the ministry's command and on their own initiative (int02).

Within the regulation logic, safety is the most important *value* (int02; int04), which results in the mission to reduce un-safety by mitigating risks and admitting only the most safe *technologies*. In the case of RDW, they need to evaluate new vehicles and make sure they are safe to use in the current infrastructure. SWOV is an organization that assists the ministry and possibly other actors by assisting

in scientific knowledge on traffic safety. However, both organizations also state that they have a broader perspective than safety only, and they acknowledge the social values and goals from the society logic (int04; int13). Therefore these organizations need to balance between, on the one hand, secure the current infrastructure and mitigate as many risks as possible, and on the other hand create room for alternative transportation methods and experiments in order to contribute to the social values and goals from the society logic type logics. This is a challenge because the regulation logic has been formed and influenced by the automobile logic over the last decades. From an historical perspective, the view on safety and the way it is institutionalized within the regulation logic is built upon our infrastructural system at the time. Therefore, the safety requirements of new vehicles are mainly based on the technical elements of and the knowledge about cars (int08).

Regulation logic	
Sector Logic	state
Values	safety
Mission	reduce un-safety by mitigating risks
Technologies	most safe technologies
Main actors	RDW, SWOV
Expertise	technical
Organizational form	independent agencies, ministry commissioned
Funding	government

Table 3 – Sub-elements of the regulation logic

The following sections will describe the most fundamental tensions in the sector, created by contradictions in beliefs in values institutionalized in the various ideal type logics. These tensions revolve around the car 'lock-in' and the room for other vehicle types to compete in the sector (4.4); safety and its priority on the political agenda (4.5); and roles of - and communication between - various actors with regard to the admission of LEV's (4.6).

4.4 Tensions around the car 'lock-in'

The automobile and the society logic can be seen as being in competition. The reason for this is the notion that the mobility sector is locked in the use of cars for personal transport. People are accustomed to using the car for their traveling, which makes it very difficult to change behaviour (int01; int08). In addition to this, the infrastructural system is organized around car-use, which can be

seen by the level of space cars get on the road and the amount of parking places. This is problematic, because, as one respondent states it, alternative vehicles as a replacement for cars are placed on cycling lanes, while the space that is created by substituting these cars is taken up by other (polluting) vehicles (int08). Respondents make clear that this is not a natural thing, but a human construct as a result of human choices. They underline both the need, but also the possibility to change both behaviour and urban planning to make room for alternative transportation methods. However this is logistically challenging and explained by one respondent of SWOV as follows: "*I think.. In many cities there is little room for extra wide cycling lanes. Or, as some people argue, to build an entire new infrastructure for LEV's. (…) A cycling lane only used for heavy cargo bikes for example would be great, but there is often no space, let alone money"* (int02).

In line with the car lock-in, the behaviour of people is difficult to change due to the attractiveness of car-driving in contrast to alternatives. Also here, the reason can be that the car is the 'standard' transportation method, coming from the automobile logic, which is institutionalized in such a way that people will keep using the car because of the advantages it has. For instance, parking tariffs and the size of parking places are based on automobiles as standard. Therefore parking a car is just as costly as parking a solar powered alternative, even though it is four times smaller (int09). Besides, parking spaces in an urban area are subsidized, otherwise they would not be affordable for the average citizen (int12).

Because the automobile logic is so highly institutionalized, it can also be seen that the change to a sustainable mobility system is mainly focussed on cars, in the form of electric cars. This also shows the dominance of the car in the Dutch mobility system. The electrification of cars shows that the companies acting from the automobile logic can have more values than only their own private interests (int02; int06). These companies often do not have a choice, and have to transition with society in order to stay attractive for consumers (int14). However, this electrification is criticized by some actors from the society logic because electric cars are a 'one-dimension' alternative and do not offer an holistic solution to both sustainability, efficient use of space, and healthy mobility (int08), especially when it is not a substitute for the conventional car, but for a bike for example, it even creates a higher tension on the available space in the infrastructural system (int02). Also here the advantages of car driving can be seen. Buying an electric car gives a person a financial advantage, with the goal to give incentive of switching to electric mobility. However, no such advantages are given when buying, for example, an electric bike. The counterargument for this is clear: Electric cars are much more expansive and in that sense, electric bikes do not 'need' such an incentive. Also, electric bikes are less likely to replace fossil fuel cars, than electric cars. Although these counterarguments are also recognized and mentioned in interviews with actors from the society logic, the sentiment exists

that this is 'unfair', for people that contribute to sustainable mobility by choosing the electric bike, or other electric alternative instead of a car (int09).

4.5 Tensions around safety

Due to the mismatch in values and needs between the automobile and society logic (economic values and societal values resp.) the people and organizations (mainly RDW) that evaluate and admit novel vehicles are often criticized from both perspectives. Actors in the regulation logic are often trapped between different views on safety from both the society and the automobile logic. As explained before, the technological safety assessment is mainly based on car use, due to the dominance of the car. Therefore, the safety requirements of new vehicles are mainly based on the technical elements of and the knowledge about cars (int08). With the growing urgency and acceptance of the society logic, many new vehicle types are being developed. RDW often lacks in technical knowledge about these new vehicles. Besides, these vehicles need other types of admission procedures and technical requirements because they differ much from cars in terms of, for example, size and speed.

Next to the technological requirements of the vehicle, organizations like RDW also need to make sure that the new vehicle can safely be admitted on the road. In order to this, the ambition is to mitigate risks as much as possible (int13). Because these roads are mainly used for cars, other vehicles are often labelled as unsafe, because of the expectation of unsafe situations when both cars and the to be admitted vehicle are driving on the same road. Due to risks and uncertainties about these new types of vehicles and the ambition to mitigate risks, new vehicle types are often not admitted. Respondents underline the need for different urban planning, and an infrastructural system that is more in line with other transportation methods than cars (int02; int08, int09; int13). This call for change is stimulated by the society logic, where a transition in the view on mobility has taken place. Actors from the society look at the mobility sector from a human perspective, with a focus on social values like inclusivity and liveability, where a fast and efficient mobility system is less a priority. Respondents make clear that the historical choices that are made in favour of cars can and should be reconsidered in order to make room for a sustainable, inclusive and safe mobility system (int08; int12).

The comparison with cars both from a technological and an infrastructural perspective are the main critiques on the influence of the automobile logic on the regulation logic, and show that the current regulation system, institutionalized in the regulation logic is mainly built around the automobile logic, and does not suffice the growing urgency of the society logic.

4.5.1 Safety on the political agenda

Many respondents state that in the current interdisciplinary mobility sector, where more social values become important over time due to the influence of the society logic, the political agenda is very

dependent for the prioritizing of these values. As one respondent from RDW states: *"Because under the previous minister, the motto was: We have to innovate and quickly admit things (new vehicles), while the current minister – the accident with the Stint has played a major part here – operates from the perspective of: 'innovation is okay, as long as it is not at the expense of safety. So there you can see a political shift. And that can happen because of one accident"* (int04). Also respondents from the ministry recognize this effect. Interviewee 1 and 14, both ministry officials, mention the effect of accidents on the view on safety and the risk-averseness of some colleagues or organizations like RDW and SWOV. Many respondents mention the Stint as example. Due to the tragic accident in 2018, many respondents feel like this over-prioritized safety on the political agenda. Various studies on this event (OvV, 2019; SWOV, 2020) resulted in many restrictions for LEV's which is often seen as an disproportional response by politicians.

4.6 Tensions regarding roles and communication

Important actors within the society logic and the regulation logic are the ministry and RDW. These two organizations are both governmental organizations with a social responsibility. However, there is often disagreement between the two organizations when discussing the evaluation and admission of new vehicle types.

4.6.2.1 Expectations

Traditionally, RDW is responsible for the technological status and safety of vehicles and the maintenance of the environmental requirements (RDW, 2021). It can be seen that the main goal of RDW is safety, and there is also a focus on sustainability. These values are regarded from a technological perspective. This differs from the perspective of the ministry. Although the ministry also has safety as an important value, their view on mobility has shifted from a technological construct towards a social good, with many other values like liveability and inclusivity. In the perspective of the society logic, mobility has become a necessity to participate in the society, where the perspective from the regulation logics mainly acts from a technological expertise with a focus on safety and sustainability. Although RDW is aware of this transition, and also mention this in interviews, actors from the society logic feel that this transition is not recognized sufficiently, and that RDW over-prioritize the mitigating of risks, which hinders the adoption of LEV's in the mobility sector. For example, as a respondent from the ministry states: "*I feel like there is a missing link in the evaluation process, and that the safety check is too dominant, which is an automatic reflex of such an vehicle admission authority. And I think that the other aspects do not get enough attention, while I think it would be right to consider these as well, and to weigh safety and sustainability against each other*" (int01). This sentiment of 'safety-above-all' and the accompanied risk-averseness is criticised by other

ministry officials as well: "*Risks are included. Yes, and if you do not like that because you want it checked and submitted in six-fold in advance, than you should not innovate"* (int14). On the other hand, from the perspective of RDW, it is considered as good that RDW has a priority on safety. From their perspective, this more holistic view on vehicle admission, in which more values than only technological safety are considered is a particular role for the ministry, and their policy should be aimed at the changing environment in which more values become important (int04; int13). This creates expectations from both RDW and the ministry towards each other that or not synchronized.

Another element is the role division between the two actors. Especially when the ministry or a ministry official is trying to stimulate the development of alternative vehicles. This creates a complex and tense situation where an integrity problem can arise. Because RDW is on one hand commissioned by the ministry and the ministry delegates the technical safety check to RDW. But in this case, the ministry has a benefit in the admission of the to be evaluated vehicle, which creates a tension between the two organizations. A respondent from RDW explains it as follows: *"When those people (ministry officials) start to lead a project, and say: well RDW, I am the government and I am going to tell you that you should follow, then you have the commissioner and a project leader both, which will result in integrity problems"* (int13).

4.6.2.2 Communication

The last important element of this section is the notion of divided opinions and knowledge between ministry officials. An organization like RDW mentions that the interaction with the ministry is very dependent on which ministry official you are dealing with. One respondent from RDW gives two examples of different kind of ministry officials. The first is very visionary and wants to, and puts pressure on RDW to get the admission done. The second example mentioned is a ministry official who is very reluctant and uncertain about something, and wants the RDW give answers and take away the uncertainties. In both cases, according to the respondent, the ministry should consider and way weigh the different values and uncertainties and make the use and need of an innovation or new vehicle type clear. Afterwards, RDW can evaluate and decide in terms of safety. *"That means that they should want to know the use and need, and describe it for themselves. The fact that I have to ask about it is not right. Actually, they (ministry officials) should say: I found something, and it is super cool, and I weighed and considered everything, and if this is safe, we should do it. That is how the ministry should come to me"* (int13).

This is also underlined by ministry officials themselves. Because the ministry has a diverse set of societal goals and values, there are many different departments within the ministry, like an innovation unit, a department sustainable mobility or a department on safety. These different departments have

different goals and values as main focus, and often do not communicate properly. "*When you are promoting something, which I had for instance with the Speed Pedelec, you have on the one hand people from the department saying: super nice, we should do it, and on the other side of the department people saying, the regulations are not ready yet. (…) But that was because we did not know it from each other. And then I think by myself, why not? I think the ministry has a little too much employees"* (Int10). Because of these varieties in divisions and responsibilities between officials from the ministry, miscommunications can happen both internally between ministry officials, and between the ministry and RDW.

Conclusion

This research tried to answer in what way the configuration of institutional logics in the Dutch mobility sector influences the implementation of alternative vehicles as a solution to societal problems, with a main focus on Light Electric Vehicles as these alternatives. The answer to this question can be given in three steps, following the three sub-questions. Firstly, the results showed three distinguishable institutional logics for the mobility sector: The automobile logic, the society logic and the regulation logic. From these three, the automobile logic can be seen as the dominant logic which is showed in the dominant position the car takes in the personal transportation movements in peoples' everyday lives. Due to the development of the society logic and its more diverse and socially oriented set of values, this dependence on the fossil fuel car is criticized by respondents from the ministry of infrastructure and water management, scholars and entrepreneurs that aim to contribute to these social values. Therefore, these actors call for change, by producing LEV's (innovators), or stimulating the production and diffusion (ministry), because they perceive LEV's as a sustainable solution, contributing to getting free of the car 'lock-in' and thereby offering a holistic solution to the polluting and the perceived un-social use of cars. However, these LEV's are finding difficulty to compete with fossil fuel cars, which is partly due to the admission procedures performed by actors from the regulation logic, mainly independent agencies. Besides the fact that people are used to car-driving and value all the benefits it has in terms of speed, comfort and status, the historical influence of the automobile logic shaped the infrastructural system. Therefore, the physical landscape is shaped around cars, with little room for LEV's. This results in LEV's often being labelled as unsafe by actors from the regulation logic, because of the poor fit of these vehicle types in the car dominated infrastructural system. This has major effects on the implementation of these alternative vehicles.

This research tried to explain how the different actors with their different values interact and in doing so, what tensions might arise and what the consequences of these tensions are on the implementation of LEV's. Table 4 shows a summarization of the main findings. It shows for each pair of institutional logic the main challenges that arise with regard to the development and implementation of LEV's. The right column shows what the practical impact and consequences of these challenges are.

Interacting institutional logics	Main challenges	Influence on implementation of LEV's
Automobile and Society logic	• The car is the dominant transportation method and is a poor fit in the various social goals and ambitions forthcoming from the society logic	• People are used to car-driving which hinders LEV implementation • Main focus of policy is aimed at car manufactures and fuel industry

	• Sustainable development is aimed at car-driving which is a 'one'-dimensional solution	
Automobile and Regulation logic	• Contemporary rules and regulation are based on historical development of infrastructure and technical knowledge about cars	• LEV's are often labeled as un-safe due to outdated rules and regulations • Infrastructural system is built around car-use with little room for LEV's
Regulation and Society logic	• The society logic transitioned the view on mobility to a social good instead of a technological construct • Regulation logic acts from a 'safety'-first perspective • Events and politicians influence the political agenda • Communication and integrity problems	• Regulation authorities have little attention for LEV's as a solution to social goals (e.g. inclusivity, less congestion, social streets), besides sustainability. • LEV's are often labeled as unsafe due to disproportional responses to accidents • Implementation of LEV's is hindered due to unclear roles and bad communication between ministry and RDW.

Table 4 – Summarization of results

This table shows that each pair of institutional logics' interaction results in different impacts on the implementation of LEV's. For the automobile and society logic it can be seen that both consumers and policy makers are often focussing on cars, which limits the competitive position of LEV's. With regard to the automobile and regulation logic the consequences of the dominant automobile logic is that LEV's are often labelled as un-safe due to the poor fit of LEV's in the infrastructural system. Besides, the regulation procedures and the people that perform the admission procedures are influenced by the historical dominance of the car, and technological knowledge on cars. However, it can be concluded that the hindering factors of the implementation of LEV's are not only due to the dominance of the car and the actors from the automobile logic. When looking at the regulation and society logic, it was observed that two other factors hinder the implementation of LEV's. The first reason is the unclear role division and mis-communication between the ministry and RDW, that results in integrity problems when the ministry is both the commissioner of RDW, and the applicant for the admission of a new vehicle. This happens when the ministry is stimulating the development and implementation of LEV's and also puts pressure on RDW to admit the new vehicle. The second reason is the difference in priorities in values. The society logic includes many different social values, whereas actors from the regulation logic have a main focus on safety and sustainability. Actors from the society logic perceive this focus on safety as disproportionate, especially with regard to the reaction and position of safety on the political agenda after accidents with these new vehicle types.

The following section will give some recommendations on how policy makers might overcome these main effects on the implementation of LEV's, in order to contribute to their social values and missions.

Discussion

This research gave insights in the way in which three institutional logics are interacting in the Dutch mobility sector and in what way this influences the implementation of LEV's as a substitution to fossil fuel cars. The following section describes some recommendations for policy makers in order to better align the differences between the various actors acting from these different institutional logics. This section is concluded with a description of the theoretical contributions of this research and suggestions for further research.

6.1 Policy recommendations

6.1.1 LEV as ideal type solution

In order to achieve their transdisciplinary goals and missions mainly forthcoming from the society logic, policy makers should ask themselves whether LEV's are indeed a holistic and in some way an 'ideal type' solution. As shown in the results the assumption is often made that LEV's have the potential to replace cars in the everyday use of people. If LEV's are a replacement for fossil fuel cars, than they can be a contributing factor to sustainability, liveability, less congestion and inclusivity. However, if LEV's will be adopted by former pedestrians, or by bike-users, it will not offer this contribution.

Further research can be done to predict whether or not LEV's will be a substitution for everyday car use for people. Hyvönen et al. (2016) analysed which vehicles will potentially be substituted by LEV's by the Finnish population. They found that this depends heavily on the type of LEV. For example an electric mini car has a much higher potential to substitute the fuel car, than an electric skateboard or a Segway has, which will substitute for walking or biking most of the time.

Further insights in how these preferences are present in the Dutch population might help policy makers in stimulating the vehicles that have the highest potential to get people out of the car. It might also assist in countering the personal preferences and car dependencies of consumers as described in car lock-in literature (Geels 2012, Sachs 1992).

6.1.2 Infrastructure and urban planning

As became clear from the results, the current infrastructural system and urban planning is mainly organized around the use of cars. The transition towards a more sustainable mobility system is also mainly directed towards the replacement of the fossil fuel car by electric cars. However, with the development of many other types of LEV's, it becomes clear that the infrastructural system cannot support all these different types of vehicles. Formerly, in the Netherlands the main roads were used for cars, and bikes used the cycling lanes. Currently, there is a lot of debating on which lanes LEV's should use. The main arguments are visualized in table 5.

Place of LEV's in the infrastructure	Pro	Con
Main (car) road	These roads are already in place and are often wide enough	Creates unsafe situations because of the high speed and mass of cars
Cycling lanes	These lanes have a lower driving speed and are already in place	Creates unsafe situations because these lanes are often narrow and LEV's often have a higher speed than bikes
New driving lanes	Most safe solution	Expensive and logistically challenging

Table 5 – Pro's and Con's for the placement of LEV's in the infrastructural system

The main difficulty in this, as can be seen in table 5, is that the placement of LEV's on existing driving lanes, both car roads and cycling lanes, will always result in unsafe situations, purely due to the fact that the new LEV's have to share their lane with vehicles either with a higher or lower speed and mass. However, the solution for this is building an entirely new infrastructural system for LEV's, which is a very expensive and logistically challenging solution. Therefore it is important for policy makers to create insights in the possibilities and obstacles for injecting LEV's in the current infrastructural system.

6.1.3 Clear role division and communication

The communication of mainly the ministry of infrastructure and water management and the RDW needs to be improved. As stated in the results section, the current regulation system is heavily influenced by the automobile logic. This creates frustration from both sides because of different prioritizing in values, e.g. safety versus transdisciplinary social values. The regulation system needs to be revised to the current situation in the Dutch mobility sector, with a less dominant position for cars, and a broader view on different vehicle types. This is already happening with the new admission rules for LEV's which are currently being written by the ministry.

Next to this, the ministry and RDW should clarify their different roles in the stimulation and evaluation of new vehicle types in order to avoid integrity problems. As explained in the results section, these integrity problems arise when the ministry, or a ministry official, tries to stimulate the development of a new vehicle type and thereby has a benefit in the admission of this new vehicle. This creates a tension because the admission of new vehicle types is delegated to RDW.

Finally, the view on safety needs to be discussed. All respondents agree that safety is an important value and that new vehicle types should (at the least) not increase un-safety dramatically. However, the priority of safety varies a lot between the different logics. As also discussed in the previous section, the implementation of LEV's in the current infrastructural system results in more unsafe situations,

and therefore comes with a risk. Actors from the society logic are often more willing to accept this risk, due to the contributions LEV's have on other social values. The 'safety above all' view from the regulation logic creates tensions with this more holistic approach of the society logic. From the society logic, safety is perceived as overprioritized within the regulation logic. The argument that is given is the perception that the priority of safety is heavily influenced by politics and events like accidents. This creates a situation in which safety regulations are perceived as too strict, and new vehicle types are not admitted at an early stage of diffusion. The results is a loss of knowledge which could be gained from experiments with these new types of vehicles (int01; int14). Therefore debates need to be organized in which the view on safety will be synchronized between the various actors resulting in a situation in which there is proper safety regulation on technological aspects, as well as social aspects of mobility (e.g. inclusivity, sustainability, liveability). This might be realized by adding a third party of sub-department to RDW that includes more social values next to safety.

6.2 Theoretical relevance and limitations

This research contributed to innovation theory by using the concepts of institutional logics to see what institutions within the Dutch mobility sector influence actors in the system and how this has its impact on the implementation of Light Electric Vehicles. Building on the theory and methods of Fuenfschilling & Truffer (2014), and other studies on conflicting institutional logics like Baur (2020), Kieft (2020) and Dunn & Jones (2010), it used the concepts of institutional logics and applied them to the case of the Dutch mobility system, and LEV's in particular.

In doing so, it broadened the understanding of innovation in the Dutch mobility sector. Where, for example, Geels (2012) did a multi-level perspective analysis of low-carbon transitions in the transport sector, and already observed an existing automobility regime, this research elaborated on that by using qualitative methods to understand how actors perceive this regime and the notion of the car lock-in.

The problem that this research addressed was the lack of a proper reference framework to weigh and balance safety with the other values and goals that the government is striving for. Although this research did not provide a ready to use model to weigh safety against other values like sustainability, liveability or congestion decrease, it shows how these values are embedded in institutional logics, and how they create tensions between actors and their values. These insights can be used by policy makers to guide them in the interaction with various actors with identical or very different beliefs and visions on innovation, and in particular on LEV's as substitution for (fossil fuel) cars as personal transport method.

Initially this research aimed to include two cases, namely LEV's and automated driving systems. However, due to the complexity and size of the LEV-case, only that case was analysed. To improve the generalizability of this research for the total Dutch mobility sector, other cases can be studied, or other modalities can be regarded, like aviation, public transportation or freight transport.

This research distinguished three different ideal type logics for the Dutch mobility sector. Because the scope of this research was aimed at the admission of LEV's, mainly actors involved in these LEV trajectories were interviewed, as can be seen in the overview in Appendix A. After analysing these interviews in turned out that these respondents were primarily acting from the society and regulation logic. The construction of the automobile logic therefore has been based upon previous literature on the automobile regime and the perspective and opinions and beliefs from interviews with actors from the society and regulation logic. Further research on the actors from the automobile logic (e.g. car and fuel industry), might contribute and elaborate on this research.

By means of a qualitative research, this study contributed to the insights in the configuration of the different ideal type logics in the Dutch mobility sector. Insights were given on the different institutional logics present in the sector and how these logics determine the behaviour and prioritization of values of the different actors. This research used interviews as an explorative research method in order to distinguish these various ideal type logics. Further research might elaborate on this by deepening the understanding of these ideal type logics and reconstruct the level of institutionalization for each of the distinguished elements in the results section. For example, the car or fuel industry might be further researched on how these actors perceive the society and regulation logic.

This research can be used as a building block for scholars and policy makers who are interested in the different values that resolve around innovation and transition in the mobility sector, both from an institutional theory perspective and from an governance perspective.

References

Battilana, J., Leca, B., & Boxenbaum, E. (2009). 2 how actors change institutions: towards a theory of institutional entrepreneurship. *Academy of Management annals*, *3*(1), 65-107.

Baur, P. (2020). When farmers are pulled in too many directions: comparing institutional drivers of food safety and environmental sustainability in California agriculture. *Agriculture and Human Values*, *37*(4), 1175-1194.

Centraal Bureau voor de Statistiek. (2021, 10 maart). *Hoeveel reisden inwoners van Nederland en hoe?* Geraadpleegd op 15 juni 2021, van https://www.cbs.nl/nl-nl/visualisaties/verkeer-en-vervoer/personen/hoeveel-reisden-inwoners-van-nederland-en-hoe-

Charmaz, K., & Belgrave, L. L. (2007). Grounded theory. *The Blackwell encyclopedia of sociology*.

DiMaggio, P. J., & Powell, W. W. (1983). The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. *American sociological review*, 147-160.

Dunn, M. B., & Jones, C. (2010). Institutional logics and institutional pluralism: The contestation of care and science logics in medical education, 1967–2005. *Administrative science quarterly*, *55*(1), 114-149.

Fuenfschilling, L., & Truffer, B. (2014). The structuration of socio-technical regimes—Conceptual foundations from institutional theory. *Research Policy*, *43*(4), 772-791.

Geels, F. W. (2002). Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study. *Research policy*, *31*(8-9), 1257-1274.

Geels, F. W. (2012). A socio-technical analysis of low-carbon transitions: introducing the multi-level perspective into transport studies. *Journal of Transport Geography*, *24*, 471–482.

Geemente Amsterdam. (2013, juni). *Amsterdam Aantrekkelijk Bereikbaar - MobiliteitsAanpak Amsterdam 2030*.

Hekkert, M. P., Janssen, M. J., Wesseling, J. H., & Negro, S. O. (2020). Mission-oriented innovation systems. *Environmental Innovation and Societal Transitions*, *34*, 76-79.

Higgins, V., Bryant, M., Hernández-Jover, M., McShane, C., & Rast, L. (2016). Harmonising devolved responsibility for biosecurity governance: the challenge of competing institutional logics. *Environment and Planning A: Economy and Space*, *48*(6), 1133-1151.

Hyvönen, K., Repo, P., & Lammi, M. (2016). Light electric vehicles: substitution and future uses. *Transportation Research Procedia*, *19*, 258-268.

Kieft, A., Harmsen, R., & Hekkert, M. P. (2017). Interactions between systemic problems in innovation systems: The case of energy-efficient houses in the Netherlands. *Environmental innovation and societal transitions*, *24*, 32-44.

Kieft, A., Harmsen, R., & Hekkert, M. P. (2020). Problems, solutions, and institutional logics: Insights from Dutch domestic energy-efficiency retrofits. *Energy Research & Social Science*, *60*, 101315.

Lawrence, T. B., & Suddaby, R. (2006). 1.6 institutions and institutional work. *The Sage handbook of organization studies*, 215-254.

Mazzucato, M. (2017). Mission-oriented innovation policy. UCL Institute for Innovation and Public Purpose Working Paper.

Onderzoeksraad voor Veiligheid. (2019). Veilig toelaten op de weg - lessen naar aanleiding van het ongeval met de Stint. Geraadpleegd van https://www.rijksoverheid.nl/documenten/rapporten/2019/10/16/rapport-ovv-veilig-toelaten-op-de-weg-lessen-naar-aanleiding-van-het-ongeval-met-de-stint

Orsato, R., & Wells, P. (2007). U-turn: the rise and demise of the automobile industry. *Journal of Cleaner Production*, *15*(11–12), 994–1006. https://doi.org/10.1016/j.jclepro.2006.05.019

RDW. (2021). *Informatiemap voor de voertuigbranche*. Geraadpleegd van https://www.rdw.nl/zakelijk/branches/startende-voertuigbedrijven/voorwaarden-en-gebruik-van-een-erkenning/informatiemap-voor-de-voertuigbranche

Reay, T., & Hinings, C. R. (2009). Managing the rivalry of competing institutional logics. Organization studies, 30(6), 629-652.

Reay, T., & Jones, C. (2016). Qualitatively capturing institutional logics. *Strategic Organization*, *14*(4), 441-454.

Sachs, W. (1992). *For Love of the Automobile*. Amsterdam, Nederland: Amsterdam University Press.

SWOV. (2020). *Voorstel voor een methode van risico-inventarisatie voor lichte elektrische voertuigen* (R-2020-13). Geraadpleegd van https://www.rijksoverheid.nl/documenten/rapporten/2020/10/07/swov-voorstel-voor-een-methode-van-risico-inventarisatie-voor-lichte-elektrische-voertuigen

THE 17 GOALS | Sustainable Development. (2018, 20 april). United Nations. https://sdgs.un.org/goals

Tweede Kamer der Staten Generaal. (2019–2020). *Beleidsagenda IenW 2020*.

Thornton, P. H. (2002). The rise of the corporation in a craft industry: Conflict and conformity in institutional logics. *Academy of management journal*, *45*(1), 81-101.

Thornton, P.H., Jones, C., Kury, K., 2005. Institutional logics and institutional change in organizations: transformation in accounting, architecture, and publishing. In: Jones, C., Thornton, P.H. (Eds.), Transformation in Cultural Industries. Research in the Sociology of Organizations, vol. 23. Emerald Group Publishing Limited, pp. 125–170.

Thornton, P. H., & Ocasio, W. (2008). Institutional logics. *The Sage handbook of organizational institutionalism*, *840*, 99-128.

Thornton, P.H., Ocasio, W., Lounsbury, M. (2012). The Institutional Logics Perspective. A New Approach to Culture, Structure, and Process. Oxford University Press, United Kingdom.

Unruh, G. C. (2000). Understanding carbon lock-in. *Energy policy*, *28*(12), 817-830.

Appendix A: List of respondents

Organization	Field of work	Specific case
SWOV	Safety assessment	No
TU Delft	Safety science	No
RDW	Safety assessment	No
Ministry of infrastructure and Water Management	Innovation Manager at DG mobility	No
Ministry of infrastructure and Water Management	Department of sustainable mobility	No
Ministry of infrastructure and Water Management	Department of sustainable mobility	No
University of Amsterdam	Urban Planning	No
RDW	Safety assessment	No
Ministry of infrastructure and Water Management	DG Mobility	No
Port of Rotterdam	Smart mobility	No
Bondi	Innovator	Yes, LEV's
Fietsdiensten.nl	Visionairy and promotor	Yes, LEV's
Squad Mobility	Innovator	Yes, LEV's
Ministry of infrastructure and Water Management	Cluster coördinator	Yes, LEV's
Association of insurers	Insurers	Yes, LEV's

Disclaimer: The order of respondents is randomized and does not follow the in text references.

Appendix B: Interview Guide

This interview guide acts as a guideline for the interviews for both phase 1 and phase 2. Because the interviews will be of semi-structured form, the interview guide mentions the various to be studied topics but the questions will not necessarily be asked in this form or this order. In the case of an expert on a specific case, the case specific topics and questions will also be covered.

1. **Introduction (5 minutes)**

1.1 Welcome, and thank you for participating in this interview. You have read and signed the informed consent form and agree that this interview will be recorded?

2. **Value and missions (15 minutes)**

Values and missions of the interviewee and his/her organization

2.1 Can you tell me about the different missions that you/your organization has in mind for the mobility sector?

2.2 Having these missions in mind, what goals need to be achieved to complete these missions?

2.3 Who shapes these missions? You yourself, your employer/organization, other?

2.4 What are the values that are at the basis of these missions? *(Probably in some part derivable from the answers from 2.1-2.3)*

2.5 Do you recognize contradicting values in the mobility sector? (Potentially but not necessary between different actors)

This questions is essential and therefore asked in a very open way to prevent influencing the interviewees' answers. However, if the interviewee says simply 'no', or finds it difficult to come with examples, some examples could be: a. sustainability vs safety b. sustainability vs economy c. ethical issues. Of course the answer can still be 'no'.

3. **Actor (10 minutes)**

3.1 Can you give an explanation of your position as an actor in the mobility sector?

3.2 With what other actors are you involved? What are the relationships?

3.3 Can you tell me more about these relationships? What are potential conflicts between actors?

4. **Actions (10 minutes)**

4.1 What actions are taken by you/your organization to support the values and achieve the missions mentioned in section 2 of this interview?

4.2 Which of these activities create tensions with other actors' activities, missions and values?

5. **Impact on implementation of solutions to societal problems (10 minutes)**

5.1 What can be the consequences of conflicting values in the case of a new vehicle type or technology?

5.2 How can these conflicts be settled? Do you have an example of a previous conflict?

5.3 Who is or should be responsible for settling these conflicts?

6. Case specific questions (10 minutes)

6.1 What is your role in the assessment of vehicle x for day-to-day and public use? Are you actively participating in the assessment process?

6.2 What is the current status of the progress of the assessment of these vehicles?

6.3 What can be the potential benefits of this vehicle? What problems might be solved with the use of this vehicle?

6.4 What challenges do occur in the assessment of these vehicles?

6.5 What values are in competition when assessing these vehicles? How can this competition be settled or even resolved?

7. Closing the interview

Thank you for participating. Am I allowed to contact you when I have additional questions or need an elaboration or further explanation on one of your answers?

You will be notified when the results of this research are finished and published.

Appendix C: Informed Consent Form

Informed Consent Form for participation in:

How policy makers can overcome competing values in the pursuit of solutions to societal problems – Institutional logics in the Dutch mobility sector from a safety perspective

To be completed by the participant:

I confirm that:

- I am satisfied with the received information about the research;
- I have been given the opportunity to ask questions about the research and that any questions that have been risen have been answered satisfactory;
- I had the opportunity to think carefully about participating in the study;
- I will give an honest answer to the questions asked.

I agree that:

- The data to be collected will be obtained and stored for scientific purposes; the collected, completely anonymous, research data can be shared and re-used by scientists to answer other research questions;
- Audio recordings may also be used for scientific purposes.

I understand that:

- I have the right to withdraw my consent to use the data;
- I have the right to see the research report afterwards.

Name of participant: _____

Date, place: __/__/____, _____

Signature: _____

To be completed by the investigator:

I declare that I have explained the above mentioned participant what participation means and the reasons for data collection. I guarantee the privacy of the data.

Name of investigator: _____

Date, place: __/__/____, _____

Signature: _____