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Master's Thesis – Master Innovation Sciences

Co-evolution between municipal regulations and bike sharing business models



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Abstract

This study examined how the regulatory regime can affect the design space of niche business models when scaling up and how niche actors adapt their BM to deal with the regulations. By studying the co-evolution process between the regulatory regime and the development of niche business models, implies the selection environment for this research. The municipality of Amsterdam and seven bike sharing providers operational in Amsterdam were taken as a case study. The study was conducted in a qualitative manner in combination of three methods. Firstly, a document analysis was used to identify the starting situation and the developments of the key events of both actors from 2016 onwards. The data were analysed for the period between 2016 and 2021. Since, in 2016 the first bike sharing companies became operational in Amsterdam, and in 2021 the small-scale experiments started. Secondly, a more in-depth analysis based on four semi-structured interviews with project members and policy makers of the municipality of Amsterdam were used to gain insight into the policy implementation by the municipality. In addition, six semi-structured interviews were conducted with bike sharing providers to analyse the variety of adopted business models over time, reflecting their strategy. Lastly, through thematic analysis patterns of a fit- or stretch like strategy were identified and linked according to these niche empowerment strategies to deal with to regulatory regime through a deductive manner. Whereas new observations of fit-like strategies were performed in an inductive approach to define the new findings. The study shows that niche entrepreneurs adapted their business model differently, but all providers adopted a fit-like strategy to deal with the regulatory regime. Additionally, the research shows that regulation plays an import role on the design space of an (innovative) business model, as more than two elements of the business model can be directly affected which makes the operationalisation of a model impossible. Finally, the examining on the development of niche business models provided new insights on how niche actors adapted their business model and reflects the adopted fit-like strategy to deal with the regulatory regime within the ST-system. The study thereby, enhances the knowledge on the literature of the business model design space and the niche empowerment strategies, which reflects the co-evolution process.

Table of contents

ABSTRACT	2
1. INTRODUCTION	4
2. THEORY	6
2.1 BUSINESS MODELS	6
2.2 BUSINESS MODEL INNOVATION	8
2.3 CO-EVOLUTION OF BUSINESS MODELS AND REGULATION	8
2.4 BUSINESS MODELS AND MUNICIPAL REGULATION IN THE BIKE-SHARING ECONOMY	9
3. METHODOLOGY	11
3.1 RESEARCH DESIGN	11
3.2 DATA COLLECTION	12
3.3 DATA ANALYSIS	14
4. RESULTS	15
4.1 BIKE SHARING COMPANIES ENTERING THE MARKET IN AMSTERDAM	15
4.2 THE CO-EVOLUTION PROCESS BETWEEN THE ACTORS	17
4.2.1 REGULATION OF PUBLIC BIKE SHARING BY THE MUNICIPALITY OF AMSTERDAM.....	17
4.2.2 ADOPTED BMS BY THE BIKE SHARING PROVIDERS	19
5. DISCUSSION	24
5.1 DISCUSSION OF THE RESULTS	24
5.2 MANAGERIAL AND POLICY IMPLICATIONS	26
5.3 LIMITATIONS AND FURTHER RESEARCH DIRECTIONS	27
6. CONCLUSIONS	28
ACKNOWLEDGEMENTS	28
APPENDIX	29
APPENDIX A – THE INTERVIEW GUIDE WITH THE MUNICIPALITY	29
APPENDIX B – THE INTERVIEW GUIDE WITH BIKE SHARING COMPANIES	30
APPENDIX C – OVERVIEW OF THE AREAS FOR THE SMALL-SCALE EXPERIMENTS OF SHARED.....	31
REFERENCES	32

1. Introduction

The climate is changing nowadays. If humanity does not take climate action, more planetary boundaries will be exceeded which could have fatal consequences for the earth (Steffen et al., 2018). One of the planetary boundaries is related to the increasing degree of greenhouse gas emissions, due to increased automobility, among other things (Frenken & Schor, 2017). Personal transportation has become a more important requirement for many people (DeMaio, 2009). Especially due to factors such as a pandemic (e.g., COVID-19) people prefer private vehicles rather than public transport (Falchetta & Noussan, 2020). Fuel-powered passenger cars cause negative environmental impacts as well as traffic congestion and excessive use of public space in cities (Winslow & Mont, 2019). An environmentally friendly and more sustainable solution to commute could be the bicycle (Yang, Hu, Qiao, Wang & Jiang, 2020). This means of transportation also reduces energy consumption, decreases harmful gas emissions, improves public health in general and promotes economic growth (Qiu & He, 2018).

Niche entrepreneurs attempt to capitalise on opportunities that occur in the market or in the socio-technical landscape (i.e., broader contextual developments that influence the socio-technical regime) such as new technologies or shifts towards sustainability, like e-bikes or services to share bikes (Meijer, Schipper & Huijben, 2019; Van Waes, Farla, Frenken, de Jong & Raven, 2018). To take advantage of these opportunities often niche entrepreneurs adopt innovative business models, which may enable enterprises to scale up (Van Waes et al., 2018). Subsequently, if these innovative business models become widely adopted within the same niche, as demand increases, new economies may emerge. One of these is the sharing economy, which can be seen as an umbrella term encompassing other economic systems (e.g., Collaborative-, Peer-to-Peer- or Gig Economy) based on the provision of products or services often via an online platform (Popov, Hercegova & Semyachkov, 2018). Over the last 10 years, the sharing economy has become increasingly popular and interesting for businesses (Frenken & Schor, 2017; Zvolska, Palgan & Mont, 2019). This is mainly due to the development of digital devices and people worldwide having more and more access to the internet at any time of the day, making connectedness to sharing economy platforms increasingly accessible (May, Königsson & Holmstrom, 2017). According to PwC, revenue from the sharing economy was estimated at \$15 billion worldwide in 2015 and is forecast to grow to \$335 billion by 2025 (PWC, 2015).

Well-known contemporary sharing economy companies Airbnb and Uber are examples of organisations that entered the market as start-ups in a niche market and disrupted the regime (Acquier, Carbone & Massé, 2019). These firms are in the business of sharing houses and sharing rides, respectively. Another niche market within the sharing economy is shared bicycles that has developed rapidly in recent years (Shui & Szeto, 2020). These bicycles are often used by travellers as the 'first mile' or 'last mile' to connect to public transport from their place of origin or destination, or as substitute to other services to move around (Shui & Szeto, 2020). Van Waes et al. (2018) have identified two main business models (BM) that can be distinguished in the shared mobility, the station-based model and the free-floating model. A BM can be defined as "how the enterprise creates and delivers value to customers, and then converts payments received to profits" (Teece, 2010 p. 173). Station-based models are defined as "round trips with pickup and return at fixed stations", while free-floating models are defined as "one- or two-way trips in designated areas" (Vaskelainen & Münzel, 2018 p. 276).

Bike sharing has great potential to contribute to (sustainable) mobility, as it can contribute to the greening of cities and their surroundings by providing an alternative means of transportation to vehicles in an era of climate crises (Winslow & Mont, 2019). In the past, however, in some cities of the Netherlands, shared bikes have caused nuisance in public spaces, such as in the municipality of Amsterdam (Gemeente Amsterdam, 2019; Van Waes et al., 2018).

As the roll-out of niche BM became widespread in a short period of time, the nuisance increased and became controversial for (local) society. The niche entrepreneurs were stretching the given (local) regulations and ultimately became in conflict with the regulations when scaling up. Regulation is determined by formal institutions (i.e., municipality), which thereby determine the boundaries of the business model design space (BMDS) to which niche actors must conform (Huijben, Verbong & Podoyntsyna, 2016). The BMDS is defined as “all the legal business model design options available to niche entrepreneurs” (Huijben et al., 2016 p.3). In response to the regulatory regime, niche entrepreneurs can adopt niche empowerment strategies, which includes a strategy for dealing with the regulation within the niches (Huijben et al., 2016). In practice, both actors adapt their strategies in response one to the other. However, little is known about the co-evolution mechanism between the development of policy and regulations and (niche) bike sharing BMs (Yang et al., 2020).

This thesis aims to contribute to this field, by providing a better understanding of the co-evolution between the regulations and the development of bike sharing BMs, that is, how the actors respond to each other and their motives to change and whether both parties are intimately related to each other. This study addresses the following research question:

How do bike sharing business models and municipal regulations co-evolve in the bike sharing economy?

To understand the interplay between the municipality and niche actors in the bike sharing economy enhance the knowledge on the literature of niche empowerment strategies and the BMDS (Huijben et al., 2016). It thereby, responds to a recent call by Van Waes et al. (2018) to adopt a dynamic perspective (over time) to investigate the co-evolution of BMs and socio-technical regimes. Co-evolution can be defined as “how a firm's capabilities evolve is intimately linked with how the markets that a firm serves evolve” (Levinthal & Myatt, 1994 p. 46). Previous studies have not addressed the dynamic interactions and mutual effects between the regulatory regime and bike sharing BMs (Yang et al., 2020; Kallis, 2007). Moreover, little is known about how bike sharing BMs develop over time to cope with (changed) regulations of municipalities (Van Waes et al., 2018). A key element of this includes how bike-sharing BMs create, deliver, and capture value as niche innovations in a socio-technical regime, something that is not yet sufficiently understood (Acquier et al., 2019).

The chapters in this paper are structured as follows. Firstly, the theory discusses the theoretical framework to provide insight on the literature of BMs and transition studies. The third chapter, methodology, elaborates on the data collection and analysis, both of which were conducted in a qualitative manner. Subsequently, the results present the outcomes of the case study and reveals how niche actors in the bike sharing economy adapted their BMs to deal with the municipal regulations. The findings of the results will subsequently be discussed in chapter five and finally, chapter six presents the main conclusions and managerial and policy recommendations.

2. Theory

To understand the current state of the literature on the topic of this study, firstly the BMs related to bike sharing are elaborated in section 2.1. Next, section 2.2 describes how BMs evolve through business model innovation to enhance the value creation by companies. Additionally, section 2.3 addresses the co-evolution mechanisms of the regulation and niche BMs in general. Finally, these co-evolution mechanisms are outlined to municipal regulations in relation with the bike-sharing-economy in section 2.4.

2.1 Business models

A BM is a conceptual tool that exhibit the value creation of an organisation (Osterwalder, Pigneur & Tucci, 2005). The BM succinctly describes how an organisation creates, delivers to customers, and captures value (Teece, 2010). A BM considers both the revenue and the cost side of the business. The question of how value is created by a company is the essence of a BM (Chesbrough, 2010). In general, research into BM focuses on what measures of value creation for customers are used, and how the value created is exploited by the organisation or disseminated in the ecosystem of the initiative (Bowman & Ambrosini, 2000; Osterwalder et al., 2005). This research focuses on how niche actors adapt their BM to deal with the regulations.

BM's have been studied by scholars since the 1950s, but since the 1990s there has been a surge of interest in them among scholars due to the rapid growth of the Internet and thus the digitisation of companies (Van Waes et al., 2018). A BM can be divided into four different building blocks (Johnson, Christensen & Kagermann, 2008). The first core feature of a BM is the customer *value proposition*, which reveals how a certain customer need is met (Johnson et al., 2008). Next, a second core feature of BM is the *profit formula*, which indicates how the company generates value (Johnson et al., 2008). In addition, a third core feature of the BM is the *key processes*, which indicate which processes deliver a proposition (Johnson et al., 2008). Finally, a fourth core feature of BM is the *key resources*, which refer to those resources that are needed to deliver the proposition (Johnson et al., 2008). Table 1 provides an overview of the core feature of the BM, each with a description.

In the case of bike sharing companies, the BM can be divided into two types of dimensions (Van Waes et al., 2018). The first dimension is the distinction between single rides and returns rides. In 'one-way' systems (single journeys) the user can pick up and leave the bike anywhere (A-B), whereas in 'two-way' bike sharing systems (return journeys) the user must return the bike to the location where it was picked up (A-A). The second dimension is the distinction in bike parking. For instance, many older systems require to park the shared bicycle at a designated docking station, whereas modern systems allow to park the shared bicycle at any location in public space. These two types of dimensions ensure that a distinction can be made between four types of BMs namely *one-way station-based*, *two-way station-based*, *one-way free floating*, and *two-way free floating*. An overview of the characterisation of the four BM archetypes for shared bicycles is visualised in Figure 1.

An unfamiliar model in the Netherlands, but more familiar in European cities like Paris (Vélib') or London (Santander Cycles) is the *one-way station-based model*, which can be defined as "take and return the bike to a docking station" (Van Waes et al., 2018, p. 1303). Hybrid systems of this model also emerged later. These one-way systems allow to leave the shared bicycle (without extra costs) within a designated zone (i.e., instead of a docking station). The collection and return of the shared bicycles can take place at any of the various designated locations (Petzer, Wiczorek & Verbong, 2020). The most well-known *two-way station-based* shared bicycle scheme in the Netherlands is the 'OV-fiets', which can be defined as "take and return the bike to the original location" (Van Waes et al., 2018, p. 1303). In addition, in recent

years innovative *one-way free-floating* systems, defined as “take and drop the bike anywhere”, have been introduced (Van Waes et al., 2018, p. 1303). These systems use an application to unlock and lock the bike. Examples of providers are Hello-Bike, FlickBike or Donkey Republic. Finally, several *two-way free-floating* systems (peer-to-peer), which are defined as “share or rent an existing bike”, have emerged (Van Waes et al., 2018, p. 1303). Peers can rent out a personal bike via an online platform. The bike must be returned to its original location. In this research focuses on the one-way free-floating and two-way free-floating models, as these models cause the most friction with municipal regulation and, therefore, are the most relevant for this study.

Concept	Description
BM	<p><i>Value proposition</i> Reveals how a certain customer need is met. Examples of different propositions of bike sharing services are a 'first- or last-mile' solutions, tourist mobility or local urban transport.</p> <p><i>Profit formula</i> Indicates how the company generates value. For example, through a subscription, or a pay-per-use model.</p> <p><i>Key processes</i> Indicate which processes deliver a proposition. Maintenance and redistribution of bikes are examples of this.</p> <p><i>Key resources</i> Refer to the resources needed to deliver the value proposition. For example, some systems are based on physical parking infrastructure, such as docking stations.</p>

Table 1. Core features of a business model.

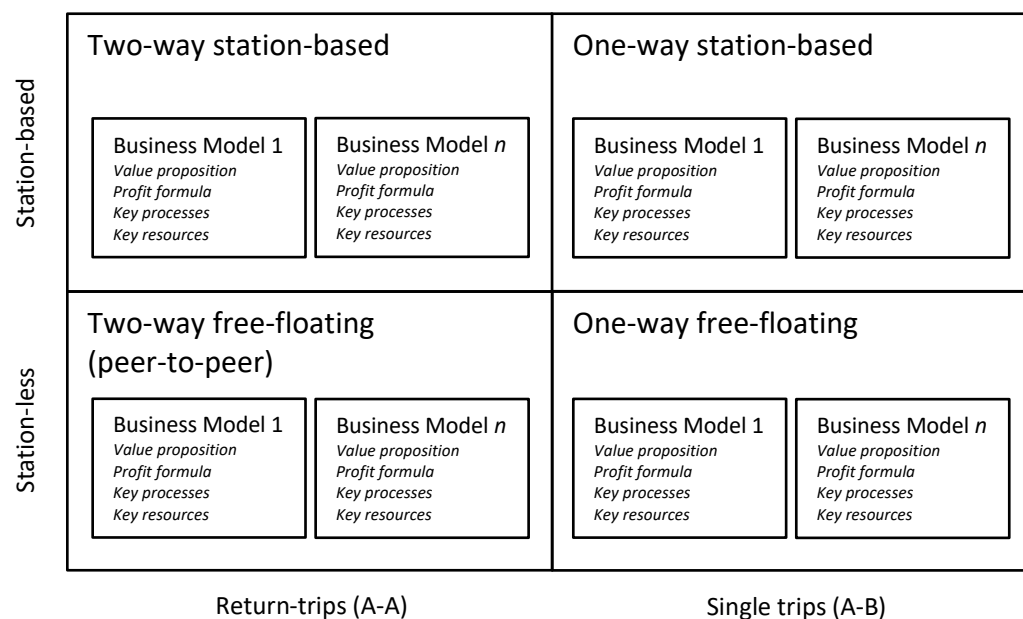


Figure 1. Business models archetypes for shared bicycles.

2.2 Business model innovation

After discussing the BM, it is also essential to gain insight into the evolution of a BM. Innovation is an important process for companies to maintain their existence (e.g., profit, competitiveness) (Teece, 2010). By adapting the BM, companies can respond to sustainability challenges, customer behaviour or technological innovations. Hence, these societal changes or developments provide a 'window of opportunity' for new BMs (Giesen, Riddleberger, Christner, & Bell, 2010). Whereas a BM determines the starting point for innovation, business model innovation (BMI) is a deliberate change of an existing BM or the creation of a new BM that better satisfies customer needs than existing BM (Chesbrough, 2007). BMI can be defined as "adding new activities, linking activities in new ways, or changing one or more of the parties performing one of the activities" (Zott & Amit, 2012, p. 40). The word 'new' is key in this sense. This implies that a form of BMI is only valid if the model is new for companies and actors in the wider socio-technical (ST) system as well, not just for the company. However, analysing BMs that contribute to broader transition processes also entails examining possible (mis)positions between a BMI and its external environment, which will be addressed in section 2.3.

Bike sharing models can be seen as a BMI that disrupt existing markets or address sustainability challenges, enabled by digital platforms (Long & Van Waes, 2021; Winslow & Mont, 2019). Van Waes et al. (2018) propose that there is a difference between station-based models and innovative free-floating models. Station-based models are mostly operated by incumbents, while (one-way) free-floating models are mainly operated by niche actors (Van Waes et al., 2018). This implies that traditional models are accepted by municipal organisations and embedded in the regime, whereas free-floating models, are still relatively new and, therefore, not embedded in the regime yet (Van Waes et al., 2018). However, municipalities are looking at how innovative business models can be sustained in their city (Van Waes et al., 2018). This topic creates relevance for this study, as BMI reveals how niche actors adapt their BMs over time but may deviate from the (local) regulations.

2.3 Co-evolution of business models and regulation

By adapting an existing BM or creating a new model that better responds to customer needs, as explained in the previous section, also provokes reactions from stakeholders such as the government and thereby entails the interplay between (local) governmental policies and niche actors (Pelzer, Frenken & Boon, 2019; Huijben et al., 2016). This positions the innovative BM of companies in the context of the ST-system, namely while niche actors scale up, these niches must deal with mainstream regulations, which sets the boundaries for the design space of the niche BMs (Huijben et al., 2016). This research focuses on the policy dimension of the regime (i.e., regulatory regime) in the ST-system, to examine the impact of the dimension on the BMDS (Geels, 2004; Huijben et al., 2016). Companies such as Uber and Airbnb recently have disrupted established industries with their innovative BMs (Uzunca, Rigtering, & Ozcan, 2018; Pelzer et al, 2019). They came under (negative) public scrutiny and became controversial in some places, due to their rapid and widespread roll-out in a short period of time (Hwang, 2019). For this reason, the government intervened and restricted their activities, which affected their BM (Hwang, 2019). Through mechanisms of enforcement and sanctioning, municipalities tried to regulate the sharing economy in the past (Pelzer et al., 2019; Uzunca et al., 2018). Regulatory instruments such as formal rules, laws, taxes, bans and policies can affect the BM, as these are used as regulatory mechanisms to coordinate and structure the establishment and operation of sharing providers (Van Waes et al., 2018). Regulation is defined as "a set of rules designed to control and govern conduct by an authority that may enforce the imposition of penalties" (Uzunca & Borlenghi, 2019, p. 920).

However, to create a protected space for niches, niche entrepreneurs are shielded from mainstream selection environments such as rules and regulations (Schot & Geels, 2008; Huijben et al., 2016). This unique process of niche shielding can consist for example of niche regulations (i.e., financial support or rule exemptions) or a company incubator and determines the level of niche shielding (Boon, Moors & Meijer, 2014). These instruments of active niche shielding are intended to protect niches from mainstream pressures and to encourage niche developments, and thus provide opportunities for (radical) innovations. Nevertheless, niche entrepreneurs must comply with mainstream regulations just like established firms, as mainstream regulations are determined by formal institutions (Huijben et al., 2016). This implies that the mainstream selection environment of the regime may limit the design space of niche BMs. These boundaries (e.g., the policy dimension) can induce niche actors to adopt different niche empowerment strategies to deal with the regulatory regime (Huijben et al., 2016). Firstly, niche actors can adopt a 'fit and conform' strategy and adapt their BM within the opportunities offered by the regulatory regime, while simultaneously dealing with its limitations. Secondly, niche actors can also adopt a 'stretch and transform' strategy and adapt their BM, either incrementally or radically, to gain additional benefits from the existing regulatory regime (Huijben et al., 2016).

To examine the co-evolution process between the regulatory regime and niche BMs development, the BM is a suitable unit of analysis as the BM gives a holistic view of the value creation and reflects the adopted strategy of the company (Sommerrock, 2010). Thereby, the niche empowerment strategies to fit or stretch the mainstream regulations can be exposed by studying the different types of BMs applied the niche entrepreneurs (Meijer et al., 2019). This is relevant for this research, as it reveals how both actors adapt their strategies in response to each other. Additionally, the regulation of local nuisances is best suited to state-level municipalities, as municipalities better understand the unique problems of their communities (Yang et al., 2020). Through regulation, the municipality can encourage or temporise the emergence of the sharing economy or restrict it entirely. This makes the role as regulator contradictory: the municipality is expected to encourage innovation and at the same time ensure control over its society (Ganapati & Reddick, 2018). As new technologies have their specific physical and social characteristics, regulations generally need to be adapted, or even created, to solve specific problems or conflicts that arise (Kivimaa & Kern, 2016). These may relate to health and safety regulations, property rights, labour rights and the norms and beliefs embedded in existing practices (Yang et al., 2020). As a result, the government has a (major) stake, through regulation, in the development and diffusion of innovative BMs, or whether they can take advantage of possible new technologies (Van Waes et al., 2018). As cases like Uber or Airbnb showed how local authorities intervened when these firms started exploiting their sharing BMs in various cities (Pelzer et al., 2019; Uzunca et al., 2018).

2.4 Business models and municipal regulation in the bike-sharing economy

Finally, the theory described above will be synthesized to make it applicable to the scope of this study. Bike sharing is not new for Dutch municipalities. For instance, the first public bike sharing system (White Bikes) was established in Amsterdam in 1965 (Fishman, 2016). In the following years several new generations of bike sharing models (e.g., one- or two-way station-based and free-floating models) have been exploited in Amsterdam (Van Waes et al., 2018). In the beginning, two bike sharing providers (Hello-Bike and Urbee, section 4.1 provides more information on the companies) who entered the market with the one-way free-floating model were financially supported (i.e., subsidy) by the municipality, with the primary aim of reducing unused bicycles and replacing short car trips of office employees with bicycles (Gemeente Amsterdam, 2017). However, this BM became discredited by the Amsterdam municipality after a few months (Long & Van Waes, 2021). As these shared bicycles caused nuisance in public

spaces and bicycle parking facilities for local citizens due to the unregulated provision of the shared bicycles (Gemeente Amsterdam, 2019). The value proposition for users of this one-way model entails that a shared bicycles can be left and collected anywhere in the public space without using a docking station. In 2017, the first free-floating bike sharing companies were operational in Amsterdam, but after the model became in conflict with formal institutions (e.g., local bike parking rules and offering a service in public spaces) it was banned by the municipality of Amsterdam (Petzer et al., 2020). In consequence of the nuisance, new rules and regulations for public bike-sharing were created to coordinate and regulate the offer of shared bikes in Amsterdam (Gemeente Amsterdam, 2019). Other cities like, Utrecht or Rotterdam also announced to regulate free-floating bike sharing by means of adapted local legislation (Long & Van Waes, 2021). At the beginning of 2020, the municipality of Amsterdam announced to start with a two-year pilot with four shared bike providers. Based on a regulated offer, 1300 shared bikes are allowed to avoid parking problems in the city (Gemeente Amsterdam, 2021).

This study aims to contribute to a better understanding on the co-evolution process between the regulatory regime and the development of niche BMs in transition. The dynamics are visualised in a framework, Figure 2, and builds on the research of Van Waes et al. (2018), and Huijben et al. (2016). A central starting point of the framework is that both actors have impact on each other (arrow A and B, in Figure 2). By examining the municipal regulations, it reveals how the municipality of Amsterdam monitors and regulates in the shared bicycle mobility. The regulatory regime can have either a positive or a negative impact on the developments of niche BMs, and outlines the (legal) boundaries for the BM design space (Huijben et al., 2016). The larger the design space, the more the variety of BMs. In addition, studying the developments of niche BMs over time shows how niche actors adapted their BM (unless not required) to the regulatory regime within the legal BM design options. In this regard, niche actors can follow different empowerment strategies to fit or stretch the regulatory regime (arrow C in Figure 2). Therefore, this study examines how (niche) BMs are affected by policy and regulations, something that is often ignored in the existing literature (Huijben et al., 2016).

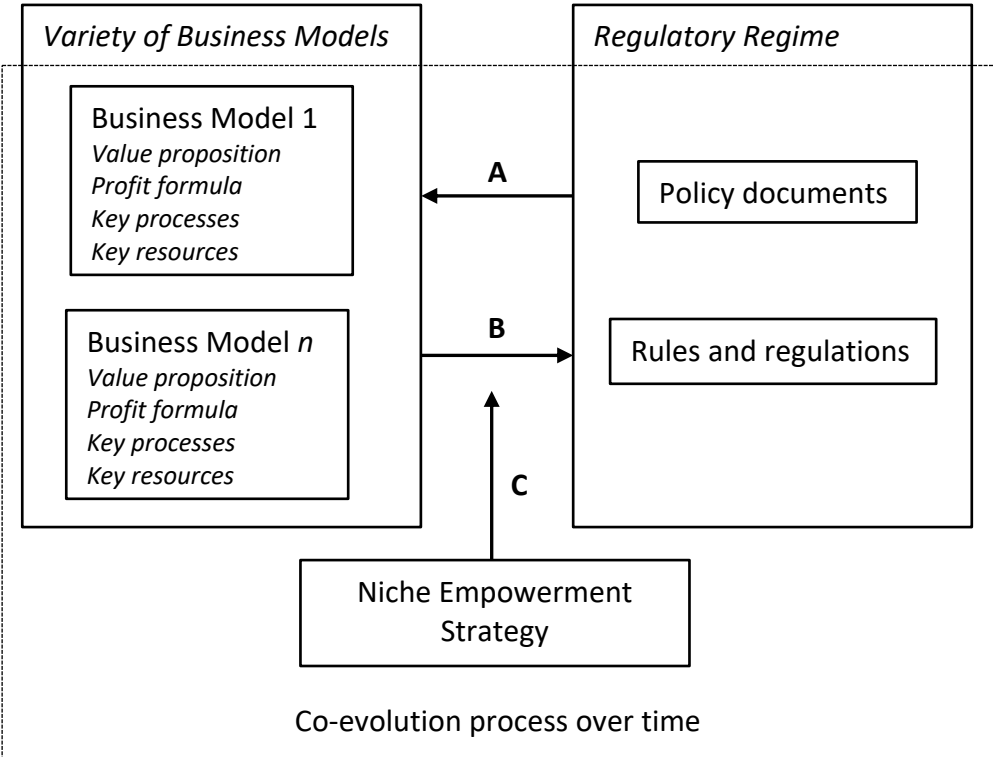


Figure 2. Visual framework between the dynamics of business models and regulations.

3. Methodology

This chapter outlines the research design in section 3.1 and the research methods used to collect the data in section 3.2. Finally, section 3.3 describes who the data was analysed to answer the research question.

3.1 Research design

An embedded single case study design was applied to study the interplay between the variety of BMs applied by niche entrepreneurs and the regulations set by the municipality of Amsterdam through a qualitative approach (Yin, 2009). The data is gathered and analysis by means of document analysis, semi-structured interviews, and thematic analysis. These methods were used as the literature regarding co-evolution between bike-sharing BMs and regulation in the Netherlands is limited at present (Van Waes et al., 2018). The research was conducted in two phases, using different methods and sources, as outlined in Table 2. To answer the research question, data was collected from primary and secondary sources published between 2016 to 2021. Since, in 2016 the first bike sharing companies became operational in Amsterdam, and in 2021 the small-scale experiments started. Table 3 and 4 provides an overview of the examined cases.

Firstly, a document analysis was used to identify the starting situation of the shared bicycle mobility market and its development. This mainly involved looking at which policy have been made in the past by the municipality of Amsterdam to regulate public bike sharing in the city. Since there is little literature available on the subject to date, a document analysis can help identify which laws and regulations on bike sharing BMs are applicable to this research (Bryman, 2016). In addition, a more in-depth analysis based on semi-structured interviews was used to collect data on the co-evolution process of the regulatory regime and development of the free-floating BMs. The research focused exclusively on these models, as they cause the most friction with municipal regulation and are therefore the most relevant for this study. An overview of the research scope can be found in Figure 3.

The analysis for this research was done in a qualitative fashion. Through thematic analysis common themes and patterns were identified from set of texts of various sources (i.e., legal pronouncements, policy documents, Dutch newspaper articles or web pages) and the interview transcripts. The data was analysed with a combination a deductive and inductive coding to understand the co-evolution between the regulations and BMs for bike sharing and thereby answer the research question.

<i>Research phase</i>	<i>Research method</i>	<i>Sources</i>
Data collection	Document analysis	Legal pronouncements Policy documents Dutch newspaper articles Web pages
Data collection	Semi-structured interviews	Interviews (semi-structured)
Data analysis	Thematic analysis	Legal pronouncements Policy documents Dutch newspaper articles Web pages Transcribed interviews

Table 2. Overview of research phases.

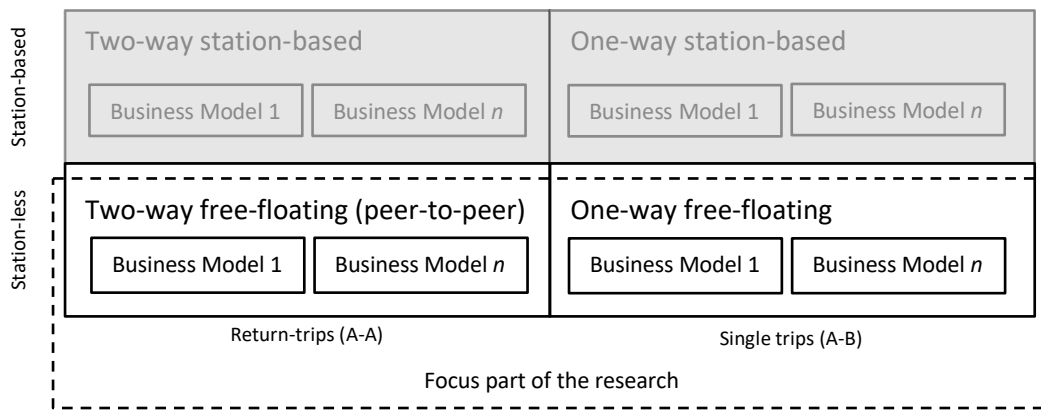


Figure 3. Scope of the research.

3.2 Data collection

By using an inductive qualitative research style, information was retrieved from document analysis to identify the starting situation and its development regarding the regulations applied by the municipality of Amsterdam and the (niche) BMs exploited by the bike sharing companies (Bowen, 2009). This form of secondary data provided insight into the bicycle-sharing mobility across both actors which ensured relevance to this study. As some developments have taken place recently, such as changed regulations for public bike sharing, enhance the interest to study the co-evolution between the two actors (Van Waes et al., 2018). The research focuses on the city of Amsterdam as a case study, this decision was made as Amsterdam reacted more strictly against public bike sharing than other cities in the Netherlands. As stressed, in 2017 the municipality banned public bike schemes, which makes it interesting to examine this city (The city of Amsterdam, 2017). The data was collected between the period of 2016 and 2021, as the first shared bike provider started its operations in 2016 and the small-scale experiments became operational in 2021. By setting a distinct geographical and sectoral scope for the study within a certain time frame ensures the (external) validity (Merriam & Grenier, 2019). Furthermore, to enhance the reliability and validity of the study, information was gathered from multiple sources (Bryman, 2016). Regarding the municipal regulations, which has a legal background, legal pronouncements of the Council of State and the municipality of Amsterdam were consulted for legal statements on bike sharing schemes. In addition, information and interpretation to these regulations were retrieved from seven policy documents and six Dutch newspaper articles (e.g., Het Parool, de Volkskrant, and NRC) to examine the developments over time. The following search terms were used 'regulation', 'policy', 'bike sharing', 'bike sharing system', 'Amsterdam' to gather data on the regulation for public bike sharing in Amsterdam. In support, web pages such as ShareNL and Eur-lex.europa.eu, Rijkswaterstaat and CROW-Fietsberaad were consulted to examine the dynamics between bike sharing providers and municipalities. In addition, the bike-sharing providers for this research were selected as follows: through web-searching, operational bike sharing providers in the Netherlands were retrieved for a general overview. To this end, the following search terms were used: 'bike sharing system Netherlands', 'bike sharing companies Netherlands' or 'Netherlands dockless bike companies', verified with the following key features of the models; 'bike sharing', 'bike sharing system', 'application', 'smart-lock', 'redistribution', 'digital platform', 'special purpose' and 'bike owner' in English and Dutch. Subsequently, the identified bike sharing companies were verified, via their own web pages, which of the companies exploit a free-floating model and operate in Amsterdam. The total of seven companies - *Urbee*, *Hello-bike*, *Donkey Republic*, *FlickBike*, *oBike*, *Spinlister*, and *ListNRide* - were selected, which are the only providers that apply the free-floating model in Amsterdam. All historical key events of each bike sharing

company were retrieved from their own website and from nine Dutch newspaper articles (e.g., Het Parool, de Volkskrant, NRC and AT5).

After the document analysis, the semi-structured interviews were conducted. This method of primary data collection provided insight into how the municipality enforced public bicycle sharing and how bike sharing providers adapted their BMs to deal with the regulatory regime. The semi-structured interviews were held with four project members and policy makers of the municipality of Amsterdam in the field of shared bicycles and with six bike sharing entrepreneurs of the selected companies. Table 3 provides an overview of the interviewees. A total of 21 people were contacted, ten of whom were eventually interviewed as others refused to participate. As in the case of Urbee, no employee of the firm granted permission to participate. The same applied to most municipal officials who were contacted but refused to cooperate. By interviewing project members or policy makers, relevant information was obtained on how the municipality dealt with innovative BMs, while the entrepreneurs of bike sharing companies provided substantive details on the development of their BMs and how to deal with the regulatory regime. Table 4 in chapter 4 presents an overview of the cases. The interviewees were selected according to a high degree of their (strategic) involvement in the company or public bike sharing project. Triangulation of the various methods collected through the document analysis and the (semi-structured) interviews increased the reliability and validity of this research (Roberts & Priest, 2006). By this manner it was possible to combine the different qualitative methods and to compare the observations regarding the regulation on public bike sharing over time and concerning the development of the niche BMs over time. The empirical research serves to validate and enhances knowledge on the literature of BMs and the niche empowerment strategies (Eisenhardt & Graebner, 2007; Yin, 2009).

To address various topics in a structured manner and to provide space to discuss detailed information on the regulations or BMs during the interviews, therefore an interview guide was made (Appendix A + B) (Turner III, 2010). A separate interview guide was created for the municipality (Appendix A) to enhance the understanding of public bike sharing policy and the motivation of the municipality to regulate the use of shared bicycles (e.g., by regulatory goals or instruments) and operational progress of the pilots. In addition, another interview guide was created for the bike sharing companies (Appendix B) to study the development of niche BMs and how niche actors adapted their BM (unless not required) to deal with the municipal regulations. The shared bike BMs were examined on the four different building blocks (i.e., value proposition, profit formula, key processes, and key resources), as stated in the theory section. These four core features were measured at multiple points in time (e.g., before and after the amended regulation) to analyse the adaptations of a BM or the adoption of a different model, to identify change. After each interview, the effectiveness of the interview guide was evaluated and adjusted if necessary. All interviews were conducted online via Microsoft Teams due to COVID-19 measures. The interviews were carried out in a separate consulting room to have an undisturbed conversation and to avoid affecting the results. The duration of the interviews were approximately 60 minutes and were conducted in the interviewee's native language (Dutch or English). At the beginning of each interview, the respondent was asked for permission to record the interview and informed about the way the recordings were used and stored for internal only. The names of the respondents have been coded due to privacy reasons. This makes it clear to the researcher which respondent it concerns, but it is not traceable to others (Bryman, 2016).

Respondent	Organisation	Function interviewee	Gender
R1	Municipality of Amsterdam	Account holder shared bikes	Female
R2	Municipality of Amsterdam	Project manager and advisor bike sharing	Male
R3	Municipality of Amsterdam	Policy advisor traffic & public space	Male
R4	Municipality of Amsterdam	Policy advisor traffic & public space	Male
R5	Hello-Bike	Co-founder & CEO	Male
R6	Donkey Republic	Country Manager NL & BE	Male
R7	FlickBike	Co-founder	Male
R8	oBike	Former PR-manager	Female
R9	Spinlister	CEO	Male
R10	ListNRide	Co-founder	Male

Table 3. List of the interviewees.

3.3 Data analysis

The analysis of the documents consisted of a purely qualitative process. As described in the previous section, legal pronouncements, policy documents, Dutch newspaper articles and webpages were analysed to identify which rules and regulations have affected the BMs for public bike sharing between 2016 to 2021. Therefore, this study examined the mainstream regulations to regulate public bike sharing over time. In addition, niche shielding instruments (i.e., financial support or rule exemptions) were assessed if shielding instruments were made available by the municipality to niche entrepreneurs. To this end, relevant rules and regulations or policy text fragments were highlighted during the coding process.

The interviews were analysed by means of a thematic analysis. The transcribed interviews were analysed using NVivo 12, as this programme enables qualitative data to be analysed in a systematic and thorough way (Bryman, 2016). The transcripts can only be obtained on request, due to privacy reasons. First, the collected data were reviewed to obtain a thorough overview before the individual items are analysed. For this purpose, all interviews were transcribed, the data were read through, notes were taken and in general terms, the data were read through to get familiar with it. Subsequently, important, or potentially useful transcribed text fragments were highlighted and compiled in codes. To this end, the codes were verified whether these corresponded to the highlighted sentences. For a thorough analysis and to ensure validity, in this process, the entire data set was constantly being shifted back and forth which may lead to new codes (Yin, 2011). To identify patterns among the codes, the codes were generated into themes according to the niche empowerments strategies, *fit and conform*, and *stretch and transform*, as stated in the theory section. These steps entailed a deductive approach of analysis, whereas additional approaches to niche empowerment strategies were performed in an inductive manner to observe and define new findings. Afterwards the themes were reviewed, to make sure the themes are useful and accurate representations of the data to ensure the reliability and validity of the research (Yin, 2011). During the final analytical step, the themes were defined and named by describing the meaning of the theme and giving them an appropriate name to assess how the niche actors adapted their BMs (unless not required) to deal with the municipal regulations, and to this end followed a fit- or stretch like strategy which illustrates the co-evolution process.

4. Results

This chapter presents the results of the collected data, gathered from the document analysis and the semi-structured interviewed. Figure 4 provides an overview of the timeline to visualise the key events by the municipality and the bike sharing companies. The first section 4.1 (highlighted in blue in Figure 4) provides a general overview of the events by the bike sharing companies entering the market in chronological order. Subsequently, section 4.2 (marked in orange in Figure 4), outlines the co-evolution process between the municipal regulations and the BMs adopted by the bike sharing providers. Section 4.2 is divided into two subsections (marked in deep orange in Figure 4) to better indicate the key events of both actors. Subsection 4.2.1 highlights how the municipality of Amsterdam regulated public bike sharing. Subsection 4.2.2 describes how the bike sharing providers changed (unless not required) their BMs over time.

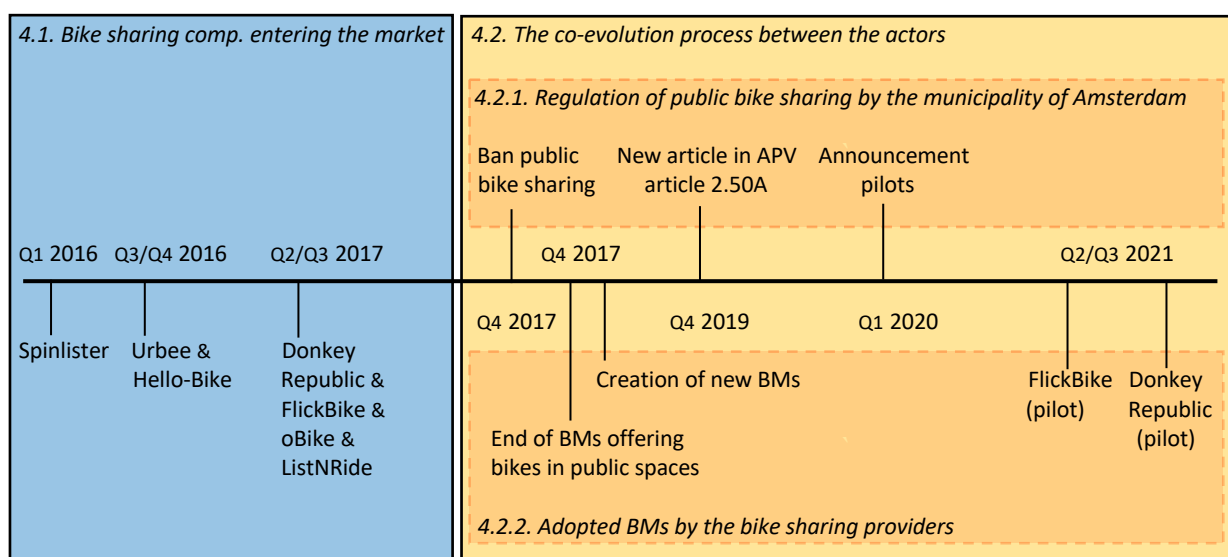


Figure 4. Timeline of key events by the municipality and the bike sharing companies.

4.1 Bike sharing companies entering the market in Amsterdam

In March 2016, an American company Spinlister settled in Amsterdam after acquiring a Dutch company, Cycleswap (Knobben, 2016). Spinlister became operational by offering a two-way free-floating model for peer-to-peer sharing of bikes (Knobben, 2016). The company was not required to get approval from the municipality, since the operation is only active in the private sector. *“About 90% of our transactions do take place in North America but when it comes to Amsterdam, or any European country, we play the platform card. It means we are just the platform, like to connect people. So, we never had any issues or conflicts with the municipality in the past”* (R9). Currently, no specific figures are available on how many bicycles are offered through Spinlister's platform in Amsterdam. In 2012, Spinlister was founded and initially financed by private capital, and later by venture capital (R9).

In September 2016, Urbee started their operations with the one-way free-floating model primarily focussed on companies and business locations in Amsterdam. Secondly, tourists and other users were considered (Van Zoelen, 2016a). The company was founded in cooperation of e-bike Network B.V., Hartmobile B.V. (Qwic) and Dutch Bicycle Rental B.V., and marketed under the brand name, Urbee (Witteman, 2016). The Amsterdam Climate and Energy Fund (Akef) invested together with Qwic, Dutch Bicycle Rental and Skopei in the mobility start-up Urbee to roll out an innovative sharing system of electric shared bicycles (Witteman, 2016). In 2017, the Dutch company had placed 1.050 shared e-bikes at central locations in the West,

New-West, East, South-East of the city of Amsterdam (Van Zoelen, 2016a). The Urbee bicycles were mainly offered from privately bicycle parking areas, i.e., based on a subscription model, companies provide an e-bike to their employees (Wittevan, 2016). The shared e-bikes can cover distances for commuting and thereby replace car trips. Many of the e-bikes are also available in the public sector, based on a pay per use model, although Urbee focuses less on this market segment (Van Zoelen, 2016a). It is unclear whether Urbee requested permission from the municipality to operate their model in the public sector when it launched its service.

In November 2016, Hello-Bike started as a bike sharing provider operational at the Zuidas in Amsterdam (R5). Hello-Bike was founded in 2015, after the three owners gained their expertise from a previously founded start-up, the Bikevertising Company (i.e., commercial advertising on bicycles) (R1). The Dutch company obtained a tender set up by Hello-Zuidas (a stakeholder group on the Zuid-as in Amsterdam) in cooperation with the municipality of Amsterdam to improve mobility around the Zuidas area. Through a subsidy from Hello-Zuidas and the municipality, Hello-Bike was permitted to deploy 500 shared bikes, based on the one-way free-floating model by the end of 2017 (Van Zoelen, 2016b).

From May 2017, the Danish company Donkey Republic placed 360 of their shared bicycles, based on the one-way free-floating model, in the city districts West and East of Amsterdam (Posthumus, 2017). During this operation no tender program by the municipality of Amsterdam was granted (R6). Donkey Republic was founded in 2012 and switched to a self-service bike-sharing system as known nowadays in 2015 (R6). Before Donkey Republic became operational in Amsterdam, the company was already active in other European cities (Posthumus, 2017). The company started with seed money from a Kickstarter campaign, subsequently Donkey Republic was funded by venture capital, and went public in 2021 (R6).

In June 2017, the Dutch company FlickBike started offering 1.000 shared bicycles in the city centre, West, East, and South of Amsterdam (Cornelissen, 2017). The shared bikes were offered based on the one-way free-floating model (R7). Before FlickBike started their operation, the company was in contact with a policy advisor from the municipality, who gave FlickBike permission to offer the shared bikes in the city of Amsterdam. However, no clear agreements were made regarding the number of bikes offered (Cornelissen, 2017; R7). In 2017, FlickBike started their operations with private capital financed by the three owners (R7).

In June 2017, Singaporean company oBike established itself in Amsterdam by means of one-way free-floating model (Teuling, 2017). With an aggressive strategy, oBike provided rapidly 3.600 shared bicycles distributed across the city in the centre, West, East, and South of Amsterdam (Cornelissen, 2017). oBike states to have had contact with the municipality, however no tender program was granted by the municipality of Amsterdam (R8). In 2016, the company was founded and funded with venture capital from technology companies. oBike was already operational in large international cities (e.g., Singapore, or Melbourne), before the company launched their BM in Amsterdam.

In August 2017, the company ListNRide became operational in Amsterdam (R10). In 2017, ListNRide was founded by two entrepreneurs. Through a crowdfunding campaign, the company started their business (R10). The German company employs a two-way free-floating model, offering an online marketplace for peer-to-peer bike rentals (Van Waes et al., 2018). Most of the bikes offered on the platform are mid- to high-end bikes, divided into 33 bike categories (R10). More than 1500 bicycles are listed on the site that is provided in different international countries, including The Netherlands, Spain, Germany, Argentina, Japan, and the United States (R10). The bicycles are offered and rented in the private sector in Amsterdam. Therefore, the company does not need to obtain permission from the municipality (R10).

4.2 The co-evolution process between the actors

By mid-2017, a total of 5.000-7.000 shared bikes were placed in Amsterdam's public spaces by the various bike sharing providers (Gemeente Amsterdam, 2017). At the time, there were no other regulations in place different from the prevailing bicycle parking rules, based on article 4.27 of the 'Algemene Plaatselijke Verordening' 2008 (APV; in which the municipal regulations on public order and safety are stated) (The city of Amsterdam, 2017). The article states, among others, that it is forbidden to park a bicycle if this would: hinder or obstruct the passage of traffic or obstruct the safety or flow of traffic or the visibility of traffic (Overheid.nl, 2019a). As emphasised in section 4.1, the municipality was only involved (i.e., subsidy and a tender program) with two bike sharing systems, Urbee and Hello-Bike (The city of Amsterdam, 2017). The primary aim of the municipality was to reduce unused bicycles and to replace short car trips of office employees with bicycles. Some other bike sharing providers made mutual agreements with officials as highlighted. However, over time these bicycles were causing an excessive demand on Amsterdam's limited public space and parking facilities, especially caused nuisance for residents in crowded areas of the city (Gemeente Amsterdam, 2017). In addition, several more bike sharing providers applied to the municipality to start offering their shared bicycles in Amsterdam (Long & Van Waes, 2021; R1). The following subsections (i.e., paragraphs 4.2.1 and 4.2.2) highlight the key events by the municipality of Amsterdam, who regulated public bicycle sharing, and by the providers who subsequently adopted different BMs, or were not required, after regulation. It should be noted that these developments by the actors are intertwined in a dynamic way, which typifies the co-evolution process, but the key events are structured below in a static fashion to provide a better overview.

4.2.1 Regulation of public bike sharing by the municipality of Amsterdam

In August 2017, the municipality of Amsterdam announced to ban the provision of shared bicycles in the public areas of the city. The arrival of the one-way free-floating shared bikes did not bring the municipality what it was aiming for. *"A couple of operating shared bike parties were unable to adhere to the rules in place for this purpose, regarding the parking of bicycles, the orderly use of public space, and the handling of complaints. This caused a serious disorganisation of the public space, a chaotic streetscape, and complaints from citizens"* (R3). Based on article 2.50 of the APV, the municipality stated that the bike sharing companies who used the public order for commercial activities were in violation (The city of Amsterdam, 2017). The article states that it is prohibited to offer or provide services on or near the road or public water for payment for an activity, such as a shoe shiner, guide, portraitist, photographer, guardian of vehicles or other objects, car cleaner or solicitor of customers for companies such as canal shipping companies, hotels, catering establishments and prostitutes (Raad van State, 2020).

After the announcement of the ban of the free-floating model for shared bikes in the city, the municipality published various policy documents in the following years. The most important of these are 'Long-term bicycle plan 2017-2022' and the policy papers 'Kansen voor deelfietsen' published in 2017 and 'Deelmobiliteit, kansen voor de stad' in 2019. These documents outline the design of the policy. The municipality has indicated to start a dialogue with service providers about ideas that can contribute positively to the public space and accessibility of the city (The municipality of Amsterdam, 2017). However, to combat inconvenience, as in the past, and promote an efficient use of the available space, the municipality opted for a regulated system of shared bicycles.

Until the 20th of October 2017, the shared bike providers that operated a one-way free-floating model, had the opportunity to remove their bicycles by themselves. After this date the bikes would be removed by the municipality (Kruyswijk, 2017). It was not permitted to park the

shared bicycles in regular bicycle racks afterwards, since those are intended for bicycle owners, and not for commercial purposes (Van Unen & Van der Meijden, 2017). Most providers obeyed the government's order by removing their shared bicycles off the streets. In the case of Urbee, the ruling hardly had any impact on their BM, as the company mainly offered their bikes from private space (Witteaman, 2016). Nevertheless, the other bike sharing providers reacted differently. *"This was very disappointing for us. We were in contact with the municipality before. However, there was no indication that this might happen. In fact, a meeting with the municipality's evaluation group was already planned, to evaluate the shared bicycle concept in the city"* (R8). Other shared bike providers were less surprised and indicated that they were urging the municipality for policies, to regulate this new concept. Some bike sharing providers indicate that the market was disrupted when new foreign providers placed many bicycles on the street in a short period of time and would benefit from a well-defined policy and regulation by the municipality. *"Policy remains very important, if there is a good policy where a few providers are given a license to offer a citywide service with a reasonable fleet, then it can create a comprehensive system"* (R7). *"The biggest problems we faced, is when there is no licence system or policy from the municipality. More like a cowboy market, which we saw in 2017. That's super unbeneficial to anyone"* (R6). Additionally, FlickBike took legal action, after the company was penalised and fined for not removing their shared bikes. FlickBike argued that the municipality had interpreted the article (2.50 of the APV) incorrectly.

In July 2020, the Council of State agreed with FlickBike and ruled differently from the court's decision a year before (Ranzijn, 2020). According to the Council of State, the article exclusively relates to the situation in which a person intrudes a certain service to passers-by in the public space (Raad van State, 2020). However, since the shared bikes can be reserved on individual initiative through an application, and no person offers the shared bikes on the street, the element of imposition is absent (Overheid.nl, 2019b; Raad van State, 2020). Moreover, according to the Council of State, the fact that the municipal council amended the APV indicates that offering shared bicycles in public order is not covered by article 2.50 of the APV. In October 2019, the municipal council has included a new article in the APV, namely article 2.50A, which prohibits offering bicycles for use on or near the road to third parties for payment or otherwise for commercial purposes without a permit from the municipal executive (Raad van State, 2020). As a result of the ruling, FlickBike was not obliged to pay the fine, or the costs charged by the municipality for removing the bicycles. However, the company was still unentitled to offer shared bicycles without an exemption by the municipality of Amsterdam, based on article 2.50A.

In April 2020, the municipality announced to grant permission for small-scale experiments of two (maximum three) years for five areas: Zuidoost, Oost, Rivierenbuurt, Zuidas and Westas (an overview can be found in Appendix C). In total an exemption has been granted for 1,300 (electric) shared bikes divided among the participating parties (Gemeente Amsterdam, 2021). By means of small-scale experiments, the space requirement will be limited, and the municipality wants to investigate whether the shared bicycles can contribute to reduce bicycle parking pressure, improve transport chain, and replace car trips: *"Shared bicycles can contribute by making better use of public space and improving the quality of public space by reducing the number of bicycle parking spaces. If the shared bicycles are used sufficiently often per day and we all make more bicycle trips with fewer bicycles, the bicycle parking pressure will be reduced. Residents may then waive their own 2nd or 3rd bicycle"* (R1). With the use of the shared bicycles, the municipality focuses on two target groups: the resident and the frequent visitor to the city by means of a 'first-' and 'last mile' solution perspective (R3; R4). The municipality indicates that shared bicycles could become a crucial part in the chain of mobility, as a Mobility as a Service (MaaS) solution (R2). MaaS is defined as the provision of multimodal, demand-driven mobility services, whereby customised travel options are offered to customers

via a digital platform with real-time information, including payment and transaction handling (R1; R2). In this context, the municipality opted for the one-way station-based system with designated parking locations, as only this model was supported by the College (i.e., the College consists of the mayor and the aldermen and is the daily administration of the municipality) since it strives to avoid parking problems by using shared bicycles and achieve the municipal goal of 'more bicycle trips with less bicycles' (R4). In this system, the public shared bicycles must be returned to designated parking locations, which are distributed and facilitated by the municipality. Appendix C indicates an overview of the parking areas in public space and the corresponding parking signs. The municipality opted for multiple bike-sharing systems with various providers, which are all restricted to a geographical area. The small-scale experiments were planned to start later in 2020. However, due to the COVID-19 pandemic, these pilots were delayed and started from 2021 onwards (R2). To date, two bike sharing companies, FlickBike and Donkey Republic have an exemption for the pilots (R2; R6; R7). The municipality and the bike sharing companies experience a good working relationship during their cooperation. Both parties meet monthly to discuss progress, compliance with permit conditions and undesirable effects, such as parking nuisance. Apart from the start-up period, the outbreak of the COVID-19 pandemic caused some difficulties and delays: *"Two areas are operational and the remaining 3 should follow in the coming months"* (R2). During the experiments the shared bicycle providers must share (anonymous) data about e.g., use per subarea number of kilometres (total and per bicycle), type of user (resident, visitor, commuter or other), location of bicycles and report to the municipality on the process of monitoring and enforcement (R1; R6; R7). To establish a bicycle sharing system in the city, the municipality acknowledges that it needs the bicycle sharing parties: *"Because you can't get anywhere on your own. I don't think you should want that as a municipality either. But it is a challenge, both for the municipality and for the providers"* (R1).

4.2.2 Adopted BMs by the bike sharing providers

This paragraph provides an overview of the BM adopted by the bike sharing providers. Figure 5 provides an overall picture of which BMs the providers have applied over time. It should be noted that business models have adapted over time in more dynamic fashion than illustrated. A significant moment is the amended regulations in Q4 of 2017. As shown in Figure 5, all bike sharing providers which operated in the public space have adopted a different BM or has left the market. Only oBike is no longer active in Amsterdam after the municipality of Amsterdam amended the regulations for public bike sharing. The regulations made it impracticable to maintain their BM, and the company decided to focus on other international cities in which it was already operational. Only the providers who applied a two-way free-floating model did not change their BM over time. All BMs are described below according to four different building blocks of a BM including: *value proposition*, *profit formula*, *key process*, and *key resources* (Van Waes et al., 2018). Table 4 presents a comprehensive overview of the key characteristics of the bike sharing companies.

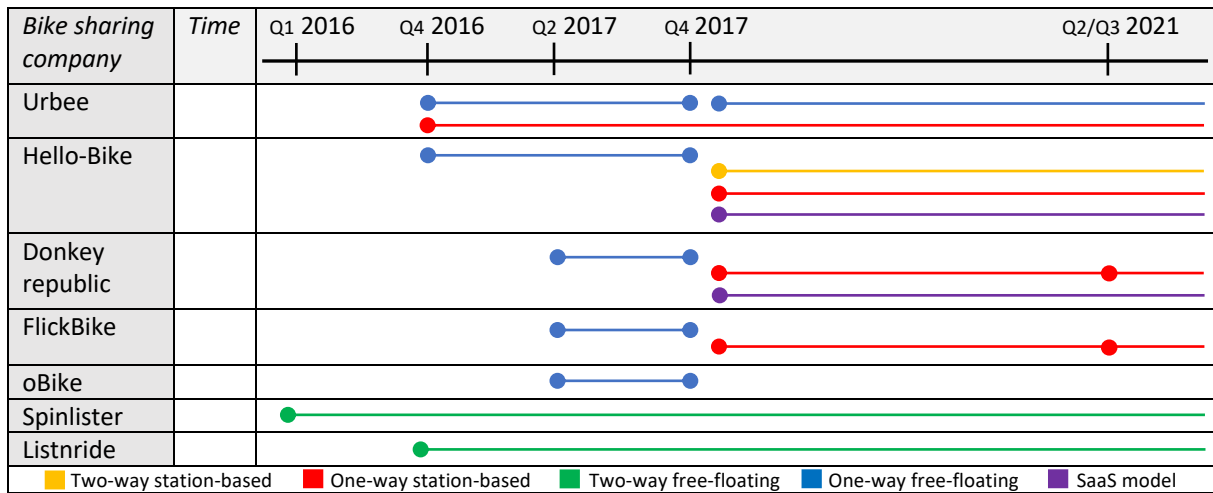


Figure 5: Change of the BMs by the bike sharing companies over time.

The two-way station-based model is utilised by Hello-Bike. The company stated that the main reason for adapting their BM to the station-based model was due to the amended regulations by municipality: "A lot changed regarding the regulation of public bike sharing in 2017. As a public bike sharing company, it became impossible to offer bicycles in this sector. The advantage of the new model is that we do not need a permit to be operational. The bicycles are not publicly accessible and parked on private property" (R1). With this model, Hello-Bike has 400 bicycles operational around the Zuid-as in Amsterdam. The *value proposition* of this model is offering a MaaS solution, in terms of first- and/or last-mile facility, to commute from the station to the office in both directions. Organisations use the bikes as a service for their employees to improve the accessibility of the offices. The bikes are parked at stations or corporate bicycle parking areas. "We have a client, EY. They park our bikes at the RAI and commute to their office and backwards. An amount of 50 bicycles, which are all used twice a day. That is a healthy revenue model" (R1). The standardised bicycles can be located and unlocked through an application and rented during the entire day. The *profit formula* of this model entails revenues and costs. Revenues are obtained through a monthly subscription payment by the organisation, for a closed user system for business estates, industrial areas, or educational campuses. The costs are linked to the *key processes* and *resources*. The key processes encompass maintenance, repair, enforcing correct parking of the shared bicycles and servicing the application for the users. This implies that the bikes, smart locks, application, user data, parking facilities and employees for the operation are the key resources for Hello-Bike.

The one-way station-based model is implemented by the following bicycle sharing companies: Urbee, Hello-Bike, Donkey Republic and FlickBike. The model is applied by Urbee and Hello-Bike exclusively in the private sector, while Donkey Republic and FlickBike operate in the private and public areas. The *value proposition* of this model optimises the first and last kilometres beyond public transport by offering a (new) option in chain mobility, as a MaaS solution. Nowadays, the bike share providers prefer a more financially sustainable model than before, with a fixed group of returning users rather than volume. "We are constantly insisting on more bikes trips with less bikes. That means that the bikes are used more frequently and theoretically need 1/5 or 1/3 of the bikes, which makes a huge difference" (R6). The shared bikes can be tracked and unlocked via an application. As soon as an active user locks and thereby signs-off the shared bike, it becomes accessible again for other users. There is no limit to the rental period. The shared bicycles must be collected and returned, at no extra cost, to the designated locations. However, this need not be the original pick-up location. For business use, the spaces are located on private property and the shared bikes are offered by means of a closed user system, whereas for public use, the shared bikes are offered within the five areas and available to the public (Appendix C provides an overview of the five areas). The *profit*

formula of this model includes revenues and costs. The revenue is based on pay per use as a public service or through a monthly subscription payment which companies pay for their employees. The providers indicate that, to remain profitable, the interest in cooperating with companies has increased, and therefore started to apply this model in the private sector or in both sectors in parallel: *"We don't think that with purely public service it could be profitable anymore after the amended regulations"* (R5). This was emphasised by other interviewees: *"In total, you need different propositions to close the business case nowadays"* (R7) and *"Through cooperating with companies, you get a huge amount of people on the shared bikes at once. Furthermore, we have noticed that the bicycles are also used outside working hours, and it better gets into their system if they need for example a bicycle once, they take a share bike. We offer the bikes in different cities, so if someone needs to work in Rotterdam but live in Utrecht, they can get a bike in both cities"* (R6). The bike sharing companies will not be subsidised by the municipality during the pilot, because an agreement was reached between the parties at an early stage. This agreement remains unchanged despite the developments around COVID-19: *"A plan was drawn up at the time, which will be maintained, to maintain a level playing field between the five areas. That also means that if a new party would submit but would indicate from their experience of other cities that the municipality must provide a subsidy to keep it profitable, then our position is: no, that's not possible"* (R2). The bike sharing providers react differently regarding to subsidies from the municipality to make these kinds of projects profitable. However, the parties collectively admit that the form of subsidy should stimulate the use of shared mobility and relate to social interest, instead of just subsidising companies to establish their BM (R5; R6; R7). In addition to the revenues, the costs consist of the bike fleet, to some extent storage and personnel to service, repair and distribute the bikes. These operational costs are linked to the service area where the company operates: *"If the service area is too widespread, operational costs will increase. The biggest component of costs is, of course, labour; which means that if an employee must travel long distances to repair bicycles, service costs will also increase. That's why many service providers tend to have as dense a service area as possible, because that reduces costs"* (R6). For the pilot, the participating parties estimate that the imposed limitation on the number of allowed bicycles is sufficient to make a minimal loss (R6; R7). The providers want to gain experience in Amsterdam and consider it as an investment for the future: *"500 bikes may well be enough. In Utrecht, we are operational with 500 bikes for the past 2 years; in The Hague and Ghent with 300 bikes. So, we are experiencing this in several cities. Besides, in Amsterdam we can serve a reasonable area, but of course not the whole city"* (R6). For the pilots, Donkey Republic is allowed to place 300 shared bikes in Oost and 200 shared bikes at the Zuidas, and FlickBike 400 shared bikes along the West Line of the metro and along the bus line towards Westpoort (Gemeente Amsterdam, 2021; R6; R7). Figure 4 from Q2/3 2021 visualises the pilots for both providers. The target group is focused on customers (B2C) rather than partnerships with businesses (B2B), as the first part of the line implies. Related to the mentioned cost items are the *key processes* and *resources*. The shared bike companies provide and maintain the shared bicycles and ensure that the bicycles are parked in the designated areas. Wrongly parked bicycles should be moved or redistributed. Coherent to these key processes, the companies provide application maintenance and development, customer service towards consumers (B2C), business clients (B2B) or cities (B2G), marketing activities and complaint handling. As a side-line activity, the companies are engaged in innovating or business development: *"We look at the developments that occur in the market, for example, what types of locks are available or what types of organisations would like to participate"* (R7). To achieve these processes, a dense network of available sharing bicycles, equipped with smart locks that can be opened with an application, and designated parking facilities are needed as key resources. Moreover, the companies work almost exclusively with user data as a key resource: they analyse the type of user or the user behaviour, in order to

make (strategic) decisions based on it for their operations. All data is collected through their enterprise resource planning (ERP) systems and software and analysed by employees.

The one-way free-floating model is operated by Urbee by means of a personal e-bike (Urbee One) in the private sector. This indicates a significant difference regarding to the offering of the e-bikes with this BM; in the past the e-bikes were offered as shared bicycles, whereas nowadays they are offered as personal bicycles. The *value proposition* is offered to consumers to increase their mobility on a carefree personal e-bike. A free repair service is guaranteed with the lease construction and the bicycle is insured in case of damage or theft (Urbee, 2020). There are no limitations regarding parking restrictions since the e-bikes are offered in the private sector as personal means of transport. The *profit formula* is covered by the revenue stream on a subscription bases, which can be cancelled monthly, and costs to offer the e-bike service. The costs include the asset of e-bikes, maintenance, repair, and personnel. To provide service for this model the *key processes* are repair service, increasing the parking infrastructure, customer administration and invoicing, and finally analysing and tracking customer data. For this purpose, e-bikes, parking spaces and customer data are needed as the *key resources*.

Another model, which is not discussed in the typology by Van Waes et al. (2018) but which has been created over the time by bike sharing providers Hello-Bike and Donkey Republic, is the Software as a Service (SaaS) Model. The software is offered to external partners but operated by the partners themselves. This indicates the *value proposition* of this model, as the software solution aids for operational efficiency, for example in case of bicycle keys administration for bike delivery companies or bike rental companies. It ensures that external parties can continue to focus on their core business. In the case of Hello-Bike, licensing software to external parties is currently their most valuable activity. The software has been provided to over 50,000 bicycles distributed among various external partners, like food delivery services, hotels, or company bikes: *"The model has actually grown rapidly to become our main business model"* (R5). The *profit formula* consists of the revenue and costs. The revenue is generated by charging external partners a monthly payment for the solution. The costs consist mainly of employees working hours to develop, maintain and provide the core software and optionally to analyse data on daily customised dashboards created online. These processes are related to the *key processes*. The *key resources* consist of developers, computers, and license with partners.

Finally different to the previously described models, the two-way free-floating model ("peer-to-peer") was not contrary to the regulations and therefore did not change over time. This model is applied by Spinlister and ListNRide. Those companies do not own the bicycles themselves. The bicycles are offered and rented through a platform by private or business bicycle owners. The *value proposition* of this model facilitates a two-way marketplace. The platform provides a network between supply and demand of bicycles on own account worldwide. To date, most bicycles are rented for niche activities, such as mountain biking, road trips, cycling: *"The majority of rentals I would say 90% come from people that are traveling, like tourist. Tourist business that kind of things, they don't want to travel with their bike or don't have the means to travel with a bike"* (R9). In addition, there is a group of users who are looking for the high end, because they may not be able to afford these types of bikes, or they want to try them out for test rides (R9; R10). The availability of ordinary bicycles or alternative means of transport for daily use is high, which means that the profitability on these bicycles is lower than bikes for special occasions and are, therefore, less offered. The *profit formula* is divided into revenue and costs. Revenue is generated by claiming a percentage of the customer's rent. The percentage between peer-to-peer customers and corporate customers is different. This is justifiable since corporate customers are less susceptible to financial fraud and the volume of purchases is higher. The costs include software maintenance, operations, business

development and are related to the *key processes* and *resources*. To provide service, the companies must ensure that their platform runs stably as an essential key process. This means that the website and the application must remain functional, to ensure that customers will be able to find each other. In addition, creating marketing activities for brand awareness, to ensure sufficient supply of bicycles on the website. Hence, making new and existing users enthusiastic and helping them to grow the community. Lastly, customer service, which partly involves manually checking each listing before approval to ensure quality against fraudsters or pranksters. To realise these activities and grow the platform, skilled employees are needed as a key resource.

Bike sharing company	Est.	Introduction in AMS	Archetype of BM	Parking space	System	Payment method	Target group	Fleet amount in AMS	Locations operating	Funding	Interviewee + date
Urbee	2016	2016	One-way station-based	Private	Closed	Subscription	B2B	1.050	National	Venture capital	N.A.
Hello-Bike	2015	2016	One-way free-floating	Private	Closed	Subscription	B2C/ B2B	-	AMS	Private capital, Municipal subsidy	Co-founder 4.8.21
			One-way station-based	Private	Open	Pay per use	B2C/ B2B	500			
			Two-way station-based SaaS model	Private	Closed	Subscription	B2B	400			
Donkey republic	2015	2017	One-way station-based	Public	Open	Pay per use	B2C/ B2G	500	Global	Venture capital, stocks	Country Manager NL&BE 9.9.21
			One-way station-based	Private	Closed	Subscription	B2B	-			
			SaaS model	Private	Closed	Subscription	B2B	-			
FlickBike	2017	2017	One-way station-based	Public	Open	Pay per use	B2C/ B2G	400	AMS	Private capital	Founder 14.9.21
oBike	2017	2017	One-way station-based	Private	Closed	Subscription	B2B	400	Global	Venture capital, backed by tech. comp.	PR-manager 7.9.21
			Exit	N.A.	N.A.	N.A.	N.A.	N.A.			
Spinlister	2012	2016	Two-way free-floating	Private	Open	Pay per use	B2C/ B2B	-	Global	Private & venture cap.	CEO 26.8.21
ListNRide	2017	2017	Two-way free-floating	Private	Open	Pay per use	B2C/ B2B	-	Global	Crowd-funding	Co-founder 2.9.21

Table 4. Key characteristics of bike sharing companies in 2021.

5. Discussion

The results revealed interesting findings that provide a better understanding of the co-evolution process between the regulatory regime and the development of niche BMs. Section 5.1 discusses the findings in more detail in relation to the theory. Subsequently, section 5.2, highlights management and policy recommendations based on the results. Finally, section 5.3, discusses the limitations of this research and provides recommendations for future research.

5.1 Discussion of the results

This study enhances knowledge on the literature of niche empowerment strategies and the BMDS described by Huijben et al. (2016) through focusing on the interplay between the municipality and niche actors in the bike sharing economy. The research provides better insights into understanding of the development of niche BMs over time, and how niche actors adapt their BM to the regulation in the ST-system.

The results demonstrate how different actors in the same niche adopted various fit and conform strategies to deal with the (amended) regulations by the municipality in October 2017. This reflects the co-evolution process between the two parties, as the development of a company's BM is closely linked to the developments taking place in the operating market. In 2017, niche actors were applying a one-way free-floating model. However, this (incremental) innovative BM became in conflict with the current regulatory regime, due to the widespread roll-out of this BM in a short period of time the caused nuisance in public spaces and bicycle parking facilities for local citizens. After the nuisance in public spaces increased, the municipality amended the regulation for public bike sharing. In response, some niche actors adapted their BM to a station-based (see Figure 5 the yellow and red line) and followed a 'fit and conform' strategy to deal with the regulatory regime. It thereby reinforces the understanding on the niche empowerment strategies to the previous work by Huijben et al. (2016) by highlighting a similar strategy through partnering with organisations. The bike sharing providers established partnerships with businesses to facilitate a MaaS solution or partnered with the municipality by means of small-scale experiments. In this manner, the bike sharing providers adapted their BM within the possibilities offered by the regulations as emphasised by Huijben et al. (2016) in the theory section. However, in contrast to the mentioned similar strategy above, the results also revealed some new findings with respect to bike sharing BM archetypes and fit-like strategies. Thereby, this study contributes to the literature on the development of niche BMs and niche empowerment strategies (Geels, 2011; Huijben et al., 2016). Firstly, a few companies have created value by exploiting a new archetype of BM: the SaaS model (see Figure 5 the purple line). This BM cannot be captured in the categorisation of four BM archetypes for shared bicycles described by Van Waes et al. (2018). As this model is related to service and therefore cannot be classified in the type of dimensions among the distinction between single- and returns rides or the distinction in bike parking (Van Waes et al., 2018). Moreover, relating to the niche empowerment strategies, the creation of a new model (see Figure 5 the purple line) demonstrates an additional fit-like strategy of niche entrepreneurs to deal with the regulatory regime. This observation, to create a new BM within the possibilities offered by the regulatory regime, contributes to the knowledge of the niche empowerment strategies as emphasised by Huijben et al. (2016). Similar to the following two additional approaches that were observed. The second complementary approach, to exit the market, was observed in the case of oBike. The literature by Huijben et al. (2016) states that niche entrepreneurs can adapt their BM to fit or stretch the regulatory regime. However, this finding shows that providers can also leave the market, as an additional approach, when a niche interacts with the regulatory regime. This development was caused due to the regulations by the municipality. The regulations made it impracticable to maintain their BM operational. This

required the bike sharing companies to decide. However, oBike was already operational in other international cities and choose to focus on those cities. Finally, this study identified, the portfolio of BMs, as a final additional approach which reveals a new insight with respect to the literature of Huijben et al. (2016). As emphasized and can be derived from Figure 5, most bike sharing companies applied a portfolio of BMs which are operated in parallel and thereby reveals an additional fit-like strategy on how niche entrepreneurs adapt to the regulatory regime. However, it is not evident from the results whether niche shielding instruments (i.e., financial support or rule exemptions) affected the choice of the previous identified strategies of the niche actors. As there was a low level of niche shielding by the municipality in place during the examined period.

In addition, the results showed how the amended regulations affected the design space of niche BMs. Since niche providers were no longer allowed to offer their shared bikes in public shared providers adapted their BM, as described in the previous section. However, as stated in paragraph 2.4 of the theory, the results demonstrate that the amended regulation can have a negative and a positive impact on the design space. To comply with the regulations niche actors were required to adapt their current BM (i.e., one-way free-floating). Despite the development, it even led to collaborations with previously unrelated parties and the creation of an entire new a BM (e.g., SaaS model). As emphasised niche actors adopted different BMs (i.e., one- or two-way station-based model in Figure 5) and established partnerships with businesses, or with the municipality by means of small-scale experiments. In this way, latent consumer needs were captured such as the accessibility of the city, or business parks through first- and last-mile solutions. In this regard, a change can be defined as exploiting a new or different BM than before (Zott & Amit, 2012).

Furthermore, this study contributes to the BM literature and links it to the literature of transition studies. The results show that elements of a BM were directly affected by the regulatory regime as emphasised by Huijben et al. (2016). Adding to this, this research identified that more than two elements of a BM can be directly affected by the regulatory regime or even affect an entire BM and becomes impracticable in a particular sector. As Figure 5 indicates, the one-way free-floating model is still applied by one provider, but the core features of this model - *value proposition*, *profit formula*, and *key process* - have changed significantly compared to how the bikes were offered in the past. The value proposition offered a carefree on-demand bicycle, which could be unlocked at any time via an application and left anywhere in the public domain by the user. However, this have changed to a personal bike without ownership provided in the private sector to meet municipal requirements. Moreover, the profit formula has changed as well since the bicycles are no longer charged on a pay per-use basis but through a subscription. Lastly, the regulation affects the key process of this model, as the bicycles are offered in a different way, the process of geographical redistribution of the bicycles is no longer necessary. As the results highlight more than two elements of the BM can also be directly affected by the regulatory regime. Moreover, the (amended) regulation made it impracticable to apply the one-way free-floating model in the public domain of Amsterdam. In this way, the (amended) regulations affected indirectly the entire model. As a result, niche entrepreneurs adopted different BMs (e.g., traditional station-based models) to remain competitive and deal with the regulations, as emphasized in the sections above. By this manner, this study reveals new insights into the transition of BMs, and thereby contributes to the theory as stressed by Huijben et al. (2016).

Finally, this research highlights that not all niche providers had to adapt their BM. Some niche actors were not required to adapt their model (i.e., two-way free-floating model) after the municipality amended the regulations for public bike sharing in October 2017. The analysis shows that the model fits the current regulatory regime, allowing providers to maintain their BM. As such, none of the core features of this BM have changed over the years from 2016 to

2021. This is mainly because providers offer their service only in the private domain in Amsterdam, targeting a niche market for specific activities. Therefore, the regulatory regime did not yet affect the design space of this BM. However, when smart locks are installed on the offered bikes, and technologically supported, it will add a significant difference to the value proposition of the two-way free-floating model. In fact, this implies that the friction of face-to-face transaction that must take place will be eliminated. Simultaneously, this could stretch or transform regulation in the future. Since no clear regulation is in place for this value creation, niche actors can take advantage of operating in an 'grey area' (Wesseling, Bidmon & Bohnsack, 2020).

5.2 Managerial and policy implications

As the results show, it appears that there are different opportunities for niche entrepreneurs to adapt their BM in an innovative way while following a fit like strategy to comply with the regulatory regime. Creating new, or diversifying, BMs by responding to technological and BMI can create value in a different or new way, which even may be more profitable than a previously applied BM. Although BM adaptations may lead to additional transaction costs and investments (Mormann, 2014). The costs can be limited by implementing software-based solutions, gained through technological developments, or by addressing different target groups simultaneously with the same model, have proven to be an effective solution. Moreover, it should be noted that niche shielding plays a major role in stimulating the development of BMs. Another recommendation regarding niche actors is to continuously orient themselves and learn from others, either from actors who are operational in a different niche market. As the study shows, regulations can change over time if the situation arises, therefore entrepreneurs will have to be creative in strategic reorientation and innovation of the BM.

Where the municipality is committed to shared mobility, this primarily concerns the provision of (bicycle-sharing) mobility in the public space. In the public space, the municipality performs its organisational task, by ensuring a level playing field and a well-ordered society. However, in the past there have been problems occurred with shared bike mobility in the public space of Amsterdam. At the time, the municipality intervened by amending the regulations and subsequently adjusting its policy accordingly. Formulating policy is a critical process. It is important to consider the desired effect from the outset and to consider the resources available to a municipality. In addition to financial means to stimulate, legal means are required to regulate or direct. Which legal means are involved, strongly depends on the location where the shared bicycle is offered. To this end, for the municipality it is essential to consider to what extent it wants to regulate the supply of shared bicycles in the public domain. The municipality may consider exerting limited control and thus giving freedom to the market. However, if the municipality wishes to exert a higher degree of control, the priority is to stimulate the market and regulate the market to such an extent. The municipality can play a facilitating role in this process. Therefore, niche shielding instruments (e.g., subsidy) could stimulate use of shared mobility. However, it concerns how the instrument is used, for example by giving a subsidy for each ride facilitated by a shared bike provider, to appeal to a (target) group that does not yet use the service. Or for positioning a solution by facilitating to realise sufficient supply. In this context, it is particularly important to analyse how problematic the development of the niche market is. Does it concern (financially) high risks for niche actors to develop or other constraints from regime dimensions.

5.3 Limitations and further research directions

For this study, the co-evolution between regulations by the municipality of Amsterdam and the BMs of shared bicycle companies were studied. For this purpose, a qualitative method was used to collect data regarding both actors in the geographical area of Amsterdam. However, a limitation of this study is that the obtained results are not easy to generalise since the sample size is limited and only initial observations and insights into a specific subject in a geographical area are given. Additional research is needed to generalise the population results and obtain more conclusive results on the co-evolution of bicycle sharing BMs and the regulation in other cities. Further research can thereby also provide more valuable understanding on the niche empowerment strategies regarding different technologies or institutional contexts. Additionally, another limitation of applying the qualitative method is that a bias may arise and therefore a less holistic picture is obtained. For this study, if people were willing to cooperate, each of the founders or project leaders of various shared bicycle companies were interviewed. This means that the interviewees are naturally closely linked to the subject of the study through their positions and may therefore paint a distorted picture of the company. By maintaining an interview guide and coding the interviews afterwards, this bias was minimised (Turner III, 2010). However, future research could interview several people within an organisation, for example across various departments, to reflect a more holistic view of perceptions of the company in question.

In addition, related to public bike sharing the data gathered of the small-scale experiments is relatively limited to date. This limitation is caused by the fact that the small-scale experiments started later than planned, due to the COVID-19 pandemic. This implies that it is too premature to comment or generalise the results of the small-scale experiments at this stage of the pilots. Therefore, optimal theoretical saturation has not been reached for this study. Although the last interviews with neither the municipality nor the various shared bicycle companies resulted in significant new information, which could indicate saturation, conducting interviews at a later point in time and interviewing different people within an organisation (as described above) may contribute to the iteration nature of the research in public bike sharing until theoretical saturation is reached. Future research can contribute to understand the effect of regulating niche a market (i.e., the shared bike systems) in relation to the (profitable) development for these BMs. The completion of the small-scale experiments is an ideal moment to conduct future research. In addition, other bike sharing systems implemented in the Netherlands can provide more insights to the study and should be analysed to measure the regulatory impact on these (niche) BMs. In this manner, the outcomes on public bike sharing are more generalisable, which may lead to achieve optimal theoretical saturation.

Finally, this study focused particularly on the co-evolution process between the municipal regulation and BMs of bike sharing providers by examining the development of niche BMs and describing how the niche actors adapted their BMs to fit or stretch the regulatory regime. Thereby this study contributed to the literature on niche empowerment strategies by highlighting similar and new findings on the strategies by niche actors, as stressed in section 5.1. However, other dimensions of a ST-system, such as culture or markets, user preferences that plausibly affect the development of a niche BM could be added in future studies to improve the understanding of the regime dimensions of a ST-system (Loorbach, Frantzeskaki & Avelino, 2017). To enhance the understanding in which manner the other dimensions (i.e., markets, user preferences, science, culture, technology, and industry) affect the design space of niche BMs or from the perspective, how transitions of niche BMs can contribute to stabilising or destabilising the regime by adopting a fit or stretching strategy in a ST-system.

6. Conclusions

This study examined the co-evolution process between the regulatory regime and the development of niche BMs, both of which have a mutual effect on each other. The municipality of Amsterdam and seven bike sharing providers operational in Amsterdam were taken as a case study. To this end, the research illustrates the interplay between the regulatory regime and the development of niche BMs. It showed that different fit and conform strategies were adopted to deal with the regulatory regime, which resulted in the adoption of a variety of BMs, and to what extent the regulations affect the design space for (innovative) niche BMs. As both actors are closely linked to each other by developments occurring within an active market in the ST-system. The selection environment for this research focused on the regulatory regime and the development of the niche BMs. The dynamics are visualised in a developed framework, Figure 2, that builds on the research of Van Waes et al. (2018), and Huijben et al. (2016).

The research addressed the following research question: *How do bike sharing business models and municipal regulations co-evolve in the bike sharing economy?* By studying the co-evolution process between the regulatory regime and the development of the niche BMs revealed that the niche entrepreneurs adapted their BM differently, but all providers adopted a fit and conform strategy to deal with the (amended) regulations. The study shows that the regulatory regime plays an important role (i.e., negatively as positively) on the design space of a BM. The results highlighted that more than two elements of the BM (i.e., value proposition, profit formula, and key process) were directly affected by the amended regulatory, which made it impracticable for most niche actors to maintain their current BM operational. Nevertheless, most niche actors managed to remain competitive and deal with the regulations by adapting their BM according to a fit and conform strategy. The adaptation of the BM has even led to previously unrelated partnerships or the creation of a new BM. However, it is not evident from the results to conclude whether the level of niche shielding affected the choice of strategy for niche actors. The examining on the development of niche BMs provided new insights on how niche actors adapted their BM and reflects the adopted strategy to deal with the regulatory regime within the ST-system. Firstly, linking these dynamics revealed that niche actors adopted a new archetype of BM, the SaaS model, within the possibilities offered by the regulatory regime and thereby contribute to the knowledge of the niche empowerment strategies. Secondly, the study observed a market exit of a niche actor as an additional approach to deal with the regulatory regime. Finally, the portfolio of BMs operated in parallel has identified as last additional fit-like strategy on how niche entrepreneurs adapted their BM to deal with the regulatory regime.

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Appendix

Appendix A – the interview guide with the municipality

Concepts	Guiding interview questions
Interviewee function	<ol style="list-style-type: none">1. What is your background and experience?2. What is your role and motivation to perform this role?
<i>Regulations</i>	
Informal	<ol style="list-style-type: none">3. What is your vision of the public bike sharing debate?4. Did the number of providers cause confusion among users in Amsterdam in 2017?5. Do companies from abroad operate with less respect (supervision) regarding the market?
Formal	<ol style="list-style-type: none">6. What was the main reason to ban, based on article 2.50 APV, the FFBS?7. Was banning FFBS the only way to solve the problem?8. Did all FFBS companies obey to the ban?9. Why did the municipal council include a new article in the APV, namely Article 2.50a?10. In which way has the policy for FFBS in Amsterdam developed over time?11. How is the cooperation with the bike sharing companies in general?12. Did bike sharing companies lobbied to influence municipal regulations in their favour?13. In which manner does the municipality provide a license for FFBS companies?14. What is the vision of the municipality regarding FFBS?15. How can the development of bike sharing be supported?16. What are the barriers to the development of bike sharing schemes?17. Would you like to add anything which isn't discussed, or do you have any questions?

Appendix B – the interview guide with bike sharing companies

Concepts

About the company/
interviewee function

Guiding interview questions

1. When was the company founded?
2. What was the motivation?
3. What is your background and experience?
4. What is your role in the company and motivation to perform this role?

Business model

General

Value proposition

Profit formula

Key processes

Key resources

Development BM

5. Can you briefly describe the business model(s) of the company?
6. What value does the model(s) offer and to whom?
7. Large capacity of bikes to be shared means less demand?
8. How does the company generate value for the customers?
9. How is profit division with the municipality organised?
10. What are the costs and revenues?
11. What are the key activities?
12. What processes are needed to deliver value to the customers?
13. What resources are needed to deliver the value proposition?
14. How is the business financed?
15. Which of these core features of the business model have changed over time?

Regulations

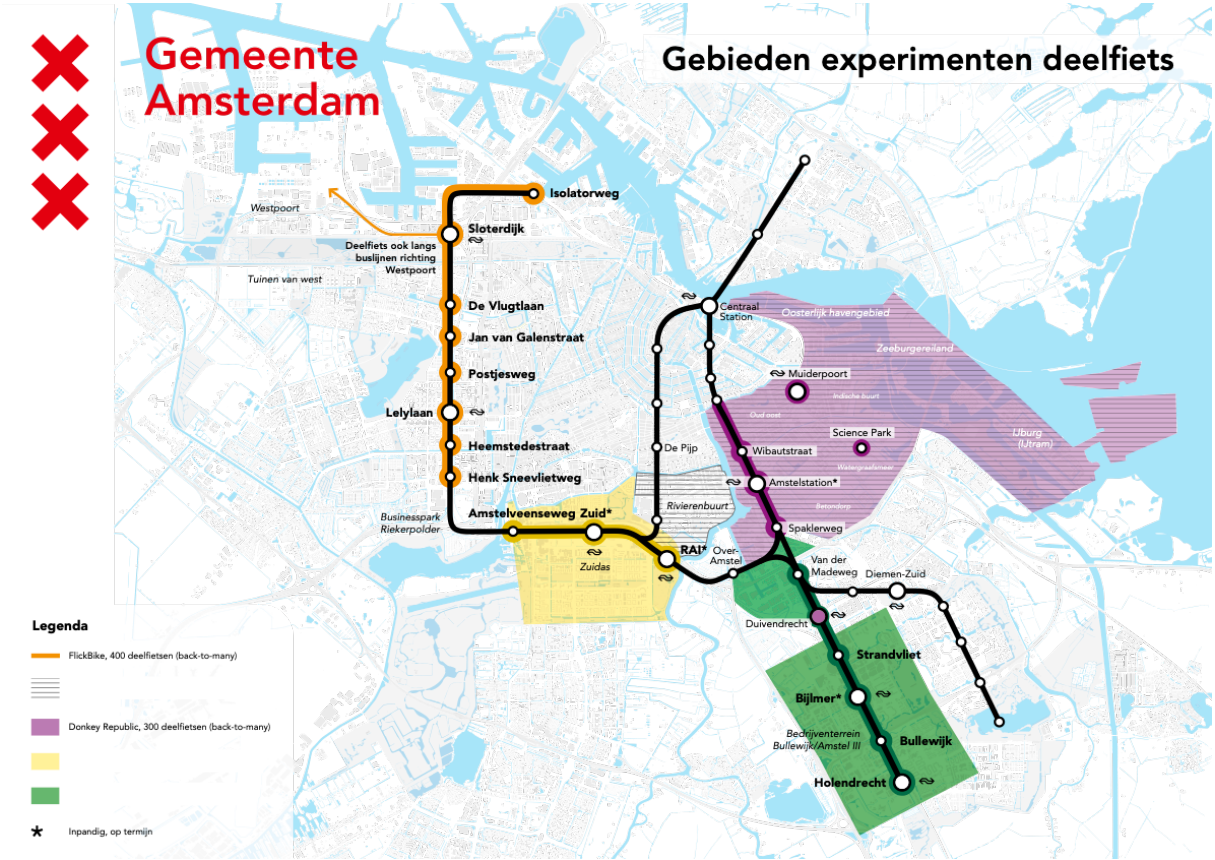
Formal

16. Which regulations and policies do you have to cope with in Amsterdam?
17. How does the company comply with the regulations?
18. Did the policy change for FFBS according to Article 2.50 APV had negative impact on the company's operation?
19. How does the company comply with the amended policy against FFBS?
20. How is the cooperation with the municipality in general?
21. In which manner can a license for shared bicycles be obtained from the municipality?
22. Does the company need a license to be operational?
23. How can the development of bike sharing be supported?
24. What are the main barriers to the development of bike sharing schemes?

Informal

25. What is your opinion on the public bike-sharing debate?
26. How do you feel about the local policies on bike sharing?
27. Does the number of providers cause confusion among users?
28. Do companies from abroad operate with less respect (supervision) regarding the market?
29. Would you like to add anything which isn't discussed, or do you have any questions?

Appendix C – Overview of the areas for the small-scale experiments of shared bicycles in Amsterdam.



Parking sign for public shared bikes



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