

# Chances and Challenges of New Mobility Services and Future Implications of Aerial Taxis

## **Bachelorarbeit**

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## 1. Introduction

The transport and mobility of people has always fascinated mankind. From early days air balloons and aims to fly to the shift from horses to the automobile, there have been many developments in the mobility sector as illustrated in Figure 1.

During the 19<sup>th</sup> century and the industrial era, especially railways have made it possible to transport people over long distances in a relatively short amount of time.

Next, in the 20<sup>th</sup> century mass production made it possible for many to afford their own car and to travel long distances independently.

Through the arrival of the information era, many new possibilities have arised in the mobility sector. It is now possible to connect the need of many consumers and bundle different desires and especially mobility options.

New services such as Ridehailing, Bikesharing, Carsharing and more have since been made possible. Especially the vision of “flying-cars”, gaining popularity in the 1985 movie “Back to the future” is set to become reality in the form of electric Vertical Take-off and Landing (VTOL) aircraft, conducting Aerial Taxi services, in a few years. Moreover, societal changes, the urbanization and globalization are affecting the way we consume and the ways and means we make use of the mobility sector.

The chances, challenges, advantages and disadvantages of these new services are regarded and discussed in this paper.

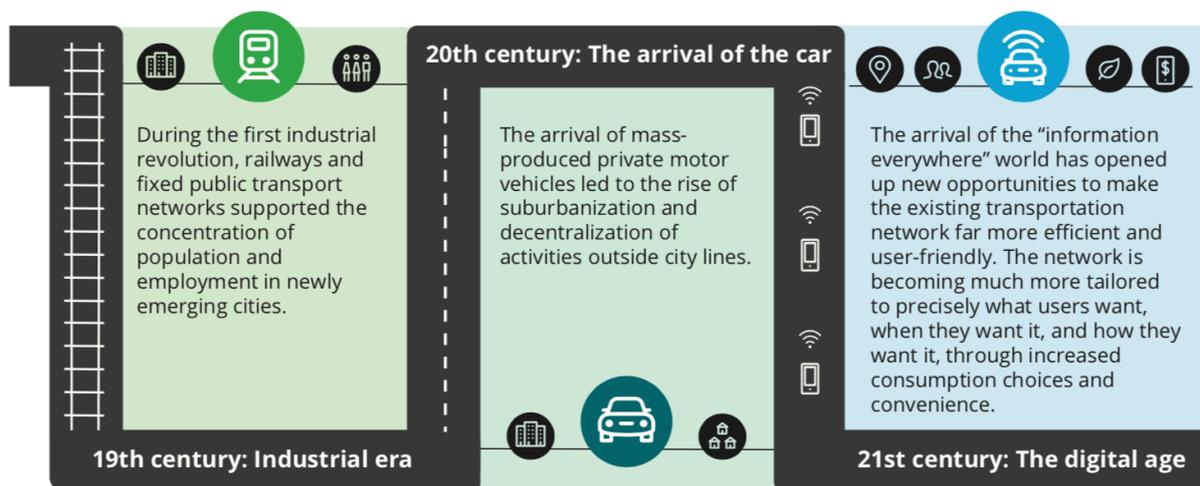


Figure 1: The development of transportation through the centuries. Source: Goodall et al. (2017)

## 1.1. Relevance and Motivation

In the last years and decades many cities have seen the emergence and development of New Mobility Services (NMS) such as Ridehailing, Ridesharing, Car- and Bikesharing. Consequently, a variety of cities fancy the thought of integrating Aerial Taxis to face today's mobility challenges.

Today, many city dwellers spend many hours in traffic jams. For instance, a Los Angeles inhabitant loses about 102 hours each year being stuck in traffic jams, with rates being comparably high in New York with 91 hours and Sao Paulo with 86 hours, costing each economy a high amount of money. (Grandl et al: 2018)

The aim and idea of Aerial Taxis is to mitigate the existing problems that city inhabitants have to face concerning the mobility sector within cities.

A high level of pollution, high traffic and congestion, health threats as well as long commuting times are the most important current challenges.

It is expected, that by 2050 about 70% of the World's Population will live in cities, compared to around 30% in 1970 and 54% in 2014. (Goodall et al.: 2017)

Especially with that background it is important to implement concepts and measures that make the mobility sector efficient, comfortable, fast and reliable.

Today many cities face overcrowded streets and also see a daily "fight" between the different means of transport, for example between bike riders and car drivers.

Hence, New Mobility Services aim to mitigate and solve some of the problems.

This paper outlines the different chances and challenges that come along with the New Mobility Services.

## 1.2. Structure of the Thesis

First, a definition about New Mobility Services is given to understand the term of New Mobility Services. This part is followed by the requirements, push-forces and the recent fast-moving development of New Mobility Services in the different sectors.

A consideration of selected services is given regarding the impact of each service in the city. Advantages and disadvantages are regarded and described.

Afterwards electrical VTOL aircrafts are regarded. After an introduction of the emergence and concept of VTOL aircrafts, they are deeply analysed.

With the help of the PESTEL methodology the analysis is divided into the following areas: politics, economic, socio-cultural, technology, environment and law. The political section especially deals with policies and views of the political stakeholder towards VTOL aircraft and needed work. The economical section deals with costs of

the vehicles and the operation while the socio-cultural sphere regards the acceptance of inhabitants towards possible VTOL operation. Additionally, the technological section deals with current possibilities of VTOL aircraft but especially addresses the barriers that need to be tackled. Ending the PESTEL-analysis, the environmental impact of VTOL aircraft is investigated, followed by legal considerations that have been taken and need to be taken in the future.

## 2. New Mobility Services

### 2.1. Definition New Mobility Services

In the last decades, the mobility sector has undergone constant change and old patterns have undergone disruptive change. There has been a trend emerging with people using the so-called “New Mobility Services” (NMS).

Spulber et al. (2016) define New Mobility Services as followed:

*„New mobility services are transportation solutions enabled by emerging technologies and wireless connectivity that allow for more convenient, efficient, and flexible travel.“*

Moreover, they state, which business models are among the new services and currently get the most attention:

*„Carsharing, ridehailing, ridesharing, microtransit, bikesharing, and mobility-as-a-service are among the most noteworthy new mobility services currently being developed. Each has its own business model and underlying service characteristics.“*

Regarding to that definition, NMS “just” describe the emergence and development of new transportation modes, that have not been available in the past.

That means transportation of people and/or goods, aside from the “classical” transportation in a personal car.

Consequently, the above-mentioned services are not limited to them. It is possible, that in the coming years and decades further services or adaptations of the prevailing services do occur.

Even though, Carsharing and especially Bikesharing have been present in a wide variety of cities around the world for many years. For example, the first-generation of Bikesharing has appeared in the 1960s in Amsterdam. (Cohen&Kietzmann: 2014)

Some form of Carsharing has existed, for example when two colleagues of one company used the same car to get to their workplace.

Consequently, the scientific results of this part are mainly based on publications from various VTOL aircraft stakeholders including online media sources and consulting companies having made research on the topic.

Additionally, the impact of New Mobility Services regarding additional traffic that might occur might not be accurate. Mostly it is regarded what impact one service might have, but not the combination of various services together, for example Ridehailing and Bikesharing. Results might differ when taking a further mix of services into consideration. Mobility-as-a-Service apps can stand as a basepoint when taking a look on intermodal travel and conducting studies for intermodal travel and the combination of several transport options.

Because of the scope of this work, the very recent emergence of micro mobility and e-scooters was not regarded.

Moreover, the different areas have only been touched and more research regarding the, for example impact of New Mobility Services concerning the reduction of traffic, could have been conducted. In terms of environmental sustainability, one possible concept of VTOL aircraft was regarded, different concepts might have a slightly better or worse impact in terms of CO<sub>2</sub> emissions.

In a future work more research could include a qualitative study for the impact of one or more New Mobility Services.

Once operation starts, supporting studies regarding the impact of VTOL aircraft services should be conducted to identify impacts and possible improvements.

However, it is yet not 100% sure, that operation will start in the next decade or if further obstacles and challenges might occur that have not yet been regarded, kneecapping the vision of intracity VTOL aircraft operation.

## 6. Conclusion

New Mobility Services provide a huge win in comfort and convenience for its consumers and therefore city residents. The emergence of ICT, the existence of mobile applications, the ubiquitous availability of the mobile internet and changed consumer perceptions lead to the existence and wide use of the New Mobility Services.

Customers can choose the option that fits best to them and have a variety of options besides the “typical” modes of transportation by car, bike, public transport or walking. Moreover, in some cities, consumers can even combine different modes of transport in one app with the availability of new Mobility-as-a-Service apps and pay every service using only one single account.

Some services such as Bikesharing or Carsharing are likely to reduce car traffic within a city while others, especially Ridehailing services are adding traffic to city streets especially because of new trips that are taken because of the availability of the service.

People living in sub- and exurbs however, do not have the same availability of these services as the operation is only profitable in densely populated areas.

Aerial Taxi services are set to add an environmentally friendly service to the NMS sphere and aim to bring additional comfort and mitigate city street traffic by transferring a part of the traffic from the streets up in the air.

Travel times especially for routes being longer than 15-20Km or even shorter are set to decrease significantly while paying a price close to a taxi rate in the mid- and long term.

Many high-valued companies such as Uber, Embraer and Airbus are working on electrical VTOL aircraft to start commercial services in the mid 2020s.

First test flights have been successful, even though several challenges have to be tackled before the operation can start.

Regulation, certification and technological challenges represent the main current obstacles that need to be overcome. However, the companies have clear ideas of how to solve these issues.

As the technological development is typically quicker than the development of legal questions, stakeholders must focus to have support from the political side as well as from the major certification authorities. Luckily, the various companies are aware of these circumstances and work closely together with authorities and political stakeholders.

Once these challenges are tackled, chances are high that operation of VTOL aircraft will bring a benefit to the cities. Moreover, the new market segment will be worth many billions of Dollars and will produce additional economic value in cities.

So, fasten your seat belt and get ready for the future of mobility.