Shared Micro Mobility: What is happening in our streets?

A study on Micro Mobility and Mobility Data

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ABSTRACT

This business research aims to explain the micro mobility industry and explore the potential of mobility big data. This is done by looking through the lens of the Industry-Based View and the Resource-Based View. In order to explain the micro mobility industry, Porters five forces is used as a framework. In order to explore the potential for big data, VRIO is used as a framework. The research is conducted as a multiple embedded case study. Primary data was collected from six interviews, from different actors within the micro mobility sector. Regarding the industry, the analysis shows that the Shared-Micro-Mobility-Industry has changed, and is on the verge on intensive rivalry. Further, the analysis highlights why this is happening by looking at government policies and product development. The analysis on big data shows that this resource could be a source of (temporary) competitive advantage. It then explores how to fit big data into a digital business strategy. Finally, the two analyses are combined in order to discuss the future of the mobility industry, and emphasized the introduction of Mobility-as-a-Service (MaaS).

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First I will like to thank the interviewees for taking time of their busy schedule in order to be interviewed. Secondly I would like to thank my supervisor Tronn Skjerstad for answering questions and providing guidance. A special thanks to my father for fruitful discussions and proofreading.

Finally, it is important to thank the coffeemaker on the 4th floor. You know what you did.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1. INTRODUCTION

Could there be a more 21th century research topic than mobility and big data?

The ways we move have always been a manifestation of human behavior. Humans move to work, to get home and to visit our loved ones. We move every day. The type of vehicle we own, and the kind of transportation tools we use, may be described as extensions of being human. When these tools change, human behavior also changes.

At the same time, the 21th century is an era where information – in forms of bits and bytes, continue to grow exponentially. We leave pieces of data behind with every move we make, on the internet and in real life.

This study combines these two trends. The aim is to add one piece to our understanding of mobility and one to our understanding of big data. This paper will discuss how different industry forces shapes the Shared-Micro-Mobility-Industry, an industry which is currently influencing the way urban, as well as rural, people move and live, and could potentially be a competitor to the mighty automobile industry. This paper also explores how the data generated from this industry can be a source of potential competitive advantages.

Previous research on big data suggests that more research should go into understanding big data in a business context (Mikalef, Pappas, Krogstie, & Giannakos, 2017). In addition, it will help us understand another piece of which IT capabilities can yield firm performance (Bharadwaj, 2000). This research also follows recommendations made by Transportøkonomisk Institute (TØI) and will help us understand how transportation related industries influences the larger transportation industry (Klimek, Aarhaug, & Ørving, 2019).

It is my hope that we can uncover something important, or at least something interesting.

1.1 Research Objectives

The topic of shared micro mobility and mobility big data will be assessed through theoretical lenses that is well understood and well developed in the strategic management literature.

I will explain the micro mobility industry through the lens of the Industry-Based View (Porter, 1979). On the question of value, a newer perspective is applied: the Resource-Based View (Barney, 1991).

The following are my objectives:

(1) Explain the Shared-Micro-Mobility-Industry by applying the Industry-Based View and Porters five forces framework.
(2) Explore the potential for mobility big data as a potential source of competitive advantage by applying the Resource-Based View and the VRIO framework.

The study is a research on business (Wilson, 2014) and the research is conducted as a multiple embedded case study (Yin, 2018).

1.2 Research Question

This study contributes to our understanding of the mobility industry and adds to existing literature on how different industry forces shapes industries. The most common way to address industry is to look at them retrospectively, this research does however look at the forces as they are happening. As a consequence, this research also explores big data in a domain-specific way within a business context.

The aim is also to contribute to our understanding of big data and its value potential. Thus, the report will add to the growing literature on IT-resources and digital business strategies.

The following is the research question of this study:

How are different forces shaping the Shared-Micro-Mobility-Industry? And how can mobility big data be a source for competitive advantage for mobility firms?

1.3 Thesis Structure

Case studies can be written and communicated in several forms (Yin, 2018). It is my goal that the reader of this report should be able to understand the topic of discussions without having an academic background in big data related fields, mobility and strategic management. Mobility is important. Its influence on us is undoubtable. At the beginning of each chapter is a quote regarding mobility.

Information about the mobility industry and big data is presented in chapter 2.

In chapter 3, I will present two theoretical foundations and their respective frameworks. These frameworks will later be applied to the research questions in this paper. The next chapter, chapter 4, presents the methodology.

Chapter 5 included how I conducted the data analysis, my data strategies and my analytical techniques. The chapter also included case specific information.

Chapter 6 then presents the data analysis. This chapter is split in two, where the first part addresses the industry and the second parts address the mobility big data. Chapter 7 then presents a discussion of the analysis as well as a cross-case analysis and results.

Finally, in chapter 8, I will summarize main findings, discuss limitations and address the studies implications.

2. WHAT IS SHARED MICRO MOBILITY AND MOBILITY BIG DATA

Vrooom, Vrooom, Vroooom

\- A car

The purpose of the study is to explain the Shared-Micro-Mobility-Industry and explore how mobility big data may be a source of competitive advantage. First a definition of shared micro mobility is presented. Thereafter, follows a discussion on what is currently known about the mobility industry. After this I will present, and discuss, definitions of big data and big data analytics. This is in section 3. In section 4 I will briefly discuss the questions of big data and value, and finally in section 5 I will summarize mobility big data.

2.1 What Is Shared Micro Mobility

The introduction of new mobility vehicles and technology has not only changed how we transport ourself, but also introduced a whole new vocabulary.

Shared micro mobility include bicycles, scooters, mopeds, motorcycles and cars[1], either offered as *station based* or *free-floating* system. In a free-floating system the user can pick up a vehicle from "anywhere", and when the user is finished using the vehicle it can be stationed wherever the user prefers (although, usually there are some restrictions imposed with GPS). In a station based system the vehicle needs to be picked up and delivered at designated spots. Oslo Citybikes is an example of a station based system.

Free-floating micro mobility, mainly electric-scooters (el-scooters) and bikes, has gained a lot of attention from potential users and investors. Investors may be interested due to reports pointing to a low break-even point and a worldwide market size of $300-500 billions (Heineke, Kloss, Scurtu, & Weig, 2019). This indicates huge potential for profit.

[1] And why stop here. It can also include planes and boats as long as it satisfies the following criteria's. But for the purpose of this thesis, only vehicles operating on land is considered.

The term *shared* refers to the ownership of the vehicle. In a shared model the user does not own the vehicle. The user rents the vehicle for a short period of time. However, the same vehicle is also rented by other users. Users typically rent the vehicle through an app on their phone.

Some would argue that *micro* refers to the size of the vehicles. However it is my belief that the length of the trip is a more suitable source for a definition. A consequence of this is that larger vehicles can be included, such as cars. The definition does not exclude potential future technological advances, such as flying cars. Micro refers to the length of the trip.

When discussing the *length of the trip* it is important to understand that shared micro mobility today is mainly an urban phenomenon. One could describe the length in terms of "last mile / first mile", referring to the distance it takes for a user to/from the nearest public transport. In such a scenario, the micro mobility unit would be the vehicle which takes you to and from the nearest public transportation station. However, micro mobility could include other short trips, for examples to the closest convenience store, trips to/from a friend and even trips to/from the users' workplace.

There is no absolute limit of length, but based on interviews and documents it seems that most people associate micro mobility with trips *less than 8 kilometers*. This length is not based on a micro mobility vehicles potential, but rather rooted in an environmental argument. About 60 percent of all car trips are less than 8 kilometers (Heineke et al., 2019), and environmental concerned people generally wants the number of cars to decline.

To conclude, **shared micro mobility** is units/vehicles used to travel less than 8 kilometers. They can be offered as a station based or free-floating system (or anything in-between). The Shared-Micro-Mobility-Industry is considered to be a part of the larger mobility industry. This industry consists of firms delivering shared micro mobility solutions/services.

2.2 What Do We Know About Mobility?

Mobility has changed a lot over the last years, and little research exists to explain this change. Recently McKinsey Quarterly published a report that discusses trends in the mobility industry

(McKinsey & Company, 2019). While conducting my analysis is became evident that their report overlapped with my analysis on shared micro mobility.

According to McKinsey & Company, cars will become increasingly autonomous, connected, electrified and shared (abbreviated ACES). They conclude that changes in the mobility industry will create a new competitive landscape. In this landscape different automotive original equipment manufacturer (OEMS), technological companies and startups will rival for market shares. The report also addresses the topic of interconnected and intelligent road networks.

Trends suggest that people's perception of mobility is changing from "buying a car" to "getting from A to B". This is supported by a global reduction in household car-ownership and in the increase in usage of ridesharing application. This is more prominent among the younger generation. A generation that is also less brand loyal.

Cars, which will continue to integrate new technology and will gather more data in the future. This increase in data is due to increased computing powers, more sensors and increasing data storage and capacity. The report (McKinsey & Company, 2019) suggests that this data could be of great value and could be monetized. Their findings suggest that customers are willing to let companies use data generated from and by customers if it increases the customers value.

Other trends include the introduction of mobility networks. For example the introduction of Mobility-as-a-Service (MaaS) and that ridesharing becomes more integrated in the public transportation system. Cars will be a part of this larger network of mobility services. So will public transportation and micro mobility solutions.

MaaS is a concept in which mobility is presented as a package, that can be ordered when needed through a smartphone application (Aarhaug, 2017). The coordination of modes of transportation is done through the mobile operator. The overall idea is that the users can access mobility services without having concerns about the different modes of transportations. In practice, MaaS, could allow the user to rent the type of transportation needed when needing it.

It is difficult to say what constitutes a MaaS solution, and what does not. Is public transportation included in MaaS? Operators of public transportations usually operated busses, trains and trams under one subscription, which is similar (or exact) to what constitutes MaaS. Despite the confusion regarding the terms, one of the preconditions for MaaS is a good public transportation system (Aarhaug, 2017). It has been shown that MaaS is an interesting idea, but it is difficult to assess if it is possible to develop a business plan that delivers value to the users, the mobility providers and the MaaS operators (Aarhaug, 2017)

2.3 What Is Big Data (And Big Data Analytics)?

Despite the buzz around big data, the term has no agreed definition, however several definitions have been proposed. (Boyd & Crawford, 2012; Cavanillas, Curry, & Wahlster, 2016; Gandomi & Haider, 2015; Kitchin, 2013). It is important to understand that the term big data is intertwined with technical and socio-technical issues (Boyd & Crawford, 2012).

Boyd and Crawford (2012), who raises several concerns about big data, assert that big data is "less about the data that is big than it is about a capacity to search, aggregate, and cross-reference large data sets" (Boyd & Crawford, 2012, p. 663). It is impossible to define big data by its size alone. One reason is simply that the techniques applicable to large amount of data, are applicable to "small data" as well (Boyd & Crawford, 2012).

On the other hand, this does not imply that the size of the data should be neglected. Jacobs (2009), who emphasize the size of the datasets, defines big data as "data whose size forces us to look beyond the tried-and-true methods that are prevalent at that time" (Jacobs, 2009, p. 44). This definition implies that our understanding of big data will change as the size of the data grows, and as our tools to analyze it evolves.

Common when discussing big data is the three-dimension perspective (Kwon, Lee, & Shin, 2014). A three-dimensional perspective was first proposed by Laney (2001). This perspective emphasizes that big data can be characterized through the dimensions: volume, velocity and variety. This view, with some modifications, have become a standard way of defining big data and is usually referred to as the three V's model (Cavanillas et al., 2016).

Gartner (2019) proposes the following definition of the three V's: "Big data is high-volume, high velocity, and/or high variety information assets that demand cost-effective, innovative forms of information processing that enable enhances insight, decision making and process automation". This definition is close to the definition proposed by other authors (Kwon et al., 2014; Stonebraker, 2012).

2.3.1 Three V´s definition.

The three Vs is a common framework used to describe big data (Kwon et al., 2014). I will now address the three V's: volume, variety and velocity

Volume refers to the amount of data. The size is typically what one would consider to be large. Typically examples are data gathered from the Large Hardon Collider, space research or data generated from Facebook. The definition of volume is dependent on industry, time and type of data (Gandomi & Haider, 2015).

Velocity refers to the rate of which the data is generated. A consequence of high speed is the need to analyze real-time data. Velocity refers to the increase in data creation and is closely associated with data from smartphones and "internet of things" (IoT) devices.

Variety refers to differences in datasets as well as data coming from different sources. Data from video and audio are for example different in their defining characteristics. It is not unusually to have sensors capturing internal data, and then combining this with data from external sources, such as social media (Gandomi & Haider, 2015).

All these three V´s present different dimensions of big data. Other dimensions have been proposed, such as veracity (the unreliability of the data) and variability (variation in data flow rates). The three dimensions, and the two proposed ones, are not independent of each other (Gandomi & Haider, 2015).

2.4 How Can We Get Value From Big Data

This study applies the Resource-Based View, which links the performance of a firm to the resources and skills that are firm-specific, rare, difficult to imitate and non-substitutable

(Barney, 1991). It is my goal that the application of this framework will help us understand the potential for big data as a valuable source for competitive advantage.

Examples of areas where data could potentially create value are in the contexts of data-driven innovation (DDI). DDI is the use of big data and data analytics to improve (or create new) products, processes or organization models (OECD, 2015b). The consequence is that big data is an important factor for value creation and value appropriation.

Some researcher have also explored the potential of data-driven business models (Hartmann, Zaki, Feldmann, & Neely, 2016; Sorescu, 2017), and states that this could be an essential part of how companies deliver value to its customers. Similarly, Chandy, Hassan, and Mukherju (2017), explored the potential of data and potential in emerging markets.

The technological advances in data analytics combined with the exponential growing amount of data have impact on the economics in private commerce (Manyika et al., 2011) as well as public sector (OECD, 2015b). Big data is showed to have effect on managements (McAfee, Brynjolfsson, Davenport, Patil, & Barton, 2012), influencing decision making, and overall strategy making (Constantiou & Kallinikos, 2015).

The process of which big data creates value is as important as the data itself. Big data has zero value if not managed or analyzed properly. In order to create value big data must pass through a value chain, meaning that big data must pass through a series of steps in order to create value. This idea is not new (Cavanillas et al., 2016; Gandomi & Haider, 2015; Liang et al., 2018). Even though the literature disagrees on exactly what constitutes a step in the value chain, the steps can broadly be divided into two parts: data management and data analytics.

Data managements are concerned with acquiring, curating and storing the data (Cavanillas et al., 2016; Gandomi & Haider, 2015; Liang et al., 2018). Data analytics are concerned with modelling, analyzing and interpreting the data (Cavanillas et al., 2016; Gandomi & Haider, 2015). It exists several analytical techniques and software that can be used in on a variety of different formats (OECD, 2015a). This is summarized in table 1.

Data Management	Concerned with acquisition, curating, storing and protection.
Data Analytics	Concerned with modeling, analyzing and interpretation. Includes data analytic terms such as data mining, profiling, business intelligence, machine or statistical learning and visual analytics. (OECD, 2015a)

Table 1: Simple big data value chain

2.5 What About Mobility Big Data?

In the previous sections I described the three V´s: volume, velocity, and variety. I also discussed the two parts of the big data value chain, data management and data analytics.

M**obility big data** include large amounts of data (volume), generated at a high rate (velocity), coming from several sources (variety) created from, or as a consequence of, mobility vehicles/units. Working with mobility big data includes tasks concerned with data management and data analytics.

3. THEORETICAL FOUNDATION

Focus. Speed. I am speed

- Lightning McQueen (from cars).

The purpose of this paper is to explain the Shared-Micro-Mobility-Industry and explore the possibilities of mobility big data in this industry. This chapter will present two theoretical frameworks, and the theoretical foundations of which they are based on. The framework will later be applied for data analyzing.

The analysis in this study is based on two theoretical perspectives on how firms behave, the Industry-Based View[2] (IBV) (Porter, 1979) and the Resource-Based View (RBV) (Barney, 1991). The two perspectives are different in their focus on sustainable advantage. IBV is primarily concerned with external sources for sustainable advantage, while RBV focus on internal sources (Schilling, 2017).

At the core of IBV is the proposition that the performance of a firm is a function of industry-specific attributes. The RBV on the other hand, argues that firm performance is determined by firm-specific resources and capabilities. Therefore, IBV and RBV complements each other (Peteraf & Barney, 2003). This chapter will explore the two views. In addition to a discussion on the theoretical perspectives, two frameworks will be explained:

(i) **Porters Five Forces.** Porters five forces is applied to the current state of the micro mobility industry. This framework is based on IBV, developed primarily on work from Porter (1979).

(ii) Value-Rarity-Imitability-Organization (VRIO). VRIO is applied in order to understand the potential of big data as a resource. The framework is based on RBV, developed primarily by Barney (1991).

[2] This view is also named Competitive Forces.

3.1 Industry-Based View

The Industry-Based View (IBV) addresses a firm's performance as a function of industry specific attributes, its industry structures. A common view is that some forces shape the industry and as a consequence the industries potential for economic gain. In 1979 Michael E. Porter presented five competitive forces (Porter, 1979). These forces create a foundation for which strategy could be made.

Porter argued that the degree of strength between the forces determines the profit of the industry. As an example, a startup would be better off choosing an industry in which the overall forces are weak, because it will be better room for revenue. The stronger the forces he argued, the less returns.

The principle of IBV is that competition is rooted in the underlying economies (Porter, 1979). The consequences of such an principle is that industries are not equal in potential profitability (Peng, 2014).

3.1.1 The micro mobility industry

The micro mobility industry create micro mobility services. The industry usually sells their service directly to customers (B2C), but may also sell some products to groups (B2G) or to other businesses (B2B). As mentioned in the introduction, the industry's products consist of different types of vehicles, most commonly scooters, bicycles and cars. These vehicles can be electric. In order to produce the service, this industry gets its supplies mainly from technological firms or vehicle manufacturers. In some situations the vehicles come from original equipment manufacturers (OEM). The Shared-Micro-Mobility-Industry is the part of the micro mobility Industry that focuses on delivering mobility services that are shared among the users.

3.1.2 Porters five forces framework

Porters five forces framework is chosen in order to explain the Shared-Micro-Mobility-Industry. The framework identifies five forces that shape the overall attractiveness of the industry. As a note, the weaker the combined forces the greater opportunity for performance, and the stronger the competitive forces are, the more depresses is the industry's profitability. The five forces are: (1) Threat of entry, (2) Bargaining power of suppliers, (3) Bargaining

power of Buyer, (4) Threat of substitutes and (5) Degree of rivalry[3]. The forces are described and discussed below.

(1) Threat of entry. Threat of entry is dependent on two processes: entry barriers and the potential retaliation from incumbents (Porter, 1979). Entry barriers are industry structures which increases the cost of entry (Peng, 2014). Initially Porter (1979) identified six sources of entry barriers: economies of scale, product differentiation, capital requirements, other cost advantages (such as patents, access to raw materials and government subsidies), access to distribution channels and government policies. Firms are different in their resources and skills which influences how they overcome entry barriers (Porter, 1980). Retaliation is usually determined by the incumbent's ability to fight back. That is the willingness of the incumbents cut prices in order to keep market share, and industry growth (Porter, 1979).

(2) Bargaining power of Supplier. Supplier power is determined by supplier concentrations, suppliers product uniqueness, degree of complementary suppliers, and the importance of suppliers products (Porter, 1979). Economically the power of suppliers manifest themselves in their ability to raise and/or influence qualify of the goods and services (Peng, 2014). More concentrated suppliers and high switching costs suggest high supplier power. Finally, suppliers willingness to integrate forward also influences supplier power (Peng, 2014).

(3) Bargaining power of Buyers. The determinants that make buyers powerful are mostly the inverse of those making suppliers powerful. Such as product differentiation and the importance of the product for the buyers. The buyer power is enhanced if the products they buy are undifferentiated, provide little cost savings or does not improve quality-of-life (Peng, 2014). Finally, the buyers' willingness to vertically integrate backwards influence on their power. A group is powerful if they purchase in large volumes relative to seller sales (Porter, 1980)

(4) **Threat of Substitutes.** Substitute products limits the potential of an industry (Porter, 1979, 1980). A substitute product is a product that can perform the same function as the

[3] In the original paper made by Porter (1979) this is referred to as "jockeying for position"

product of the industry (Porter, 1980). Most products and services have substitutes. The most common substitute is doing nothing or not buying. The threat from substitutes is high if the substitute is better than the existing product in quality and function, and there are low switching costs associated with switching to the other products or services (Peng, 2014). Substitutes can be developed from other industries, and such substitutes can easily be overlooked. Porter (1979) suggested especially to look at substitutes produced by industries earning high profits.

(5) Degree of rivalry. The degree of rivalry in an industry is associated with the industry growth, cost of product development, and exit barriers (Porter, 1979). A high overall degree of rivalry is bad for the overall lucratively of the industry. Degree of rivalry is linked with high number of competitors, degree of similarly among firms and industry growth. High exist barriers, costs or commitments that make it difficult for firms to abandon an industry, could also increase the amount of rivalry (Schilling, 2017).

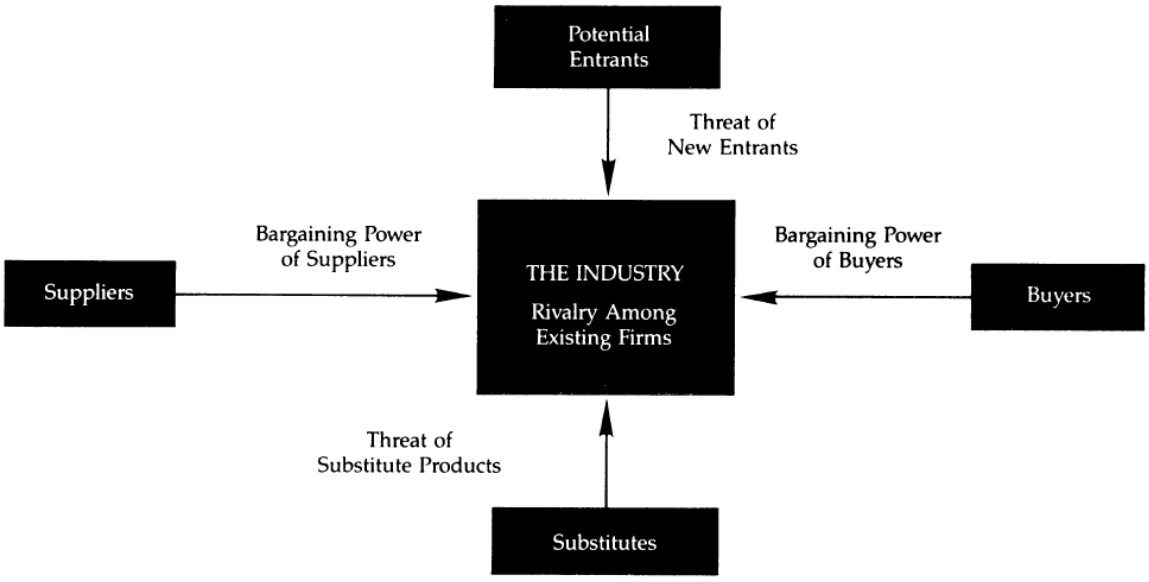

Figure 1 Porters Five Forces adapted from Porter (1980) (p. 31)

3.2 Resource-Based View

The Resource-based View (RBV) argues that some firms differ in performance due to their internal resources and capabilities (Barney, 1991; Peteraf, 1993; Wernerfelt, 1984). The underlying logic of RBV is that firms can be viewed as collections of resources and capabilities and that these can enables strategies (Wernerfelt, 1984). Further, these resources can be a source for a sustainable competitive advantage (Barney, 1991; Peteraf, 1993). For the sake of my thesis, the term 'resource' and 'capabilities' are used interchangeably.

RBV builds on two assumptions that are different than RBV (Barney, 1991; Peteraf, 1993). The first assumptions is that firms within an industry or group may be heterogeneous with respect to their strategic resources (Barney, 1991). This principle simply states that resources are distributed unevenly cross firms, and that firms have different sets of resources (Peteraf & Barney, 2003). The second assumption is that resources are not perfectly mobile across firms (Barney, 1991). This assumption implies that differences in performances could persist over time.

According to RBV, firms operating in the Shared-Micro-Mobility-Industry are heterogenous as a consequence of their strategic resources. According to this view, the resources a firm owns and its ability to exploit the resources are what may constitute a competitive advantage.

The term "resource" is of central importance in RBV. According to Barney (1991) firm resources are "all assets, capabilities, organizational processes, firm attributes, information, knowledge, etc. controlled by a firm that enable the firm to conceive of an implement strategies that improve its efficiency and effectiveness" (p. 101). The definition has since then been debated and discussed. In 2001, Barney addressed the issue of resources again and proposed another, broader, definition: "resources are the tangible and intangible assets a firm uses to choose and implements its strategies" (Barney, 2001, p. 54). I have adopted the second definition from Barney (2001).

Based on the definition of resource, three other terms needs to be addressed: 'strategies', 'tangible' and 'intangible'. Regarding 'strategic' resources, I have adopted the same view as Peteraf and Barney (2003) implying that a strategic resource help improve efficiency and effectiveness. This also implies that the firm having the resource could generate more value

than other firms. It can be noted that the value of the resource is dependent on the market context in which the resource is applied (Barney, 2001).

'Tangible' resources are observable and quantifiable resources. Tangible resources can be divided into three groups: financial, physical and technological. A similar view is proposed by Peng (2014). 'Intangible' resources are, on the other hand, resources that are difficult to codify. In his article, Barney (1991) views human capital as intangible resources. This includes training experience, judgement intelligence and relationships.

Initially, Barney (1991) defined competitive advantage as a firm that is implementing a value creating strategy not simultaneously being implemented by any other or current competitors. A more recent definition, coined by Peteraf and Barney (2003, p. 314) is: "An enterprise has a competitive advantage if it is able to create more economic value than the marginal (breakeven) competitor in its product market". I have adopted the second definition since it enables an association between resources and value creation. Lastly, the competitive advantages is sustained if current or potential competitors are unable to duplicate the benefits of the strategy (Barney, 1991).

In order for a resource to be a source of competitive advantage the resource needs to be exploited through business processes (Ray, Barney, & Muhanna, 2004). A 'business process' is an action that a firm engages in, in order to accomplish a business purpose. A business process often executes a bundle of tangible and intangible resources (Ray et al., 2004).

A competitive advantage does not imply increased revenue or economic gain, nor does it imply that all business processes are a source of competitive advantage. A business process will be a source of sustained competitive advantage if it exploits a valuable, rare, costly to imitate and non-substitutable resource. These criteria's are discussed below in chapter 3.2.2, and is usually referred to as the VRIO (Value-Rare-Imitable-Organization) framework.

3.2.1 The resource based view of IT and big data

Information Technology (IT) has impacts on decision making and organizational matters in a firm (Constantiou & Kallinikos, 2015). The line between IT and strategy is thin, and researcher calls for a better understanding of how IT is shaping strategy (Bharadwaj, El Sawy, Pavlou, & Venkatraman, 2013; Venkatraman, 1994). The research calls for focus on digital

business strategies. A digital business strategy is defined as "organizational strategy formulated and executed by leveraging digital resources to create differential value" (Bharadwaj et al., 2013). This definition is coherent with, and based on, the Resource-Based View (Barney, 1991). Big data constitutes as a part of IT and is to be considered an IT resource.

Melville, Kraemer, and Gurbaxani (2004) defines IT resource in a way that is coherent with the Resource-Based View. They divide IT into tangible and intangible resources. Other scholars use a similar definition (Bharadwaj, 2000; Kwon et al., 2014). Big data is viewed as an IT resource and this also constitutes a tangible and intangible part. The two concepts might be intertwined, but the divisions is necessary to precisely understand the resources impact (Melville et al., 2004)

Tangible IT resource comprises physical technology, IT infrastructure and specific business applications that utilize the IT infrastructure (Melville et al., 2004).

Tangible big data resources therefore also comprise the similar physical technology and big data infrastructure, as well as application utilizing this infrastructure. Examples include software, application, analytics tools and other technologies needed to facilitate for the data. The data in itself are also considered a tangible resource.

Intangible IT resource comprise of technical and managerial knowledge (Melville et al., 2004).

Intangible big data resources thus comprise technical and managerial skills associated with big data. Examples include knowledge about how to extract meaning from the data, ability to lead data-driven teams and make data-driven decisions.

IT as a source of competitive advantage. First it is believed that IT is a valuable resource (Hitt & Brynjolfsson, 1996). Recent reviews suggest similar findings, but also stress that value is dependent on internal and external factors, complementary organizational resources and competitive environments (Melville et al., 2004). This supports the idea that IT behaves according to Barneys (1991) definition of a resource.

Research suggest that tangible IT resources are easy to duplicate (Bharadwaj, 2000) and that intangible IT resources are the only IT resources that are a source of sustained competitive advantage.

Big data as source of competitive advantage. Despite the growing research on IT-resources, there is not a lot of big data specific research (Mikalef et al., 2017).

3.2.2 VRIO framework

This section explains the VRIO (Value-Rare-Imitable-Organization) framework, developed by Barney (1991). In order for a resource to be a source of *sustained* competitive advantage it needs to entail all properties listed below. If a business process exploits a valuable but not rare resource, it can only be a source of competitive parity. If the resource however is valuable and rare, it can be a source of temporary competitive advantage. Lastly, if the resource is valuable, rare and costly-to-imitate, the resource could be a source of sustained competitive advantage. The last criteria in the VRIO framework addresses the organizations ability to organize its business processes efficiently and effectively (Barney & Wright, 1998).

If all the four criteria's are present a business process could exploit a resource for a sustained competitive advantage. The rest of this section discusses each VRIO criteria.

(1) **The question of value.** A resource is valuable if it is value-adding (Peng, 2014). So the question of value is closely associated with the resources' ability to exploit and/or neutralize a threat. Discussing and evaluating value is difficult. What is valuable at one moment might not be valuable in the future, and as discussed in section 3.2, value in the eyes of RBV is market dependent. If the resource is not value-adding, the resource could be a competitive disadvantage

(2) **The question of rarity.** If every firm has the same valuable resource, it would not be a source of competitive advantage, because every firm can engage in the same business process. This leads to competitive parity. On the other hand, if the resource is held by one or a few competing firms, then the resource is rare. If the resource is rare, it can be used as a competitive advantage.

(3) The question of imitability. In order for a resource to be a source of sustained competitive advantage current and potential competitors cannot obtain the resources. There are several ways competitor can get the resource. They could obtain the resource by imitation or substitution. Substitution is when a resource is exploited in order to gain the same strategy as another resource. Research suggest that intangible resources are more difficult to imitate, compared to tangible (Ray et al., 2004).

Barney (1991) identified three reasons a resource could be difficult to imitate:

- **a.** Historical conditions: The resource is obtained due to the company´s unique path through history.
- **b.** Casual ambiguity: The link between the resource and the firm's sustained competitive advantage is not understood.
- **c.** Social complexity: The resource is exploited by the culture, traditions or interpersonal relationship of the firm. Imitation can also occur through duplication and substitution

(4) The question of organization. If a firm possesses a resource that is valuable, rare and difficult-to-imitable it can be a source for sustained competitive advantage. In order for the resource to be a sustained competitive advantage, the firm must be well organized (Peng, 2014). In these situations, the organization must not only organize the resource properly, but also its complementary assets. As a consequence, a firm can achieve sustained competitive advantage if the resource is valuable, rare, difficult to imitate and is well organized.

3.3 Theoretical Foundation And Levels Of Analysis

The two different theoretical foundations presented in this chapter are usually seen as complementary. However, the two research streams are concerned with different levels of analysis. IBV involves an analysis at industry-level while RBV is concerned with an analysis at resource- and firm-level (Peteraf & Barney, 2003).

4. METHODOLOGY

I feel the need—the need for speed!

- Peter "Maverick" Mitchel

This study is related to business and management and is considered as business research (Wilson, 2014). This study is conducted as a multiple embedded case study, following the case study definition proposed by Yin (2018). This chapter explain what this means in practice.

The research question for this study is:

How are different forces shaping the Shared-Micro-Mobility-Industry? And how can mobility big data be a source for competitive advantage for mobility firms?

4.1 Research Design

The study is an explanatory and exploratory study (Wilson, 2014). The explanatory part addresses the first part of my research question: **How are different forces shaping the Shared-Micro-Mobility-Industry?** This part of the study applied the Industry-Based View (IBV), and Porters five forces.

The exploratory part addresses the question: **How can mobility big data be a source for competitive advantage for mobility firms?** In order to address this issue, the Resource-Based View (RBV) and VRIO framework is applied.

The research is conducted as a case study. Yin (2018) proposes the following criteria's in order to determine if the research should be carried out a case study

(a) The form of the research question.
(b) The extent to which the researcher have control over behavioral events
(c) The degree of focus on contemporary as opposed to entirely historical events.

If the research question is proposed in the form of "how" or "why", the researcher has no control over behavioral events, and if the research focus is on contemporary events, a case study is a suitable choice

In this study the research question is stated as a "how", answering Yin's criteria (a). Regarding criteria (b), it is impossible to control, influence or change the behaviors or events within the mobility industry. Therefore I have no control over behavioral events. Regarding Criteria (c), the changes that is currently happening in the mobility industry is viewed as contemporary events. Thus this research fit Yins (2018) criteria's for case study.

4.1.1 Type of case study and unit of analysis

This case study is conducted as an embedded multiple-case design. The entire micro mobility industry is considered, with a holistic view, with the different firms as sub units of analysis. My research was conducted in an inductive manner and is not using any propositions.

There are some differences for each part of the research question. The difference is primarily a consequence of the two different theoretical frameworks and theoretical foundations applied. IBV, and Porters five forces framework, are applicable at an industry level. However, RBV, and the VRIO framework are a firm-level framework, applicable at a firm-level and resource-level (Peteraf & Barney, 2003). These differences are addressed in the case study protocol in appendix A.

4.2 Replication Logic And The Multiple-Case Study Procedure

For a multiple-case study design, Yin (2018) suggest using a replication logic. Replication logic relies on selecting the individual case studies such as they either predict similar results (literal replication) or contrasting results but for anticipatable reasons (theoretical replication).

This research relies on a literal replication logic. The goal is to have all the cases turning out as predicted. Replication logic is clearly distinguished from sample logic, a logic which applies to quantitative research (Yin, 2018). Using replication logic had an effect on my case study procedure.

4.2.1 Multiple-Case study procedure

This study followed a multiple-case study procedure proposed by Yin (2018). The procedure follows three steps.

The first step is define and design. This step consists of developing theory, select cases and designs the case study protocol. This step was revised several times. The case study protocol can be viewed in appendix A. The work of this step can also be viewed in chapter 2,3 and 4.

The second step is to prepare, collect and analyze. This step consists of preparing primary data collection and collecting data from primary sources. The most important primary source of data collected in my case study are from interviews. See section 4.4 for details on the preparation and collecting phase. In this type of procedure, if needed, important discoveries can make the researcher go back to the first step.

The third step is to analyze and conclude. After collecting the data individual case reports were made. After each case reports followed a cross case conclusions. Based on this theory was modified and implications were developed. A detailed description of how I analyzed the data can be viewed in chapter 5. The result of my analysis can be viewed in chapter 6.

4.3 Timelines

The idea of the study began in the autumn of 2018. My primarily goal was to understand big data and its potential for value creation and how it can be utilized for a company. The formal work began January 14th and ended at May 22th. Data collection began in the beginning of 2019.

4.4 Data Collection

Primary data was collected from six in-depth interviews. The interviews were carried out using a semi-structured approach. I developed 14 questions focusing on (1) the industry as a whole and (2) the company´s and industry usage of big data. See appendix B for the questions. All interview subjects received a similar email describing that I would like to ask them some questions about the micro mobility industry and some questions about data.

The secondary data collection never had a formal “stop”. New information was continuously found regarding both the micro mobility industry as well as for big data. I had to revisit my data in order to make sure that it reflected the newest information. The secondary data was collected from university library and from the internet.

All data was analyzed by the author.

4.4.1 Primary data collection

Twelve companies were asked to participate. Six responded and were interviewed. The interviews were semi-structured. All interviews were conducted face-to-face in Oslo, Norway, and at the workplace of the subjects.

The interview process was influenced by Kvale (1996) and Rubin and Rubin (2005). Their work influenced the interview techniques, interview interaction and helped in designing the questions. Their work also helped in understanding ethical concerns and how to make sense of the data collected.

The semi-structured interview "has a sequence of themes to be covered, as well as suggested questions. Yet at the same time there is an openness to changes and forms of questions in order to follow up the answers given and the stories told by the subject" (Kvale, 1996, p. 124). Semi-structured interview makes it possible to change the order of the questions and follow up on interesting anecdotes.

During the interview I relied on follow-up questions and probes. The interviews were taped. Notes were obtained during the interviews. After the interview was done, I spent fifteen minutes writing down my thoughts and ideas. The interviews were transcribed before conducting the next interview. This process helped me to better understand which questions were important for the next interview.

Of the six companies that participated, two operate and provide products and services to the micro mobility industry (Sharebike and NSB Bybil), two interviews were conducted with the government entity (Oslobymiljø) and the last two were with external actors. One is a consultancy firm (Rambøll) and the other is a startup facilitator (Startuplab). The use of different sources of evidence could enable data triangulation (Yin, 2018). The interview subject were chosen based on replication logic (section 4.2)

Table 2 shows information about the interviewees. The six interviews made a total of five hours and twenty minutes of recordings.

No.	Interview Date	Company name	Department
1	01.04.2019	Rambøll	Smart mobility
2	03.04.2019	Oslobymiljø	Mobility
3	04.04.2019	Oslobymiljø	Mobility
4	08.04.2019	Sharebike	
5	11.04.2019	Startuplab	Mobilitylab
6	15.04.2019	NSB	NSB Bybil

Table 2: Interview Subjects

Interviews, if conducted properly can be a great source of evidence. However, interviews do have some weaknesses such as bias due to poorly articulated questions and response bias. Even reflexivity could pose a problem with interviews (Yin, 2018)

4.4.2 Secondary data collection

The primary source of data came from the interviews. The goal was to include a broad range of secondary data. This was important due to the multidisciplinary dimension of the study.

The process of secondary data was difficult, because: (1) micro mobility is intervened in several other issues, such as infrastructure, city planning and even social relationship, and (2) articles and reports on mobility was published while working in this study. As a consequence, reviewing secondary data became not only important, but also a necessity in order to understand the changing dynamics of mobility.

In order to find research and documentation on big data broad searches on Google Scholar and in the Oria database were performed. Articles from journals with a level of 2 acknowledged by universitets- og høgskolerådet (UHR)[4] were prioritized. Secondary data was needed in order to address several aspects like definitions, usages, functions in a business plan and properties as value creation. Some of this work can be viewed in chapter 3. For an understanding of big data and its potential for value creation and data-driven innovation, work done by Cavanillas et al. (2016), OECD (2013) and Manyika et al. (2011) were important.

[4] https://dbh.nsd.uib.no/publiseringskanaler/Forside

With regards to the topic of mobility, it was more difficult to obtain all documents prior to my interviews. As a consequence, some of the data was retrieved based on suggestions from the interview subjects. Important reports includes (Klimek et al., 2019; McKinsey & Company, 2019; Uteng, Uteng, & Kittilsen, 2019; Aarhaug, 2017). New clippings was gathered primarily from Aftenposten, The Economist and Shifter.

It is important to use multiple sources of evidence, because it can help with data triangulation (Yin 2018). Data triangulation can help with construct validity. As noted, the primary source of data stems from interviews. Other sources of evidence, measuring the same phenomenon, stems from documentation (formal studies and news clippings). Some of this work is discussed in chapter 2 and 3.

Reliance on secondary data is important for the quality of the study report. The findings and conclusions are more convincing and accurate when based on several sources of information (Yin, 2018). To conclude, this thesis relies on the following sources of information: six interviews, news articles, and formal studies.

4.4.3 Ethical concerns

The right to privacy is of enormous importance. It was important to ensure that the interviewees were well informed of their rights and that formal consent was provided. Other ethical concerns were also addressed prior to starting the interview process.

The interviewees were informed that the interviews would be transcribed and analyzed. They were told that their names would not be written in the report. The only information present would be company name and the division in which they worked. All interviewees were asked if recording the interviews were acceptable. The recordings, as well as the transcriptions, would not be shared in any way. In addition, the recording and transcriptions would not be uploaded to the cloud.

The interviewees could at any time choose to withdraw their consent, or alter or change any statement they wanted up until the delivery of the study. The interviewees were also informed that they could choose not to answer a question for any reason

5. DATA ANALYSIS

I live my life a quarter mile at a time

- Dom Toretto (Fast and the Furious)

The primary approach to data analysis involved a detailed analysis of transcripts. The first step was to review notes taken during the interview, and the notes taken immediately after the interview. Each new interview was compared to the previous interview in order to confirm potential evidence. As such, earlier interviews were analyzed several times in light of concepts discovered at a later time.

When conducting a qualitative data analysis "the objective is to discover variation, portray shade of meaning and examine complicity" (Rubin & Rubin, 2005).

5.1 Case Overview

My research is an inductive embedded multiple-case research, with a holistic view of the micro mobility industry with different firms as sub units of analysis. My research questions consist of two parts. Analyses are conducted separately for the two parts. For the first part (**How are different forces shaping the Shared-Micro-Mobility-Industry?)** a case is considered one the porters five forces. This constitutes a total of five cases.

For the second research question (**how can mobility big data be a source for competitive advantage for mobility firms?)** a case constitutes one part of the VRIO-framework, which equals a total of four cases.

Each case used multiple sources of evidence (reports, news clippings and interviews). The case is supported by more than one interview, and more than one type of source of evidence. The sources are used in order to develop convergent evidence in order to increase data triangulation (Yin, 2018).

For both questions, primary interviews were analyzed. There are several levels of precisions regarding interview transcription (Rubin & Rubin, 2005). The most precise would include stalling words, profanity, changes of focuses, and so on. The transcripts were not at this level

of precision. However, they did clearly indicate the questions in the form of brackets, and separated by questions from the subjects statements.

5.1.1 Oslo city

All primary data is gathered from different actors operating in the micro mobility industry in Oslo. During the interview process it became clear that the context of which the micro mobility units where applied could determine and influence the industry. Based on the analysis, it shows that city in which vehicles is operating is important. As a consequence, an introduction to Oslo will be given,

There are a total of 674 469 people living in Oslo, and it projected that the number will grow to 815 514 by 2040 (Statistisk sentralbyrå, 2019). As of May 2019, the citizens of Oslo have several options for travel. There are currently two shared free-floating el-scooters companies: Voi and Tier. Voi is believed to have around 250 scooters, and Tier is believed to have around 600 (Breian, Eggesvik, Bjørnestad, Fuglehaud, & Husøy, 2019). In the middle of May, a third company launched with about 170 scooters, Flash (Plikk, 2019). In addition to these three companies, Zvipp, announced that will launch with a total of 1000 scooters in May (Henriksen, 2019).

In addition to this, Ruter, the provider of public transportation in Oslo, have announced that they also want to release free-floating vehicles (Ruter, 2019). Ruter is in charge of operating the public transportation in Oslo, and Akershus, a neighboring municipal. The city of Oslo own 60% of Ruter, and the municipal of Akershus own 40%. Ruter provides both municipals with public transportation such as, metros, busses and trams. The amount of people using and relying on the public transportation is increasing (Ruter, 2019).

Public transportation is one of Oslo's priority areas, and is viewed as one way to reduce automobiles in the inner city (Oslo Kommune, 2019). In addition to the public transportation offering, Oslo also wants to increase bicycling (Oslo Kommune, 2014). One strategy implemented to increase the amount of bicycling was the introduction of a station based bicycle service. Oslo Bysykkel is the name of the service, and it is a cooperation between the city of Oslo and Clear Channel (Oslo Bysykkel, 2019). As part of the deal, Oslo provides public advertising space and in return receive the shared bicycle service. The system is financed through subscription and advertisements. This type of station based system is

organized as a monopoly. Urban Infrastructure Partner Group is the operator for the system, and Sharebike is one of the suppliers. There are a total of 3000 bikes and a total of 253 stations. This deal is the reason that the city of Oslo unavailable as a partner for other shared micro mobility projects.

5.1.2 Primary data sources

Of the six companies that were interviewed, two creates products for the micro mobility industry, Sharebike and NSB bybil. Sharebike provided micro mobility solutions for cities and private companies. NSB bybil is a service created by NSB[5]. NSB is a global transportation corporation. They also operate other mobility solutions, such as busses and trains. NSB bybil is conducted as a franchise deal with GreenMobility.

Two interviews were conducted with a government entity Oslo Bymiljøetaten. One interview was with a consultancy firm, Rambøll. Rambøll, among other things, helps their customers understand the developments done in infrastructure and mobility. The final interview was conducted with a startup facilitator at Startuplab, which is a startup facilitator that helps startups. The facilitator have created a network of companies that work in, or closely related to the mobility industry.

5.2 Strategy For Analyzing Case Study

After the interviews were transcribed the process of interpretation began. The analytic strategy is to develop a case description (Yin, 2018). During the interpretation of the primary data three steps described by Kvale (1996) was followed. The steps were: structuring, clarification and analysis.

When structuring the interviews, Word and Excel were used. I started with what Yin (2018) calls “playing with the data”, looking for patterns without any general guidance. During the clarification part, the transcripts were made amendable for analysis. This was done by distinguishing essential information from non-essential. The interviews were divided into two parts. One part addressed the first section of the research questions and the other addressed the second. The different parts contained sufficient overlap of information.

[5] NSB have since the writing of this report changed their name to Vy.

As a general analytic strategy I choose do develop a case description, which is a strategy that organizes the case study according to a descriptive framework (Yin, 2019). The descriptive frameworks are described in chapter 2. Porters five forces is used to determine how the forces shape the industry. VRIO framework is used to analyze how big data can be a source of competitive advantage. Using a descriptive framework does not mean that the case must be a descriptive case. Approaching the cases using the frameworks would help when analyzing the data.

5.3 Technique For Analyzing Case Study

Analyses involved developing the meaning of the interview, including understanding the interviews purpose as well as providing perspective from the researcher (Kvale, 1996). There exist several analytical techniques. This study uses the analytical technique: explanation building.

The goal of explanation building is to build an explanation about the case (Yin, 2018). The technique could be narrative, but it is mainly casual. The technique is concerned with a "how" or "why" some outcome has occurred (Yin, 2018). Explanation building is also iterative. See table 3 for more information on how this technique was applied.

Explanation building. Adapted from Yin (2018, p.180)
• Make an initial but tentative proposition or statement of the case • Compare the proposition or statement with data from the case study • Revisit the statemen or proposition • Compare other details of the case against this revision • Compare the findings from the case with the other cases

Table 3: Usage of explanation building

5.4 Analysis in Practice

In practice the process looked something along the lines of table 4. The table shows how data analysis was conducted. The result of this data analysis can be viewed in chapter 6.

Data Analysis in practice
Phase 1 Structuring: The transcribed interviews were structured in Microsoft Excel and Word. While structuring, I looked for patterns and themes that could be of interest later. **Phase 2 Clarification:** The transcripts were altered, and non-essential information was removed. The data was also divided into two parts, one for each part of the research question. There was significant overlap of material in the two parts. **Phase 3 Analyzing:** I started analyzing **How different forces shape the micro mobility industry.** For each force, I did the following and relied in the descriptive framework: • Tried to answer "how" a given force shapes the industry, and "why". • I made an initial, but tentative proposition to this is question, and then analyzed one interview. • Then I revised my statement based on the evidence. • After that, I moved on the next interview, with a new proposition, and matched my proposition against the new evidence. • After finishing each interview, I wrote down my findings and compared them to other sources of evidence. I started analyzing **How can mobility big data be a competitive advantage.** For each question in the VRIO framework I did the following: • I made an initial proposition or statement about the "question" from the VRIO framework, based on the descriptive nature of the framework. • I analyzed the statement based on the source of evidence. I then revised my statement. I did this for each source of evidence. • I did so for all sources of evidence. When finished with a "question" I moved on to the next question When finished with all source of evidence, make a cross-case result.

Table 4: Data Analysis Procedure

6. ANALYSIS

Money may not buy happiness,
but I'd rather cry in a Jaguar than on a bus.
— Françoise Sagan

This chapter presents the result of the case study analysis. This chapter is divided in three parts. The first two addresses each part of the research question. Summary of the findings can be viewed in table 5 and 6.

6.1 How Are Forces Shaping The Shared-Micro-Mobility-Industry?

The result of the five forces model can be viewed in subsection 6.1.1. After presenting my analysis I have made some comments regarding the industry. Finally I will compare my analysis with what is considered to be the state-of-the art research on mobility.

A main finding is that this industry is trying to adapt to a new market and capture rents from technological changes. The industry is experience increasing rivalry.

6.1.1 Porters five forces analysis

Porters five forces framework helps identify the overall attractiveness and profitability of an industry. The weaker the collective forces, the more profitable the industry. The five forces are: Threat of entry, bargaining power of suppliers, bargaining power of buyer, threat of substitutes and degree of rivalry.

The result discussed below is based on primary data obtained during the work of this thesis. The findings of the analysis will be discussed and compared with other literature on the topic. In addition, plausible rival explanations will be address.

Threat to entry

The interviews confirmed that it is easier to enter the industry. The threat to entry is characterized primarily by two mechanics: government policies and capital requirements.

According to the answers, the government influences the barriers to entry in several ways. First and foremost, the government seems to favor products and services that they believe will make car ownership decline. Secondly, the government focuses on environmentally solutions.

This favors the Shared-Micro-Mobility-Industry. The interview subjects believe that these are considered important for the decision to enter the industry.

There are other specific government policies. Regarding station based micro mobility, the government's role makes it close to impossible to enter the market with a station based system. This is because the government is authorizing only one long time contracts. The contract essentially trades monopoly rights to show advertisements in the city for a station-based micro mobility system. The government owns most of the land of which these systems would be based. Essentially this makes one micro mobility service subsidized through advertisements.

The government owns most of the land where station based systems would be based. The interviewees were split regarding the implication of these policies. Some suggested monopoly tendencies. But this contract also lowers the bar to entry for free-floating micro mobility solutions, This is because the government cannot, due to this contract, go into a partnership with any other micro mobility company.

Other government policies are also lowering the bar to entry for free-floating micro mobility solutions. This is done by regulating el-scooters as bicycles and favoring parking for electric cars. The favoring of electricity makes many electric micro mobility platforms easier to manage and operate.

The answers suggest a high capital requirements are required. The capital requirement is primarily a consequence of the necessity to have a large fleet of vehicles. This is considered as a necessity because the vehicles need to be 'accessible', implying that a vehicle needs to be where the potential user is. When everybody is your potential customer, you need to be everywhere. However though, the vehicles are becoming cheaper, and they can (in most cases) be bought "of-the-shelf".

The capital requirements are different for the different modes of mobility vehicles. A micro mobility service using cars are more expensive then scooters and bicycles. Free-float systems are typically cheaper then station-based.

Bargaining power of Supplier.

The overall bargaining powers of suppliers are weaker. In addition to this, the role of the suppliers are changing, implying a high degree of rivalry among suppliers to the micro mobility industry.

There has been an increase of mobility suppliers. This increase has been quite rapid. The reason for the increase in suppliers seems to be caused by a change in the supplier role. Previously the role of the suppliers was that of a proprietary mobility supplier. Now, the focus has changed towards a knowledge based situation, caused by technological developments.

Technology is still of great importance (it might be the most important part of mobility), but there are several suppliers to choose from. This is true for pure software solutions, such as app development and GPS-tracking, as well as for the vehicles. These technologies are described as "of-the-shelves" products. Similar trends are suggested for software products.

Bargaining power of Buyer

Answers states that buyers seems have influence or power over the micro mobility industry. Buyers of micro mobility products and services have several choices. Several of the micro mobility services complement each other, lowering switching costs. The interviews revealed that customers easily can switch from one service to another simply by downloading another application.

Interestingly, the buyer group seems to be changing. All interviews points to changes such as urbanization and focus in a "greener" lifestyle. This trend is positive for the micro mobility industry.

Threat of Substitutes

The overall threat of substitutes is described to be high. The two most important substitutes are owning a vehicle and walking. In addition, the role of public transportation is important.

Owning your own vehicle, such as a bicycle or el-scooter is not very expensive in a industrialized society. A car is more expensive, but for most people in Oslo it is possible to

buy one. The industries overall service, which is to get a person from A-to-B can easily be substitutes with walking, in a lot of cases. This implies a low switching cost.

Another case can be made by adjunct industries. In the case of *micro* mobility, most applications can be completed by shared *"macro"* mobility services, such as car rentals. It seems to be the case that the interviews to a certain degree fear industries that are heavy into technologies, e.g. Google and Apple. If this is a real fear or not is difficult to state, but the overall trend of the mobility industry is that tech is becoming more and more important.

Finally, it is important to address the issue of public transportation. It is the case that some of the use cases of micro mobility overlaps with the offering of public transportation. This creates a strange dynamic, since some of the shared micro mobility firms see themselves as complements (and not as a competitor) to the public transportation offering. The role of public transportation remains uncertain as a substitute.

Degree of rivalry

The degree of rivalry is a complicated force in the micro mobility industry. On one hand, some arguments point towards a high degree of rivalry, but some forces seem to keep the rivalry relatively low, such as industry growth and product differentiation.

The firms in this industry are *not* balanced in terms of resources, personalities or backgrounds. Some firms operate with publicly assets, originates from traditional businesses, traditional mobility companies, some companies have international backgrounds and other companies have just started focusing on mobility. This should indicate a high degree of rivalry. Also, the interviewees tend to agree that the industry will continue to see entrants from companies not traditionally considered mobility companies. This is primarily due to the decline in the cost of product development, but also a consequence of a better understanding on how to implement technology.

Despite this, the interviews do not seem to believe that there is a high degree of rivalry at the moment. The most probably explanation of this seems to be industry growth, which most firms seem to leverage. At the present time, they are also exploring several niche markets. The market that sells directly to consumers seems to have a higher degree of rivalry. This is

evident in the free-floating el-scooter market, and is supported market developments internationally.

Most interviewees seem to regard car ownership as the primarily rival, and as a consequence they consider it good that more firms are entering the industry because they all seems to work for a decline in car ownership.

6.1.2 Comments on substitutes and competitors.

Drawing a line between complements and substitutes in the industry is difficult. The products and services are different from each other. For example el-scooters are small vehicles designed for short travels while cars are large and designed form longer travels. Answers suggest that the companies believe that they serve different needs. However, that is not always the case. In a lot of situations the use of the different vehicles overlaps. A car can be used even for short travels.

The same arguments can be used about public transportation. Is it a rival or a substitute? Most companies seem to state that their business-plan is associated with the public transportation. Answers state that some usage of the micro mobility services are in direct conflict with the public transportation, but public transportation is important for the micro mobility companies and visa-versa.

6.1.3 Comments on network effect

It is important to address if the industry is characterized by network externalities. If that is the case, then the value a user derives from the service increases with the number of other users of the same product or service (Peng, 2014). If so it will have an effect of product differentiation. This could explain why we see so many companies investing in el-scooters. The idea might be that only one firm could survive long-term. If this is the situation, then we should except the threat of entry to decline rapidly as the networks grow.

6.1.4 Compared to what we know about mobility

The analysis performed in this study is comparable to international trends as suggested by current research (Klimek et al., 2019). The current landscape of the micro mobility industry and the broader mobility industry is a competitive landscape. Firms from different industries

are entering the industry in different ways, constituting the broader mobility industry (McKinsey & Company, 2019).

The broader mobility market is under pressure from technologies that enables sharing (McKinsey & Company, 2019). On the other hand, these technologies are good for the Shared-Micro-Mobility-Industry. The analysis shows that the buyer group is changing, this is supported by others (McKinsey & Company, 2019; Uteng et al., 2019).

There is a difference between the degree of rivalry in the shared micro mobility industry, and the whole mobility industry. This can be due to the industry growth in the shared micro mobility industry. But it can also be explained as an abnormality that is due to change very soon.

Porters Force	**Summary**
Threat of entry	The analysis show that is has, in general, become easier to enter the micro mobility industry.
Bargaining power of suppliers	The supplier power has become weaker
Bargaining power of buyers	Buyers seems to have a lot of power in this industry
Threat of substitutes	The amount of substitutes available is increasing
Degree of rivalry	The industry does not face a high degree of rivalry in general, but there are reasons to believe that this will change. At the time of writing this report the industry is still experiencing an overall industry growth.

Table 5: Porters five forces analysis summary

6.2 How Can Mobility Big Data Be A Competitive Advantage?

In this section I will present the analysis based on the second part of the research question. The research is exploratory. The descriptive framework VRIO is applied in order to explore the role of mobility big data

As a reminder, when discussing mobility big data as a resource, it consists of two parts, the tangible and intangible. Tangible big data are the physical technology, infrastructure and applications associated with the technology and infrastructure and including the data itself. The intangible comprise technical and managerial skills associated with mobility big data.

The result of the VRIO framework analysis can be viewed in subsection 6.2.1. A summary can be viewed in table 6. This analysis is based only my primary sources, interviews and news clippings. News clippings are used in order to confirm evidence when possible.

The analysis shows that there are different types of tangible mobile big data, mobility data and quality mobility data. It also shows that intangible mobility big data is a more important source for a competitive advantage, than tangible mobility big data.

6.2.1 VRIO framework

VRIO (Value-Rare-Imitable-Organization) framework is applied in order to determine if a resource could be a source of sustained competitive advantage. The criteria's are concerned with the questions of value, rarity, imitability and organization. In order for a firm to have a competitive advantage they must have one, or several, business processes that exploit a valuable, rare and difficult to imitate resource. The advantage can be sustained if the organization is probably organized around the resource.

The question of Value

All interviews agree that mobility big data has value and is value adding, if exploited. This is true for tangible and intangible big data. The evidence suggests several areas for added value: product development, marketing and decision making.

Many interviewees state that for product development, big data is used to improve the product. In this sense, mobility data can be used in order to better understand customers' needs and they can change or alter the product in order to improve the overall value of the product/service. This is a common business process.

Regarding marketing, big data helps the firms understand their customers and improve their marketing. Business processes includes making the firms better reach potential new customer segments. This is interesting for marketing campaigns and long-term marketing strategies.

For decision making, mobility big data helps the firms understand their competitive environment. The big data helps the firms in making decisions. In this manner mobility big data could neutralize threats and help the firm exploit opportunities.

Finally, no one stated that the data in itself was the intended product. No companies have monetized their data by selling it to a third party. However, some data have been shared with other parties, always anonymized. When asked why the data was never a product to be sold, the answers were always due to a lack of market for it, and privacy concerns.

The question of Rarity

Tangible mobility big data is rare, under some preconditions. Intangible mobility big data is rare. To the degree of which they are comparable, intangible skills are rarer.

First, when discussing the rarity of the data itself, what is rare is access to quality data. With quality data it means data with small amounts of error and/or data that cover a large segment of different users. The companies manage their tangible big data differently.

What is most rare is the capabilities and knowledges it takes to turn the data into something of value. This is considered the intangible part. It seems that in order for the data to be exploited it takes technical knowledge, but also a lot of domain knowledge. In most cases the domain knowledge is concerned with mobility specific issues. Examples are how the vehicles could move in different streets and weather conditions.

A company that poses both quality data and technical expertise should have a temporary competitive advantage over their competitors.

The question of Imitability

Tangible mobility big data is imitable. Intangible mobility big data tends to be non-imitable.

The tangible data created from mobility units/vehicles have substitutes. Examples are data obtained from smartphones. These datasets are substitutes in which they can be exploited to create the same strategy.

Intangible big data seems to non-imitable. The interviewees suggest that skills and knowledge associated with big data would be more important in the future.

The analysis suggests that there are another important intangible skillset needed in order to utilize big data. This is best discussed as domain specific (mobility specific) knowledge. This intangible resource is non-imitable. The evidence suggests that this could be due to historical conditions (the knowledge is obtained due to the company's unique path through history). It could also be the case that this is due casual ambiguity.

A business process that's exploits mobility big data and domain specific knowledge could be a source of competitive advantage.

The question of Organization

In order for mobility big data to be a source of sustainable competitive advantage the organization must be well organized with respect to the resources, but also its complementary resources.

From my analysis, it is evident that big data cannot be a source of sustained competitive advantage without complementary resources. Complementary resource that seems to be important are domain knowledge. So, in order to utilize mobility big data it is important to be well organized around the knowledge associated with knowledge about mobility.

Another finding suggests that it is important to organize the company such that the firm is able to successfully combine their internal generated data with data from external sources. The analysis suggests that skills associated with understand the value of other sources of data is important.

6.2.2 What are domain specific skills?

The topic of domain specific skills seems to a missing piece in order to create value from big data. Domain specific skills seem to refer to the knowledge and skills associated with mobility specific knowledge. The skillset varies from actor to actor and seems to be closely associated with patterns of mobility, understanding human movement, and city specific issues. This is also intertwined with politics.

Domain specific skills are part of the intangible skillset of big data. Based on the interviews, it is indicated that the skills and knowledge making the big data applicable to a mobility context are difficult to understand and are multidisciplinary.

6.2.3 Is mobility data a source of competitive advantage?

Mobility big data is big data created from, or as a consequence of mobility. It includes data management and analytics. The analyses above have been concerned with two parts of big data, the tangible and intangible parts. Tangible big data resources are the physical technology, big data infrastructure and applications utilizing this infrastructure. Intangible big data are the technical and managerial skills associated with big data.

The analysis concludes that tangible mobility big data is not a source of competitive advantage. However, tangible mobility big data is of value. Also, not all data are equal quality big data are considered rare, and as a consequence it can be exploited as a temporary competitive advantage.

Intangible mobility big data are, on the other hand are of value, and is rare. As a consequence, intangible big data are a source of temporary competitive advantage. It is also the case that intangible big data seems to be non-imitable, suggesting that if the firm is organized to capture the value, it could be a source of sustained competitive advantage.

VRIO question	Summary
The question of value	Big data is of value. This is true for its tangible and intangible parts
The question of Rarity	Tangible (quality) big data is still rare. The Intangible part of big data is rare
The question of imitability	The tangible parts of big data are imitable and substitutions exist. The intangible parts of big data are becoming imitable. The domain-specific knowledge that puts big data in the context of mobility is non-imitable.
The question of organization	Complementary resources necessary to organize the firm around are associated with domain specific skills and knowhow associated with mobility.

Table 6: VRIO framework analysis summary

7. ANALYSIS DISCUSSION

Wait a minute. Wait a minute Doc,
uh, are you telling me you
built a time machine
... out of a DeLorean?
- Marty McFly

In this chapter I will discuss the findings made in chapter 6 as well as address other theoretical views. First I will address the findings regarding the industry. Following this I will make case for other industry views. After this follows a discussion on mobility big data and suggest how one should view mobility big data in the future. At the end I will make a cross-case discussion.

7.1 An Industry On The Verge Of A Bloodbath?

The result of the case study shows that the industry is changing. It is my belief that to some degree the analysis shows a snapshot of how the industry looks before the rivalry turns intense.

The study describes an increasing degree of rivalry especially in the free floating el-scooter segment. The research shows that el-scooters face more rivalry compared to other vehicles. It is likely that this segment will face the consequences of an reduced industry growth first. This report is in agreement with international trends, that suggest the same (Efrati & Weinberg, 2018). Government policies which currently are making it easier for the el-scooters, may turn around as or if better solutions emerge. This is mainly due to safety and environmental concerns. Internationally this has already begun to happen (Breian et al., 2019). These findings indicated the industry will turn more rivalry.

The threat to entry has been one of the most interesting forces in the industry. My analysis shows variations regarding entry barriers. Capital requirements, one entry barrier, are different among actors in the industry. Among the situations discussed are the capital requirements to enter the industry with cars, preferably el-cars, compared to el-scooters.

In addition to capital requirements, the question of accessibility is important. Shared-Micro-Mobility firms are dependent on being accessible, as described in my results. Accessible in

this context refers to being where the customer needs the vehicle to be. In order to meet such criteria, a lot of capital is necessary to provide enough vehicles. Only large amount of vehicles would be considered accessible. In the answers in this study accessibility is considered important. If customers do not find an el-scooter when they want one, the probability that they will look for other solutions is large.

If one considers this, it is difficult to see another tactic that to invest more than your competitors. Naively one could state that more vehicles equal better accessibility, which implies that more investments are better.

7.1.1 Is MaaS the final destination?

Several of the interviewees wanted to discuss Mobility-as-a-Service (Maas). MaaS is a concept where mobility is ordered as a package, usually through a smartphone (Aarhaug, 2017). This analysis shows that it could be that different micro mobility companies are potential modules, and that these in the future can (or would) be integrated as a larger chain of mobility modules.

MaaS and threat of entry. It could be that a MaaS solution could hinder future competition. By bundling together different types of mobility vehicles it could be more difficult to enter the industry (An examples is to have several vehicles on one subscription). It is however difficult to know if the sum of the mobility modules will be greater than if they were not in a MaaS system.

MaaS and bargaining power of suppliers and buyers. A weaker supplier force is good for MaaS solutions. Different vehicles and technology are easy to get a hold of. With regards to buyer power, a MaaS service could increase the switching costs between vehicles and thus decrease buyer power.

MaaS and substitutes. A MaaS service may be a better substitute for owning a car. It could be that operating a MaaS business needs different competence than adjunct industries (i.e. the technology industry) .

7.2 Other Views of the Industry

In order to explain the Shared-Micro-Mobility-Industry, I used the porter five forces framework which is based on the industry based view. In my view this framework was a good tool to describe and discuss the industry. But other frameworks and theoretical foundations exist.

My findings suggests that it could be beneficial to analyze the Shared-Micro-Mobility-Industry as an business ecosystem (Moore, 2006). In business ecosystems the interdependence among firms explicit (Adner & Kapoor, 2010). My findings also confirm that different firms depend on each other, and depend on public transportation to a large degree. Viewing the industry as a business ecosystem could help explain this dependency. The view could help the industry to understand how they can create more value combined (Adner, 2006). The analysis shows that the industry's goal is to create value together with other types of transportation.

The primary data seems to indicate that the actors in the shared mobility industry view cars as their primary competitor. Driving cars has for decades been the dominating transportation system, and still is. The firms in this study agree that they alone could not substitute car ownership. By applying the ecosystem view, one could describe the combination of competition and collaboration among suppliers, customers and complementors (Afuah, 2000). Finally, this view could help explain the degree to which these firms seem to step on each other toes.

7.3 Mobility Big Data as a Resources

Based on the analysis exploration of mobility big data I found that (i) mobility big data is of value (ii) quality big data is rare (iii) intangible big data is of value, is rare and could be non-imitable. I will here discuss how mobility big data can be valuable. After that, I will elaborate on the topic of quality big data. At the end of this chapter I will compare my finding with the research on IT resources.

The analysis highlights three areas where mobility big data creates value: Decision making, product development and, marketing. I will now address these.

Decision making. Mobility big data is helpful for decision making. Having access to more information, the skill and knowledge to act upon it, helps companies make better decisions. An example is cost-saving decisions, such as knowing when to order new vehicles. In the context of decision making, the data is also valuable for actors that do not themselves generate the data. Such actors could be the government. The data could be used in city planning. Data about movements, with regards to both where and how we move, is a valuable resource.

Product development. Mobility big data can help understand how to continuously improve the product. Data could be interpreted as feedback from the customer. If your product has several features, big data can help discover which features are used by the customer and which is not.

Marketing. Mobility data could include information about where people are heading. This data could be synthesized with other data and create a marketing strategy. Knowing that your one part of your customer segment always uses the vehicle to travel a certain place can help you better reach that customer segment when marketing.

7.3.1 The value of data

My analysis shows that there is difference in the quality of the data. From my analysis, quality data refers to big data that are complete and accurate. The three V's, volume, velocity and variety are no guarantee for completeness or accuracy. It this sense, quality refers to errors within the datasets and lack generalizability. Some of this could be a consequence of errors within the technology that create the data. Lack of generalizability probably has more to do with the customer segment using the different types of units.

Quality of data has been linked to have a positive effect on business value (Ji-fan Ren, Fosso Wamba, Akter, Dubey, & Childe, 2016). This is confirmed in this study. A consequence is that companies with access to quality big data could exploit this in a better way than other and thus create a temporary competitive advantage.

It is interesting to notice that no participating companies were a position where they thought they were the only company that had the given data. However this may be the case if a

company were better in analyzing data than the others. A big data monopoly would certainly be a source of competitive advantage.

Creating a lasting monopoly is close to impossible. It will always exist an alternative way to get the data. For example, regarding data about movement patterns. A micro mobility vehicle will certainly provide this, but so will a smartphone. In some cities, it might also be that the type of knowledge this data creates can be derived from a combinations of cameras.

Finally, there were no findings in my study indicating a direct relationship between big data and monetization. Maybe there is no market for mobility big data at the present time, but this could change in the future, and could be due to the quality of micro mobility data. Internationally, this is different (McKinsey & Company, 2019). This could be due to different privacy rules internationally or because the data from micro services is not good enough. A final theory could be that the market is not matured enough buy this type of data.

7.3.2 Big Data compared to IT-resources

The analysis shows that the tangible part of big data cannot be a source of competitive advantage. The intangible parts, however, could be a source of competitive advantage if exploited correctly, bundled with other resources. The other resources seem to be domain specific knowledge and skills. Additionally, my research suggests the value of mobility big data is enhanced when combined with other data. Some products also exist where the sole value is derived from big data.

From my analysis is it clear that the value of big data is mostly used for decision making. This is coherent with other research on IT (Constantiou & Kallinikos, 2015). The data is also used in order to improve product marketing, and in many parts it is essential to the service.

My analysis on intangible big data is coherent with previous research on IT-resources, which concludes that only intangible IT-resources could be a source of sustainable competitive advantage (Mata, Fuerst, & Barney, 1995). Further, my analysis also confirms that tangible big data is not immune to a duplication process which again is similar to IT-resources (Bharadwaj, 2000). Overall, my research suggests that that big data behaves similar to IT-resources when viewed through the lens of RBV.

The findings suggests that big data does play a major role as a part of a company's digital business strategy (Bharadwaj et al., 2013; Venkatraman, 1994). This is evident in the decision making phase as well as big data being a part of the value chain.

7.4 Other Views on Big Data

In order to explore the potential of mobility big data I applied the resource based view (RBV) and the VRIO framework. Some scholars have argued that RBV have limitations in fast-changing markets (Eisenhardt & Martin, 2000). The most common critique is that the view does not address environments with rapid technological changes. Dynamic capabilities is proposed to overcome the limitations (Teece, Pisano, & Shuen, 1997). Dynamic capabilities is an extension of RBV.

Dynamic capabilities helps firms adapt to high-velocity markets (Schilling, 2017). Dynamic capabilities are a "firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments" (Teece et al., 1997, p. 516). In a high-velocity markets there is no long-term sustained competitive advantage because the duration of an advantage is unpredictable (Eisenhardt & Martin, 2000). A consequence is that strategy should be a series of (temporary) competitive advantages.

My results suggest that the Shared-Micro-Mobility-Industry could be considered a high-velocity market. The analysis show blurred market boundaries, unclear business models and ambiguous market players, all which are characteristics of high-velocity markets (Eisenhardt & Martin, 2000)

In addition, my findings suggest that mobility big data is valuable for product development and decision making. These are skills which Eisenhardt (2000) consider to be important for dynamic capabilities. Therefore, studying mobility big data through the dynamic capabilities extension could help understanding how to effectively use mobility big data.

This study has not focused on the purpose of big data and its place within a business models. Future research on describing big data in greater detail, and draw from the increasing research on business models (Chesbrough & Rosenbloom, 2002; Osterwalder, 2010) .

7.5 Industry and Big Data.

The respective theoretical frameworks from the analysis complements each other (Peteraf & Barney, 2003). I will now try to address the overall role of mobility big data, for the future of the industry.

When the degree of rivalry increase, I believe mobility big data will be one of many strategic resources used in order to gain a competitive advantage. I have argued that mobility big data is of value when it comes to decision making, product development and marketing strategies. Additionally, controlling the data could be used in order to create alliances. For examples firms could give the data away for free, making other actors dependent on the stream of data. The challenges will be to do this without showing the company's strategic weaknesses. Such a strategy could effectively increase the barriers to entry.

If the industry is going to change rapidly in the future, and continue to be characterized as a high-velocity market, then continuous improvement of utilizing big data could be important. The analysis shows that mobility big data could be a source of temporary competitive advantage. By utilizing this, and creating a chain of temporary competitive advantages, mobility big data could potentially determine who "wins in this industry".

The study does not show how strategic measures in which big data could influence the industry forces.

7.5.1 Revisiting MaaS

From the perspective of MaaS, big data will be important and play several roles. The first role is clear, it will be important for integrating the different modules of transportation. In order for one mobility unit to communicate with another, it will need big data.

In a MaaS system it is also reasonable to presume that quality of data will be improved. The actors who then are the central of MaaS will therefore easily be able to hold their positions. This is under the assumptions that quality big data will be better. It is also clear that in a MaaS system, each dimension of the three V´s will be magnified.

The combined analysis shows that MaaS makes sense when looking at the industry forces, and at firm-level big data resources. That is not to conclude however, that MaaS solutions will be future of the industry, but it does make sense based on the cross-case analysis.

The discussion shows that in order to be a MaaS provider, a company will need economic power to overcome entry barriers, and need technological skills, in addition together skills, in order to work with big data, and be well organized. This is supported by other MaaS research (Aarhaug, 2017).

8. SUMMARY AND DISCUSSION

It`s not only only, but but

- Petter Solberg

This business research have explained how different forces shape the shared micro mobility industry and explored how mobility big data can be a source of competitive advantage. A multiple embedded case study was conducted.

The industry forces are described using porters five forces, and the exploration of mobility big data is done through the VRIO-framework. Six interviews were conducted for the analysis. The case was built by the analytic technique explanation building.

This was done in order to address the following research question:

How are different forces shaping the Shared-Micro-Mobility-Industry? And how can mobility big data be a source for competitive advantage for mobility firms?

8.1 Summary of Findings

This study is a multidisciplinary study, combining work from strategic management and information technology.

8.1.1 The shared micro mobility industry

In order to understand the shared micro mobility, Porters five forces was applied as an descriptive framework. The analysis shows that it has become easier to enter the industry, and that the supplier powers are weaker. The buyers hold more power in the industry, and the threat from substitutes is increasing. However, the degree of rivalry is at the moment not yet intense. As discussed, it is my belief that this could change.

8.1.2 Big data as a competitive advantage

In order to explore how mobility big data could be a source of competitive advantage, the VRIO-framework was applied. The analysis shows a distinction between tangible and intangible mobility big data.

Tangible mobility big data are the physical technology, infrastructure and applications utilizing the data. It also includes the actually data. The analysis shows that tangible mobility big data is not a source of competitive advantage. However, it does have value. This is true when data is applied in decision making, product development and marketing. The analysis further found that there exists a distinction between big data and quality big data. Where quality big data is considered a rare and valuable resource.

Intangible mobility big data are technical and managerial skills associated with big data, and are found valuable and rare. The analysis shows what intangible big data are sources of temporary competitive advantage. Further, the analysis also shows that intangible big data could be non-imitable and as a consequence, if the firm is organized to around the resource, it could be a source of sustained competitive advantage.

The analysis shows that in order for intangible mobility big data to be a source of competitive advantage it needs to be coupled with domain specific skills.

8.1.3 The future of Mobility

This study has addressed how the industry forces, and big data, could influence and shape the future of mobility. The discussion has primarily been set to the idea of Mobility as a Service (MaaS).

The discussion has been based on the industry forces and mobility big data. The discussion has showed that MaaS would be favorable and effectively decrease the industry forces. From a firm-level perspective, MaaS could improve the quality of data which is valuable and rare. In this sense, mobility big data could be a competitive advantage. However, it is still unsure if a competitive advantage based on mobility big data could be monetized.

8.2 Assessment of Quality

This study is empirical social research. Such research has been criticized for lack of quality (Yin, 2018). Several tactics exists for establishing research quality. I will now summarize some of the techniques used in order to address the concerns of research quality. Four tests

are commonly used to judge quality of empirical social research: Construct validity, internal validity, external validity and reliability (Yin, 2018). This can be viewed in table 7.

Quality Tests	**How the quality test was addresses in this study**
Construct validity	It is important to identify correct operational measures for what is being studied. I made sure to use multiple sources of evidence when conducting the analysis: six interviews, news clippings and external reports.
Internal validity	In order to establish a causal relationship of the topic I relied on an analytic technique named explanation building. When analysis and discussing I have tried to address the most plausible rival explanations.
External Validity	In order to make it possible to generalize the case study findings I relied on replication logic.
Reliability	In order to make sure that the operations of the study can be repeated I developed a case study protocol, maintained a chain of evidence and developed my case study database. Also, I did not rely on data from any social media.

Table 7: Tactics for establishing research design quality

8.3 Implications

8.3.1 Managerial implications

Managers in the shared micro mobility industry should look out for though times and intense rivalry. It will be vice to build competitive advantages on other resources than big data, or be careful in how they bundle the resources to create value. It could also be the case that mobility big data can be exploited as a temporary competitive advantage, but there is still a lot of uncertainty on how such a strategy would look like. Managers should do more than merely investing in big data.

8.3.3 Policy implications

The analyses showed that government policies greatly influence the industry. This is evident from when the authorities establish a contract with one firm. Throughout this study, I have

explained the implications of such a contract. More research could go into understanding the institutional forces influencing the mobility industry.

From a big data perspective, there can be noted that big data can be of value to the government. If the government possesses the big data, they could utilize it for better city planning and road management. From the authorities perspective it makes sense to create legislation secure that the mobility big data is shared with the government.

This study has also highlighted the role of public transportation. It has showed how mobility firms have defined themselves as complementors to these systems. Based on this analysis it is evident that the public transportation is important for the mobility industry.

8.4 Weakness and Limitations

This research is conduced as a multiple embedded case study. Primary data was gathered from six interviews, the analytic strategy was based developing a case description and the analytic technique used explanation building. I will now address how this has implications for this study, and alternative ways of conducting the resource.

8.4.1 Other research designs

This study is conducted as a multiple case study. I gathered data from multiple sources, but mainly from and about firms. This study found that the firms operating in this industry are very differently, with regards to history, economic power and culture. However, this study does not address the consequences of these differences. It could be that these differences hold information about how to build a competitive advantage.

Another research design would be a single-case design. Such a design could, for the exploratory part, better help understanding the different bundles resources that goes into a business process. My findings indicate that a successful exploitation of tangible and intangible big data, combined with domain specific skills could great a competitive advantage. With a single case design, the research could better understand how one firm bundle their resources. This would help understand what constitutes “domain specific”.

When addressing the micro mobility industry I chose to do an explanatory case study. Again I relied on the six interviews as primary data source. My analysis concluded that the industry could be on the verge of intense rivalry. In addition to this it detected certain important events, such as the city's contract with one provider. It is my belief that other types of studies could have understood the government's role in the micro mobility industry better. An approach would be to incorporate an archival analysis, focusing more on the impact of the government's choice. Another would be a single-case or multiple case-designs, focusing on *How the government influence the micro mobility industry.*

8.3.2 Primary Data

Primary data was gathered through the means of interviewing. The interviews were conducted face to face. Interviews are a common approach with qualitative research. When conducting qualitative research "the basic subject matter is no longer objective data to be quantified, but meaningful relations to be interpreted" (Kvale, 1996, p. 11). This does imply that the researcher's philosophical conceptions could influence the outcome of the study. There is also a question of reliability and validity when transcribing and conducting the interviews. The case study protocol can only help so much with this issue. The issue is more prominent with one research.

Other common types of primary data in business research are questionnaires and observations. Interviews were chosen because existing secondary data was not enough to interpret the contemporary topic of micro mobility. Questionnaires could have been suitable as another source of evidence. There exist several firms operating in the industry. They could have received a survey about the mobility big data usage and what they used the data for.

Observations would also have been a useful as a source of evidence, especially for understanding the value of data. We now know that big data is used in decision making. By including observations, the research could better understand under what conditions, and how, the data is used, when used for making decision.

8.4.3 Data analyses

The analytic strategy used in this stud was developing a case description. This was most natural since my study did not have fixed theoretical propositions. Yin (2018) describes two

other strategies: (1) relying on theoretical propositions, (2) Working your data from the "ground up". It would be possible to design the study so it would rely on theoretical propositions. The exploratory part of this study finds similar findings as other research on IT-resource. As a consequence, some propositions could have been made regarding mobility big data, based on what we know about IT-resources. Another example of a proposition could have been that the contract previously discussed. Working from the "ground up" would have been more reasonable if the study included more quantitative data.

Regarding analytic techniques, this study relied on explanation building. This was most relevant due to the explanatory nature of the research. Other techniques are, but not limited to, pattern matching, time-series analysis and logic models (Yin, 2018). Of these, pattern matching, a analytic technique where the researcher compare patterns from the findings with predicted before the data was collected (Yin, 2018), could be a rival technique. It would be interested to see if this technique would produce similar results.

Case studies are not suitable for statistical analyses. This influences on the reliability of the findings. Case studies seldom prove a hypothesis, but may create hypothesis and novel ideas.

8.5 Final Words

This study adds to the increasing literature on management information systems and is a novel contribution to the strategic management literature. The research explores big data in a domain-specific aspect within a business context. It is empirically and conducted as a case study. The research has explained how different industry forces shapes the Shared-Micro-Mobility-Industry and have explored ways in which mobility big data can be a source of competitive advantage. All of this will better help companies and researcher better understand how to create a digital business strategy.

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APPENDIX A. CASE STUDY PROTOCOL

The case study protocol is written with guidance from Yin (2018) and some modifications based on Kvale (1996).

THE CASE STUDY PROTOCOL

PURPOSE OF PROTOCOL

- Contains a set of substantive questions to be used in collecting evidence,
- This protocol also contains the procedures and general rules to be followed when using the protocol.
- Having a case study protocol is essential if conducting a multiple case study.
- The protocol is for data collection from a single case, and is not intended to serve the entire project

SECTION A: OVERVIEW OF THE CASE STUDY

Portions of section A is a statement about the case study that can be shared with anyone who may want to know about the case study.

The aim of the resource:

(i) Explain how shared micro mobility products and services influence the larger mobility industry.

(ii) Explore possibilities for sources of competitive advantage for the mobility industry.

(iii) Increase our understanding of big data as a valuable resource.

The objective of this study is:

(i) Explain the industry forces shape the micro mobility industry

(ii) Explore the potential for mobility big data as a potential for competitive advantage

This case study has no sponsors.

Research question:

How are different forces shaping the Shared-Micro-Mobility-Industry? And how can mobility big data be a source for competitive advantage for mobility firms?

Audience: The audience for this case study will be the sensor of which will grade it.

SECTION B: DATA COLLECTION PROCEDURE

The nature of the interview is open-ended. This section include explicit and well-planned field procedures, including guidelines for "coping" behaviors.

- How will access be gained:

  The first contact will most likely be by email or through linkedin.com. Emails will be collected from the internet or provided by people in my network.
- What resources is needed for the fieldwork:

  In order to carry out the research the following is required: (1) a recording device (2) a notebook (3) pen. If, for some reasons the interviewees would not like to be recorded the following is required: (1) A notebook (2) pen (3) I quite place to render notes privately
- This research is carried out by one person. In in the need of assistance, another student with the same supervisor would be called.
- Schedule for data collection activities:

  Interview are to be held from 20.03 and ending 16.04. The process of transcribing is to be finished one week after the last interview. Transcripts should be deleted by the end of summer.
- Unanticipated events:

  The routine for unanticipated events looks like this: (1) first speak to another student with same supervisor (2) get in touch with supervisor.

SECTION C: PROTOCOL QUESTIONS

Protocol questions are the heart of the protocol. The questions in this section are posed to the researcher. This section helps reminding the researcher of the data to be collected and why it is collected. This will keep the research on track as data collection proceeds and serves as a line of inquiry. **The questions posed here are level 2 questions**: questions about each case, which represent your line of inquiry. Level two questions are questions about to an individual about an organization. The questions proposed here should cater to the unit of analysis which is different that the unit of data collection.

List of level 2 questions (From an individual about an organization)**:**

How are different industry forces shaping the Shared-Micro-Mobility-Industry

- How is the current state of industry?
- How is the current state of the company?

- How aware is the company of what their peers are doing?

How can mobility big data be a source of competitive advantage:

- What is the attractiveness of big data as a revenue stream?
- How are the companies utilizing big data now?
- How can micro transportation integrate big data as part of their strategy?
- How are companies dealing with privacy issues in big data?

SECTION D: TENTATIVE OUTLINE FOR THE CASE STUDY REPORT

The protocol should contain an initial outline of the case study report.

- **Audience:** This is a thesis written in order to receive a decent grade.
- **Journal:** No journal for this thesis
- **Outline:** (1) introduction (2) Theoretical framework (3) literature review (4) methodology (5) data analysis (6) results and analysis (7) summary and discussion

APPENDIX B: INTERVIEW QUESTIONS

All interviews were conducted in Norwegian. Therefore, I have included the Norwegian questions first. After the Norwegian questions and English translation follows.

The interview questions are dividing into two parts, one addressing the industry and second big data. This divide is shown here in the appendix. During the interview However, the divide is less clear, due to the interview being semi-structured.

B.1 Questions in Norwegian

Here are the questions in Norwegian.

B.1.1 Questions about industry.

- Kunne du startet med å fortelle meg kort om selskapet du jobber og din rolle?
- Hvordan vil du beskrive produktet/tjenesten dere produsere?
- Hva er mulige konkurrent og substitutt produkter/tjenester
- Hvordan vil du beskrive hva som skjer i mobilitet industrien i dag?
- Hvordan vil du beskrive utfordringene industrien står ovenfor?
- Hvorfor tror du at vi nå ser flere microtransport kjøretøy i Oslo?
- Hvilke forretningsutfordringer står selskapet ovenfor?

B.1.2 Questions about mobility data

- Hvordan vil du beskrive IT sin innflytelse på industrien?
- Har store datamengder hatt innflytelse på industrien?
- Hvordan ser dere på store datamengder i deres selskap?
- Hvordan kan man gjøre utnytte store datamengder for å bli en del av inntektsstrømmen til selskapet? Er det noen utfordringer knyttet til dette?
- Er det noen spesiell type data ditt selskap kunne trengt for å bli mer konkurransedyktige?
- Har du noen tanker om hvordan microtransport selskaper kan tjene penger på store datamengder?
- Hvordan tror du store datamengder kan skape et bærekraftig konkurransefortrinn?
- Er det noen utfordringer knyttet til personvern og store datamengder?

B.1 Questions in English

Here are the questions in English. The questions are translated based on the Norwegian questions.

B.1.1 Questions about industry.

- Could you start telling me about the company you work for, and your role in the company?
- How would describe your product/service?
- Who/what are your competitors and substitutes?
- How would you describe the challenges the industry is facing?
- Why do you think we now are seeing more micro mobility solutions in Oslo?
- What kind of business challenges are your company facing?

B.1.2 Questions about mobility data

- How would you describe IT and its influence on the industry?
- How would you describe big data and its influence on the industry
- Is your company utilizing big data?
- How do you believe one could make big data a part of the revenue stream? What are the challenges associated with doing this?
- Is there any special type of data your company could need in order to be more competitive?
- Do you have any idea on how micro mobility firms can monetize big data?
- How do you think big data can be a competitive advantage?