UHASSELT

KNOWLEDGE IN ACTION

School of Transportation Sciences

Master of Transportation Sciences

Master's thesis

The development of a Mobility-as-a-Service (MaaS) app platform for tourists arriving at Brussels city. A Business Plan approach

Erick David Ovares Fallas

Thesis presented in fulfillment of the requirements for the degree of Master of Transportation Sciences, specialization Mobility Management

SUPERVISOR :
Prof. dr. Davy JANSSENS

MENTOR :
De heer Hafiz Muhammad Ahsan IQBAL

CO-SUPERVISOR :
Prof. dr. ir. Ansar-Ul-Haque YASAR

2019
2020

UHASSELT
KNOWLEDGE IN ACTION

www.uhasselt.be
Universiteit Hasselt
Campus Hasselt:
Martelarenlaan 42 | 3500 Hasselt
Campus Diepenbeek:
Agoralaan Gebouw D | 3590 Diepenbeek

UHASSELT

KNOWLEDGE IN ACTION

School of Transportation Sciences

Master of Transportation Sciences

Master's thesis

The development of a Mobility-as-a-Service (MaaS) app platform for tourists arriving at Brussels city. A Business Plan approach

Erick David Ovares Fallas

Thesis presented in fulfillment of the requirements for the degree of Master of Transportation Sciences, specialization Mobility Management

SUPERVISOR :

Prof. dr. Davy JANSSENS

CO-SUPERVISOR :

Prof. dr. ir. Ansar-Ul-Haque YASAR

MENTOR :

De heer Hafiz Muhammad Ahsan IQBAL

Master Thesis

HASSELT UNIVERSITY- BELGIUM
TRANSPORTATION SCIENCES

TOPIC
The development of a Mobility-as-a-Service (MaaS) app platform for tourists arriving at Brussels city.
A Business Plan approach.

AUTHOR
Erick David Ovares Fallas
- 1849540

OBJECTIVE
Thesis presented in fulfillment of the requirements for the degree of Master of Transportation Sciences, specialization in Mobility Management

SUPERVISOR TEAM
Supervisor: Prof. dr. Davy Janssens
Co-supervisor: Prof. dr. Yasar Ansar
Mentor: Ahsan Iqbal

DATE
June 2020. Hasselt, Belgium

UHASSELT

PREFACE

Urban mobility is constantly experiencing new transport solutions and services that are challenging the way we travel inside the city. The concept of Mobility as a Service (MaaS) is quickly shaping the way we manage passenger transport in Europe because it brings the possibility to aggregate all mobility providers offerings into a single digital platform. This is remarkable because not only gives a new breath for technological innovation in an already slow and rigid industry, but also because puts the passenger as the center of the system and empowers the user with more accurate information to decide the best way to travel.

This paper will propose a business plan that convinces investors and partners that launching a tourist MaaS provider in Brussels is profitable, scalable and feasible. This paper provides empirical evidence of an unexplored MaaS city (Brussels) that has different characteristics that the previously researched ones. It conducts research on the specific systematic enablers and barriers of MaaS in Brussels. Therefore, while most of the experiments have targeted residents and commuters, this master thesis targets the unexplored tourist target audience via surveys in the main arrival's hubs and in depth-interviews with the key stakeholders in Brussels.

This document represents my master thesis project, part of the Master of Transportation Sciences with specialization in Mobility Management from the University of Hasselt, Belgium. It collects two years of hard work, mobility knowledge and "learning by doing" efforts.

First, I would like to thank God, my parents and my family, who supported my studies and always motivates me to accomplish everything that makes me happy. I would like to thank my friend and colleague Darah Leonel for her initial support on the business plan, feedback and passion for MaaS. Big thanks to Piia Karjalainen for her MaaS guidance and coaching, the best manager I ever had. Finally, I would like to thank all the UHasselt staff involved in my master thesis for their guidance, feedback and decisions: Prof. Davy Janssens, Prof. Yasar Ansar, my thesis mentor Ahsan Iqbal, Prof. An Neven and Nadine Smeyers. The intention of this master thesis is to create a future start-up company that can be built with the insights of this proposed business plan.

DISCLAIMER

This master thesis was written during the COVID-19 crisis in 2020. This global health crisis has had an impact on the writing process, the research activities and the research results that are at the basis of this thesis because:

A market survey was forced to be cancelled due to COVID-19 crisis since it was unfeasible and forbidden to survey tourists during closed borders, travel ban, social distance and lockdown measures.

However, the fact of staying at home helped me to focus more and bring the best quality in my research, interview the stakeholders virtually, have enough time to reflect on the future of MaaS and came up with a more resilient business plan.

SUMMARY

This thesis aims to explore the business opportunity of launching a Mobility-as-a-Service (MaaS) platform for tourists in Brussels so they can route-plan, book tickets and explore touristic deals in the same platform. In Chapter 1 , the reader will find an introduction with problem statement, justification, hypothesis, research questions and scope. In Chapter 2, the reader will find a review in the literature related to MaaS concept, Brussels tourism and mobility service providers current initiatives related to MaaS. Also, a review of the MaaS core stakeholders and the main MaaS platform features that should be provided. Then, in Chapter 3 there is an explanation of data collection plan from surveys to tourists in main Brussels arrival hubs, interviews to key stakeholders and the elaboration of a lean start up Business Plan. Chapter 4 contains the main results from costumer and industry feedback that helps, in Chapter 5, to build a lean startup business plan to create SNEL app, the first tourist MaaS operator in Brussels. Finally, in Chapter 6 the reader will find a section with conclusions and recommendations. In conclusion, the business plan proposed here confirms that is indeed feasible to build a Tourist MaaS operator, but it could not be profitable until the 3 year of operations and only internationally scalable until roaming or MaaS standardization is in place.

TABLE OF CONTENTS

FIGURES

TABLES

CHAPTER 1

INTRODUCTION

1.1. PROBLEM STATEMENT

Urban mobility is a big challenge for tourists every time they arrive to an unknown city. Travelling to their accommodation and touristic attractions is quite difficult because route planning and ticketing is not connected in a single platform that integrates all mobility operators. This situation is important for tourist because transport information and road signs might be in a language that they might not understand and could frustrate their end-to-end travel experience. Additionally, some cities don't provide a list of the mobility operators deals where tourists can compare among their ticket prices, their real time location and availability of those transport modes. Perhaps, leader route-planners like Google Maps or Waze are being helping them in their urban mobility, but these platforms due to their global scope they don't offer an efficient booking service across modes, where you can book and pay single tickets on bikes, electric scooters, public transport, taxis and car sharing services in the same platform. Additionally, there is not much information of how tourists travel around Brussels. For example, Brussels Airport Zaventem provides statistics of the modes of transport that arrival passengers are taking once they move away from the airport, but then there is minimum data about usage and split of modes of transport, travel time, travel subscriptions, main origins and destinations taken by international tourist afterwards. (BZA,2019). It is important to address this problem because the combination of a good digital connectivity and efficient intermodal transport infrastructure is a key factor for the city's attractiveness for tourists.

Therefore, in times where, transport digitalization is shaping the way we route-plan, choose, and book our trips through smartphone apps and websites, trends like Mobility-as-a-Service (MaaS) offer business and leisure tourists the possibility to move inside the city without the need of owning a car. This thesis will contribute in the literature about MaaS by developing a business plan that justifies the market launch for a solution for tourists called "SNEL" app platform which intends to be an alternative to Google Maps but targeting the urban mobility of tourists. This platform offers a route-plan and booking service for tourists who want to book tickets in Brussels public and shared transportation as fast and easy as possible.

1.2. MISSION

The aim of this thesis is to provide a business plan that convinces about the opportunity of launching a Mobility-as-a-Service (MaaS) app platform for tourists in Brussels.

1.3. OBJECTIVES

1. To apply the main components of Mobility-as-a-Service (MaaS) through effective platform features that make tourists route plan, book tickets and navigate in a simple and user-friendly way.
2. To understand the interest of mobility services providers to partner with new MaaS solutions
3. To understand the key components and steps needed to build up a Tourist MaaS Operator.

1.4 HYPOTHESIS

- *If tourists in Brussels are willing to use a tailored platform where they route search and book their combined modes of transport, then investors and mobility service providers (MSPs) will collaborate in the development of a MaaS solution for tourists.*

1.5 RESEARCH QUESTIONS

1. What are the main MaaS features that should be included in the design of an MaaS app platform to give added value to tourists?
2. According to core MaaS stakeholders, what are the key enablers and barriers that should be addressed to partner with a Tourist MaaS operator in Brussels?
3. What is the business plan that a Tourist MaaS operator should implement to compete with larger MaaS operators in Brussels?

1.6 JUSTIFICATION

This thesis aims to analyse the business opportunity of launching a Mobility-as-a-Service (MaaS) platform for tourists in Brussels so they can route-plan, book tickets and explore touristic deals in the same platform. MaaS brings the user at the center of the transport system, therefore if we locate the tourist at the center of MaaS then this opens new possibilities for MaaS deployment and that is what we pretend to contribute within this master thesis. A platform in which an integrator brings together offerings of multiple mobility service providers and provides end-users access to them through a digital interface, allowing them to seamlessly plan and pay for mobility for tourists. (Matyas & Kamargiani, 2018).” According to Brussels Airport Report (2018) there was 12.8 million passenger arrivals at Brussels Airport Zaventem. However, there is not that much available data of tourist travel behaviour once they arrive in Brussels airport. Therefore, it is interesting to explore the possibility of tourist behavior: what modes they use, what routes they take, how much they travel in average in public transport, etc. For the Brussels study case, in terms of reason of arrival, 51% are business arrivals and 49% are leisure arrivals with an average of 2 nights of stay. (Detemmerrman et al. 2019). The offer of urban transport packages targeting tourists is very limited. The best approach so far is done by the Brussels City Card, which includes urban transport access that goes from 24, 48 to 72 hours of stay (Detemmerrman et al. 2019). Nevertheless, the Brussels Card doesn’t offer a route planning tool to guide tourists about how they can arrive to their attractions. The website links their travel suggestions to routing in Google Maps, but this platform is not connected to the Brussels Card deals which proves that it doesn’t solve the end-to-end experience of the tourists. In summary, products like the Brussels Card are performing in ticketing and Google Maps in routing, but they are not connected. Therefore, “SNEL” platform is proposed as a convenient seamless travel platform because it promises ticketing and route planning in the same place for the tourist market.

1.7 CONTRIBUTION TO THE MAAS STATE-OF-THE-ART

This master thesis contributes in the MaaS state-of-the-art by:

- Providing empirical evidence of an unexplored MaaS city (Brussels) that has different characteristics that the previously researched ones. It conducts research on the specific systematic enablers and barriers of MaaS in Brussels.

- Also, while most of the experiments have targeted residents and commuters, this master thesis targets the unexplored tourist target audience via surveys in the main arrival's hubs and in dept interviews with key MaaS players in Brussels .
- Additionally, this master thesis contributes by developing a lean start up business plan using the business model canvas (BMC) components to consider the full potential of a Tourist MaaS operator. A generic MaaS BMC for tourist that can be flexible and adaptable to use in other touristic cities in Europe.

1.8 SCOPE OF THE STUDY

Leisure, business and national tourists visiting Brussels that are willing to use a one-stop shop mobility platform to route search and book tickets from the Brussels public and shared transportation offering.

1.9 LIMITATIONS & TIMEFRAME

A solid business plan will be the core of this Master Thesis, with the intention to justify SNEL app platform. This platform could not be developed now because of the following limitations.

- **Resources limitation:** only to build a proper beta version for smartphone app requires more than 20 000 euros, the operator partnerships in advance and extra IT development integration. Also, after test and validation phase, launching a full version on IOS and Android operative systems could cost around 20 000 euros more. Those kind of resources that are not available now.
- **Time limitation:** This thesis is intended to be delivered on June 2020, so launching a full version app during the academic year is quite challenging since it usually requires more than 6 months of full-time development until is launched in the market.

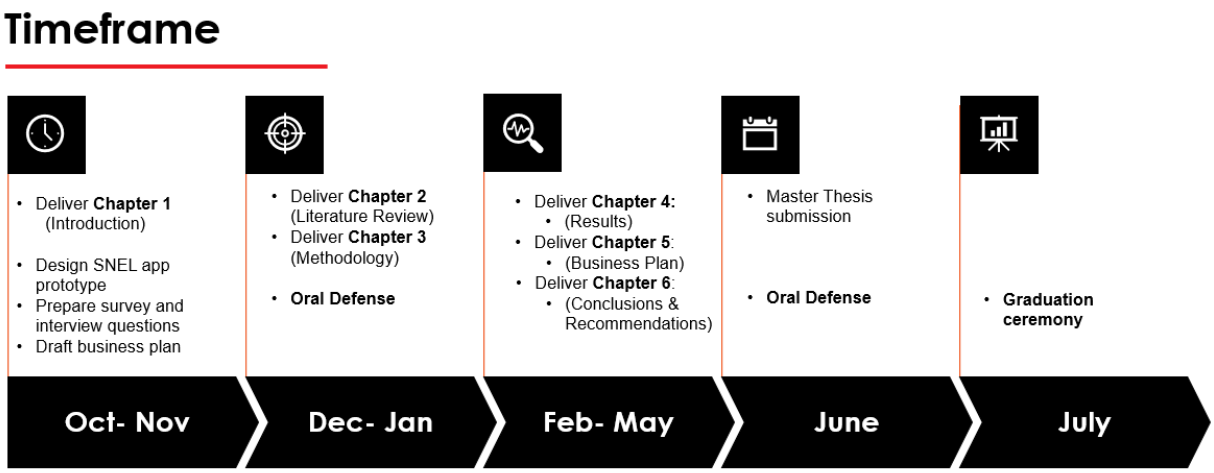


Figure 1 – Timeframe and planning of the research

CHAPTER 2

LITERATURE REVIEW

In this chapter, that reader will find six main components that contributes to the state -of-art of MaaS and specifically the MaaS literature with a tourist approach. First, there is a discussion around the definition of MaaS brought by NGOs, academics and industry groups. Secondly, an overview of the tourist market in Brussels, its dynamics and how a MaaS provider can target tourists according to the MaaS initiatives of Brussels main mobility service providers (MSP). Third, a table that summarizes what has been researched over the responsibilities of each stakeholder to enable a MaaS ecosystem, narrowed to the key stakeholders needed for the business plan proposed in this master thesis. Fourth, a literature review deciding what platforms, features and design are necessary in order to deploy a MaaS platform for tourists. Fifth, a literature review of the Business Model Canvas methodology as a preparation of a further business plan in terms of the necessary information, content and analysis related to further marketing, operational, financial and management plans. Finally, the reader will find literature limitations, thesis contributions to the state-of-art and some final remarks of the MaaS literature around the tourist market.

2.1 MAAS, BRUSSELS TOURISM & MSP INITIATIVES

In the recent years, the urban mobility field has experienced the evolution of new transport solutions and services that are challenging the way we travel inside the city. The concept of Mobility as a Service (MaaS) is quickly shaping the way we manage passenger transport in Europe because it brings the possibility to aggregate all mobility providers offerings into a single digital platform (Matyas, 2018) This is remarkable because not only gives a new breath for technological innovation in an already slow and rigid industry, but also because puts the passenger as the center of the system and empowers the user with more accurate information to decide the best way to travel.

2.1.1 DEFINITIONS OF MAAS

During the past 8 years, the MaaS concept has experienced an evolution process in its definition. NGOs agencies, academics and industry groups are mainly the stakeholders who contributes the most in the discussion of the MaaS concept. For example, agencies like the International Association of Public Transport-UITP (2019) defines MaaS as “the integration and access to different transport services (such as public transport, ride-sharing, car-sharing, bike-sharing, scooter-sharing, taxi, car rental, ride-hailing and so on) in one single digital mobility offer, with active mobility and an efficient public transport system as its basis”. Another agency called MaaS Alliance agrees that MaaS is an integration of various forms of transport services into a single mobility service, but accessible on demand. (Maas Alliance, 2019)

From the industry, the so-called father of MaaS concept and CEO of MaaS Global, Sampo Hietanen, defined MaaS in 2014 as “the combination of different transportation modes to offer a personalized mobility package to the end user, where complementary services such as journey planning, reservation and payments are offered through a single platform interface (Hietanen, 2014).

From the academic side, Romanyuk (2018) studied that “Finland is a successful MaaS case because during the past 30 years, the country has been part of different EU-level transportation system transformation projects. Nevertheless, earlier trials to introduce a MaaS-like system into the Finnish

market failed, mostly because the real demand and need from customer side did not existed and service coverage was too narrow". This explains why it took so many years for MaaS Global to deploy Whim app in Helsinki in 2015: the first MaaS platform in the world. But nowadays, with a more robust sharing economy, a more mature millennial generation and a more developed high-end technology, the transformation is ready to kick-off, the opportunity has emerged, and countries and cities may pursue the development of this new disruptive model.

2.1.2 THE AIM OF MAAS

The major aim of MaaS is providing seamless urban mobility by overcoming the mismatch between the way in which customers approach trips – as single, end-to-end journeys – and the way in which transport authorities plan and allocate resources to various networks and provide tailor-made offerings to the community. (OECD, 2016)

Seamless travel is getting from location A to location B without actual or perceived physical hindrance to interchange between vehicles or between modes (European Commission's Directorate-General for Mobility and Transport, 2012) An study from the OECD (2016) defines seamless ticketing when travelling on two or more modes of transport is performed with a single integrated ticket (rail – bus; bike-rail) because the more seamless the intermodal connections, the less congestion and stress there will be on any individual component. (OECD, 2016). Providing seamless transport experience is more a function of adapting infrastructure, operations, fare structures, payment systems and providing the necessary information to deliver a more convenient travel experience. (OECD, 2016).

As public transport is the "backbone" of MaaS seamless travel, Wardman (2014) states six factors that must be minimized to guarantee convenience and seamlessness for the multimodal public transport systems, which are:

1. Reducing walking time at any stage of the journey
2. Reducing waiting time, including time spent transferring between services and modes
3. Reducing being bound to scheduled/limited services
4. Reducing transfers within or between modes
5. Reducing variability in travel time
6. Reducing lack of relevant information
7. Reducing crowding.

Another aim of MaaS is to enable easy mobility without the need of owning a car but including the benefits of what owning a car means (UITP, 2019). The head of MaaSLab - Energy Institute in London, Maria Kamargianni states that "the notion behind MaaS is that citizens will not give up private cars as their preferred mode of transportation unless and until we give them a service that provides the benefits of convenience, reliability and low costs, whilst weaving together mobility service operators into one seamless service"(UITP, 2019).

MaaS value proposition

The value proposition of MaaS is designed in such a way so that all available modes:

- from privately-owned and shared (car-sharing, bike sharing, scooter sharing)
- rented vehicles to public transport modes (buses, trams, metros and trains)
- taxis (including ride hailing services such as Uber and Lyft) and

- transport infrastructure (i.e. parking places, etc.)

are integrated under a single platform for booking, trip planning, ticketing and payment. Depending on the availability of the different transport modes, MaaS may cover different trip types such as urban, suburban, interurban or cross-border. (Polydoropoulou, et al.2019)

2.1.3 LINK BETWEEN MAAS AND TOURISTS

MaaS is a concept that have been mainly targeted to commuters as their favorite market, which already is a broad approach to materialize MaaS in the community. As we experiment and enter new markets within MaaS we can explore tourists' urban travelers as an interesting niche that could kick-off MaaS into new levels of development. In general, transport is a key enabler of tourism by moving tourists from their place of residence/arrival to their final destination and on to various attractions, accommodations, commercial services, etc. Factors like location, capacity, efficiency and connectivity of transport play a vital role in how a destination physically develops, influence the mobility of visitors and enhances the tourist experience within the destinations (OECD, 2016). Enabling MaaS to guarantee seamless travel for tourists is important not only because enhances the visitor experience on a city and national level, but also because it could be a potential profitable business opportunity for the creation of a Tourist MaaS operator.

Therefore, this master thesis will focus on Brussels city for two reasons:

1. Brussels Capital Region has the highest level of tourist activity and arrivals in Belgium. (WTTC, 2018)

2. Brussels Capital Region is a good MaaS lab to experiment and proof scale-up opportunities to launch extra Tourist MaaS operator in other touristic capitals in Europe as it is known that MaaS grows faster when it targets cities with intense economic activity (i.e Helsinki case).

The following subsections presents and overview of the national tourist industry in order to explore the potential of the market for this proposed tourist MaaS app platform in Brussels.

2.1.4 TRENDS OF BELGIUM TOURIST MARKET

- In terms of GDP, the sector of tourism and travel contributes in 5.3% to the Belgium GDP, this means around 24.9 billion euros was inserted in Belgian economy due tourism, a growth of 6.66% with respect to the year before. (WTTC, 2018)
- Is expected that by 2028, Belgium receives 32.2 billion euros by contribution of Tourism and Travel. (WTTC, 2018)
- Belgium accounted 10 billion euros in terms of tourist's direct expenditure in goods and services. (WTTC, 2018)
- In terms of direct employment due to tourism, Belgium accounted 113 000 employment positions in 2017. There were around 1000 travel agencies operating in Belgium. (WTTC, 2018)
- In terms on how much Belgians spend inside Belgium for tourist activities, domestic tourism expenditure accounted 8.2 billion euros. (WTTC, 2018)

2.1.5 TRENDS OF BRUSSELS TOURIST MARKET

- In terms of the most visited cities in Europe, Brussels is ranked 17th according the total number of overnights stays (European cities Marketing, 2019), with more than 7,36 million overnight stays in 2018, a growth of 10% in comparison to 2017. London, Paris and Berlin are the most touristic cities (Visit.brussels, 2018).
- In terms of main arrival hubs of Brussels (for tourist and residents) :
    - **By Air**
        - Brussels Airport Zaventem receives 12.8 million passengers and ranked 24th busiest airport in Europe (BZA, 2019)
        - Brussels South Charleroi Airport receives 0.4 million passengers and ranked 64th busiest airport in Europe (BSCA, 2019)
    - **By Train**
        - Brussels-Midi Train station receives 2.2 million Thalys Train passengers (Visit.brussels, 2018). Transit passengers are not included in this study since they will not require Brussels urban mobility
    - **By coach long distance**
        - Brussels Gare du Nord and Brussels Gare du Midi are the main bus stations (Bruxelles Mobilité, 2016) but data of arrivals from main operators (Flixbus and BlaBlabus) are not openly shared.
- In terms of arrivals for tourist purpose inside the city, there were 3,91 million visitors that arrived at Brussels in 2018, an increase of 9% from 2017. (Visit.brussels, 2018).
- In terms of accommodation, there are 394 tourist hotels and more than 100 Airbnb private rentals spread all over Brussels. Overall in the year of 2018, the occupancy rate was 74.7% with an average price per 3-star hotel room of 117 euros per night. October has the highest occupancy rate and August has the lowest. The neighborhoods of Grand Place (79.6%) and Midi Lemonnier (79.1%) have the highest occupancy rate. (Visit.brussels, 2019). Brussels (54%) and Saint Gilles (13%) communes are the geographical locations where tourist stay the most because is the location of the highest number of accommodation. (Visit.brussels, 2018).
- In terms of tourist profile:
    - 54% of passengers are men and 46% are women (BZA, 2019)
    - The average passenger profile is 41.8 years old (BZA, 2019).
    - 54% of passengers travel alone, 32% with 1 travel partner and 13% in group (BZA, 2019)
    - There are six nationalities that concentrate more than 50% of all overnight stays in Brussels. These are citizens from Belgium (21%), France (11%), Spain (7%), United Kingdom (7%), USA (7%) and Germany (6%). (Visit.brussels, 2019).
- In terms of reason of stay, 51% of arrivals are for business purposes and 49% for leisure purposes. From the above nationalities, here is the share for business and for leisure, respectively: Belgium (54% | 46%), France (47% | 53%), Spain (38% | 62%), United Kingdom (50% | 50%), United States (57% | 43%), Germany (54% | 46%). (Visit.brussels, 2019).
- In terms of tourist destinations, Brussels commune is the location of 56% of all events and concerts and music (24%) are the most present events in Brussels cultural agenda. . (BISA, 2018).The following table shows the more visited touristic attractions and organized events

in Brussels, this useful for the business plan to target promotion strategies towards those tourist locations

TOP 15 MUSEUMS AND ATTRACTIONS IN 2016

400,000-500,000 visitors
Royal Museums of Fine Arts[1]
Atomium
200,000-300,000 visitors
Natural Sciences Museum
Mini-Europe
Océade
Parlamentarium
100,000-200,000 visitors
BOZAR
European Parliament hemicycle
Comics Art Museum
Cinquantenaire Museum
Train World
Musical Instruments Museum
Autoworld
50,000-100,000 visitors
Royal Museum of the Armed Forces and of Military History
Brussels City Museum

Source: Visit.brussels (Brussels Tourism Observatory)

[1] Includes the museums Magritte, Fin-de-Siècle, Old Masters, Modern, Meunier and Wiertz

ORGANISED EVENTS

Number of visitors	2016
Regular paid events	
Brussels Summer Festival	115,000
Couleur Café	52,000
Anima Festival	42,000
Memorial Van Damme	40,000
Brosella	35,000
Regular free events	
Plaisirs d'Hiver	2,460,000
Foire du Midi	1,200,000
Brussels Jazz Marathon	425,000
Bruxelles-les-Bains	375,000
Iris Festival	150,000
Trade fairs and shows	
European Motor Show	555,000
Batibouw	300,000
Salon de l'Alimentation	121,000
Brussels Holiday Show	117,000
Cocoon	75,000

Source: Visit.brussels (Brussels Tourism Observatory)

Table 1 - More visited attractions and organized events attendance in Brussels

- In terms of seamless travel to tourist, the Brussels Card and the Jump card are the best options to move around with free public transport and optional Hop on & Hop Off sightseeing bus according limited days of visit. For example, the Brussels card includes free entrance to 41 museums, 15% to 20% discounts in shops and or unlimited travel in STIB metro trams, and buses (not including NMBS trains). Prices ranges from 27 to 65 euros according 24, 48, 72 hours. (Visitbrussels.be).The JUMP card is an extension of Belgian travel card Mobib that can be used in all public transport operators in Belgium. Once the 5-euro card is purchased, trips or days can be added to the card. Prices ranges from 2.10 euros per trip or 7.50 euros for 24 hours and so on. (NMBS, 2019). The following are some figures of the Brussels card purchases which are important for the business plan helps to target the top nationalities the buys the Brussels card and the top attractions where cardholders go.

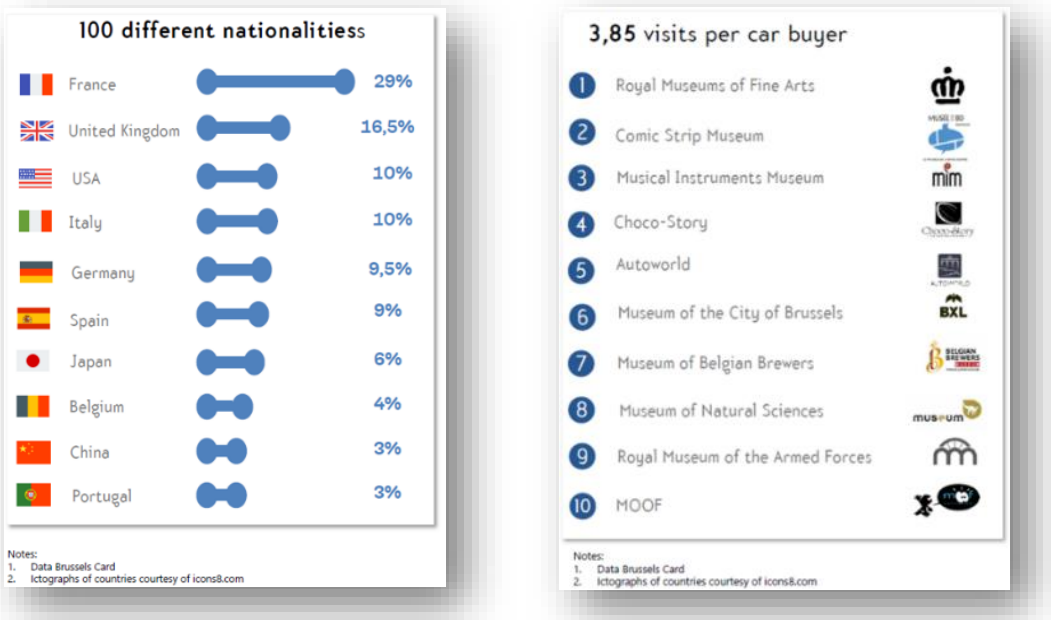


Figure 2 -- Top 10 nationalities that buys the Brussels Card & Top 10 attractions visited in Brussels

- In terms of urban mode choice departing from Brussels Airport Zaventem:

- 41% of passengers choose to travel with own car, car rental or be picked up by a family member
- 26% of passengers choose train
- 19% of passenger choose taxi
- 7% of passengers choose bus (BZA, 2019)

2.1.6 MAAS INITIATIVES FROM KEY MSPs OF BRUSSELS

The following is a table of the current MaaS initiatives that the main MSP have implemented in Brussels. Additionally, there is a list of their MaaS products that can be sold via a Tourist MaaS platform. The STIB- MIVB bus partnership could be enough since they cover all Brussels Capital Region. A further expansion to other Belgian cities should consider DE LIJN partnership (Flemish public transport operator) This MSP were selected since they are already have in place partnerships with MaaS operators and re-selling ticket partners.

Table 2 – MaaS initiatives from key MSPs of Brussels (STIB, NMBS, VILLO BIKE, DOTT)

	STIB - MIVB **Brussels local public transport operator for metro, bus and tram**
Team in charge of negotiating MaaS initiatives	STIB – B2B Sales Team • B2B Sales Manager • MaaS pilot program director
Current STIB initiatives to enable Maas	○ In their official website, STIB has a full section called "Developers" where their datasets are open and available to encourage public transport solutions that improves the passenger experience (STIB, 2020) ○ **– There are 3 open APIs and 2 shapefiles to developers** 1. "Files API" 2. "Operation Monitoring API" 3. "Network Description API" ○ - **They open 7 types of data in their APIs:** **1. GTFS:** The stops and their geolocation; The lines and their route; The details of every stop on a line; The theoretical timetables at every stop. **2. Shapefiles:** with information linked to the objects' geometry which, for STIB/MIVB, are lines (itineraries) and dots (stops). **3. Vehicles position at the stops in real time** **4. Waiting times in real time** (next departure times at the stops) **5. Travelers information in real time** **6. Stops by line:** where you can find a line of consecutive stops on a specific line, from the departure point to the end of the line. **7. Stops detail:** where you can find the stop ID, stop name and the geolocation of the stop.
STIB products that a Tourist MaaS operator could integrate	1. **An integration with the STIB MaaS pilot** that is expected to launch testing in July 2020 and launch a final version by the end of 2021. (STIB, 2020). 2. **Re-sell the Brussels Card:** card includes free entrance to 41 museums, discounts in shops and optional Hop on & Hop Off sightseeing bus or

	unlimited travel in STIB metro, trams and buses (It doesn't include NMBS trains). Prices ranges from 28 to 65 euros according 24, 48, 72 hours. Partnership has to be negotiated with VisitBrussel.be and with approval of STIB (Visitbrussels.be). 3. **Sell the Bus-Airport Express Line 12 ticket:** line between Brussels Airport Zaventem and Brussels city (30 min trip/ 12 stops connecting tram and bus interchanges). Price is 4.5 euros per trip. 4. **Sell the JUMP ticket:** refers to unlimited journeys through the STIB, NMBS, TEC, De LIJN networks inside Brussels Capital Region + Bus to Airport. Requires pre-purchase of the Mobib card. Prices go from 7.5 euros (24hours), 14 euros (48hours), 18 euros (72 hours) (STIB, 2020). 5. **Integrate the Mobib Basic Card (5 euros):** this an anonymous and reloadable card that can load single, multiple and "JUMP" tickets. This could be incorporated in the plan by linking the payment process via the "GO Easy" STIB platform database or APIs. Not available yet.(STIB, 2020) 6. **Sell the contactless tickets:** only includes single fare tickets(2.5 euros), 24-hour fare tickets (7.5 euros) and Bus-Airport ticket (4.5 euros). Do not require Mobib Basic pre-purchase, but could be linked with the Go Easy online platform (STIB, 2020). 7. **Process the "Event Pass":** is a free STIB two-way ticket pass included in the concert tickets of 3 concert arenas in Brussels. Tourists have to pre-purchase the concert ticket and then digit in the STIB vending machine the 9-character code of their concert entrance ticket to obtain the STIB "Event Pass". The following capacity and numbers of concerts per year shows the potential market of this passes: • Forest National Arena: capacity of 8400 seats. 49 concerts for 2020 (Forest National, 2020) • Ancienne Belgique Arena : capacity of 2550 seats. 161 concerts for 2020. (Ancienne Belgique, 2020) • KVS Arena: capacity of 504 seats. 96 concerts for 2020 (KVS, 2020)

	NMBS – SNCB **The national railway company of Belgium**
Team in charge of negotiating MaaS initiatives	NMBS - Business Center 10-14 B-MS.112 Adress: Hallepoortlaan 40 1060 Brussel Head of Commercial operations. E-mail: business@b-rail.be
Current initiatives to enable Maas	In their official website, NMBS has 3 options for MaaS developers. For partnerships, all MaaS providers have to fill out a web form and sign a license agreement to receive approval from the Business Center of NMBS. For example: **1. Sales of NMBS products** MaaS providers can integrate NMBS products into their digital offer by selling NMBS train tickets which increases the visibility and accessibility of the train in their digital platforms. NMBS products offered by the external partners are

	intended for different target groups; ranging from young people, families to seniors. (NMBS, 2020) Unfortunately the revenue model is not openly shared until the developer is granted with negotiation meeting. **2. B2B Employer option** Through a "Third-Party Payer Agreement", NMBS offers a private sector employer the option of allowing free travel for their employees from home to work in 2nd class seats. **3. Public data access** MaaS operators could only retrieve NMBS timetables data. This is via web URL in the form of GTFS feed and not through an API direct mutual communication with NMBS. (NMBS, 2020) After signing the license agreement, the NMBS Open Data servers gives the MaaS provider access to the timetables under rules of conduct (to avoid hackers) and rules of usage (to avoid overcrowdings of requests) (NMBS, 2020) **2 types data available in GTFS:** a. Planned timetable data (updated every day) b. Real timetable data (updated in 30 seconds) The data is made available in the form of GTFS (General Transit Feed Specification), a common format for public transport timetables. **Data is reliable from NMBS side:** NMBS shared timetables are 100% identical from the timetables they used for their own route planner. NMBS doesn't assume responsibility of the travel advice offered by the MaaS operator, since they have their own route planners: own search engine and own algorithms.
NMBS products that a Tourist MaaS operator could integrate	All of these MaaS products could be considered in the business plan of the Tourist MaaS operator: **1. Sell NMBS standard tickets:** non-discounted tickets which prices depend of the distance between departure and destination stations. Prices ranges from 2.40 euros to 21 euros. It doesn't include the airport Diabolo supplement fee. **2. Sell any standard Train-Airport ticket + Diabolo supplement fee:** this means to sell a combined ticket that includes the NMBS trip + the Diabolo fee (5.40 euros). Already available in NMBS web and app platforms. **3. Sell the B-day trip ticket:** refers to tickets that includes admission event or museums + train two-way ticket (NMBS, 2020). **4. Sell the Unlimited 1 week-pass:** This is an offer during the school holiday month of July and August for passenger younger than 26 years old. This product targets also young tourist that come to festivals in Belgium by train. **5. Sell the weekend ticket:** This is a point-to-point and two-way ticket offered at 50% discount from the standard ticket for travelling on weekends from Friday (starting 7pm) till Sunday (NMBS, 2020). **6. Sell the GO Pass 1:** this is a ticket for young travelers up to 25 years old in which they pay 6.60 euros for any single trip in 2nd class to all destinations in Belgium. Diabolo fee has to be added for the airport journeys **7. Sell GO Pass 10 ticket:** this is ticket for 10 single trips in 2nd class, valid throughout Belgium and accountable for more than 1 person. Currently is not

	available digitally, only via counters and vending machines since ticket inspection is done manually. Nevertheless, is a convenient product for tourists who travel with company, stay in Brussels and visit other Belgian cities during the day. Prices ranges from 53 euros(up to 25 years old) and 83 euros (above 25 years old) (NMBS, 2020).

	VILLO BIKE Brussels city bike sharing system
Team in charge of negotiating MaaS initiatives	JCDecaux- Villo! – Costumer Relations Centre Address: 7 Rue Joseph Stevens - 1000 Brussels Email: developer@jcdecaux.com contact.villo@jcdecaux.com
Current initiatives to enable Maas	JCDecaux company has 354 Villo fixed-stations in Brussels, 5 000 bike fleet, 37 000 long term subscribers and 1.6 million rentals in 2018. (VisitBrussels, 2018).In 2016, the company launched in their 27 worldwide cities, and free Open Data license for developers who wants to connect their bike sharing data into their digital platform. Two types of station data information can be freely accessed : ○ **Static Data:** provides information of station name and ID, station geolocation, number of bikes stands, payment terminal availability. It could be free downloaded manually in CSV file format or accessed through an API key in the format of JSON. ○ **Dynamic data:** provides information of real time data of: station state, number of available bikes and number of free bikes stands. It could be free accessed through the API in which developers have to create a free account and request an API key. (JCDecaux, 2016) Ticketing APIs are not part of the Open Data license. This has to be negotiated with JCDecaux.
STIB products that a Tourist MaaS provider could integrate	**Important remark:** it is important to point out an alarming remark about Villo! Bikes, since there is 78% of negative reviews in TripAdvisor related to their service satisfaction in Brussels. The main complaints regard on the 150 euros deposit that is immediately debited after the purchase of any subscription plan, even the cheapest one. Users feel the service is a rip-off because the deposit is refunded at least 2 weeks after the purchase (TripAdvisor, 2020). This is the main disadvantage factor of partnering with Villo! Bike, since the deposit conditions are a totally inconvenient factor for tourist users. Despite this disadvantage, if we don't get a parentship we them we might conside rental bikes or free-floating bike sharing companies because offers a more flexible fleet on-demand and user friendly payment process. However, if Villo Bike can guarantee that the security deposit can be reduced and not immediately debited, then the partnership sounds feasible for tourists and the MaaS platform can give the 6-digit code to tourists to activate the Villo system at the station and unlock the bike. The following are tourist products that a MaaS provider can offer in their platform:

	1. **Day ticket:** is a "pay as you go" subscription plan with unlimited free 30-min trips for 24 hours. The cost is 1.6 euros the day. The penalty after the free first 30 min, is charged every half hour in this escalated way: 0.5 euros, then 1 euro and then 2 euros for the following half hours . Every bike has to be returned to a bike stand within 24 hours after initial purchase, otherwise the deposit will be debited. Apparently deposit is debited right away. 2. **7-Day Ticket:** is a "pay as you go" subscription plan with unlimited free 30-min trips for 7 days. The cost is 8.2 euros. The penalty for overcrossing the first 30 min is the same as above. (Villo!, 2020)

	ELECTRIC KICK-SCOOTER COMPANY **DOTT Brussels**
Team in charge of negotiating MaaS initiatives	emTransit B.V. (DOTT) – Team for a Maas partnership • General Manager • Operations Manager Brussels Address: Rue de la Presse 4. Brussels 1000. Belgium
Current initiatives to enable Maas	Kick scooter booking and ticketing data integration with 3rd operators is very new in Europe and worldwide. Since 1st February 2019, scooter company's circulation is under Brussels Region regulation in which they have to follow 10 requirements to guarantee their 3-year license. Two main regulations could enable MaaS operators: o Kick-scooter operators are required to report trip details and fleet information to the Ministry of Mobility and Public Works of Brussels and must participate in a publicly open data platform by providing real time geolocation of all their scooters. o Scooter operators are required to participate in an annual survey organized the public authority. (Price & Popijn, 2019) As part of their commitments to the city, DOTT scooter company states the following in their official website: o **Transparent data sharing:** DOTT commits to "share all anonymized trip data with municipalities, including trip details and fleet information. This data will help paint an accurate picture of current traffic flows and will be helpful in the city planning of bike lanes and parking zones" Nevertheless, there is no current scooter company operating in Belgium who shares ticketing data to MaaS operators such as MaaS Global or SKIPR. The german JELBI MaaS platform, launched on June 2019 and powered by Trafi Ltd, is the first platform in Europe that offers electric kick-scooter rides via TIER scooters APIs. TIER shares real time data of geolocation of scooters in Berlin, their ID, price to unlock and battery percentage usage. All rides bookable in the same JELBI app. (Intelligent Transport, 2019)
DOTT products that a Tourist MaaS operator could integrate	1. **Sell "Pay as you go" rides:** once both app platforms are linked via APIs, the MaaS provider can locate the scooters in real time and communicate with DOTT to unlock and lock the scooter after payment is done by the user. Unlock fee costs 1 euro and 0.19 euros extra minute of usage. It is not priced

	by kilometer, just by time usage. As part of DOTT policy, 5 euros are hold temporarily and reimbursed as a fraud prevention measure

	TOURIST SERVICE PROVIDERS
Products that a Tourist MaaS provider could integrate	1. **Sell the Brussels Tourist Tramway tour ticket:** Is a 4-hour tram trip that travels around emblematic heritage monuments of Brussels. Prices are 20 euros per person. Museum entrance ticket can be also sold by 12 euros per person. Capacity of 28 seats per tour.30 tours programmed for 2020. (Brussels Tram Museum, 2020)

2.2 MAAS CORE STAKEHOLDERS

Maas Business Ecosystem

In the literature review, there is a notion that MaaS is a complex market to develop because it requires an ecosystem where technologies, infrastructure and regulation has to be in place before key stakeholders agree to participate in. To address the different MaaS stakeholders and their responsibility within MaaS, Kamargianni & Matyas (2018) identifies players that are distributed in three different layers of a business ecosystem:

- Core Business layer
- Extended Enterprise layer
- Business Ecosystem layer.

The first core player is the MaaS provider [operator] which basically aggregates information, performs the MaaS main features and promises the end-to-end travel experience to the user. This player could be a public transport authority, a transport operator, a private firm or an existing company from the banking, telecommunications and other sectors.

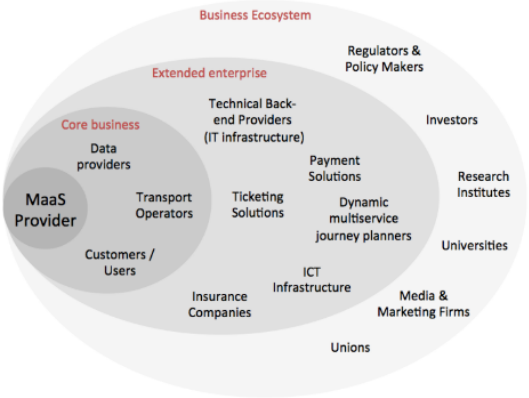


Figure 3 – The MaaS Business Ecosystem (Kamargianni & Matyas, 2018)

However, Kamargianni & Mathias (2018) are more in favor on private firm as the MaaS provider since they are better on enabling MaaS faster, more diversified and scalable, but with the risk that transport operators could lose their role as the transport integrator and provider of the city. The following is the MaaS business ecosystem.

Enabling Factors from Key Maas Stakeholders

The following table summarizes what has been researched over the responsibilities of the stakeholders to enable a MaaS ecosystem. Only focused in the most important stakeholders for this business plan.

Table 3 – The MaaS stakeholders and what the need to provide to enable MaaS

CORE STAKEHOLDER	What they need to provide to enable MaaS?

Mobility Service Providers (MSP)	• Provide access to their data via secure APIs (Application Programming Interfaces)
	• Make interoperable and open the following APIs:
	  • API for routing
	  • API for real time vehicle location
	  • API for booking
	  • API for ticketing
	  • API for payment
	Display sensors on their fleet and ticketing systems to accept smartphone reading. (Kamargianni & Matyas, 2018)

[Tourist] MaaS Operators	**Operations Team:** • Integrate and aggregate information from their core suppliers: transport operators, data companies and users. • Provide the MaaS main features (integrated route-planning, booking, payment and ticketing) in the platform. • Deliver easy, fast and mobile friendly end-to-end travel experience to the user. (Kamargianni & Matyas, 2018) • Guarantee costumer support due to cancellations, refunds and any kind of feedback. In charge of managing a multi stakeholder environment • Provide the most cost-effective ways to get from A to B across modes, across transport operators, travel cost and travel time. • Provide multimodal journey planning capabilities were different modes of transport are listed to complete trip legs or the entire door-to-door journey. • Provide intermodal journey planning capabilities were different transport providers of the same mode are listed to complete trip legs or the entire door-to-door journey. • Provide real time information (network conditions, vehicle location, stop location, network disruption, vehicle high capacity, weather condition, etc.) • Be dynamic and adjust the trip suggestions according to a variety of anomalies on network disruption, high capacity, weather conditions, etc. (Kamargianni & Matyas, 2018)

	IT Team
	• Supply with the collection, storage, processing, interoperability and protection of the data coming from users and from the transport operators
	• Offer data and analytics capabilities
	• Store and retrieve data in a fast, reliable and secure manner
	• Accommodate levels of scale, speed and data variability.
	• Guarantee interoperability were all devices, systems and infrastructure within a single MaaS scheme can communicate information by being able to read, understand and translate each other's data. (Kamargianni & Matyas, 2018)
	• Ensure large scale of data collection, cloud computing, real time data management and strict security and data policy requirements to assure it complies with European General Data Protection Regulation. (GDPR)
	  • Create the technology, costume code, algorithms and all the development of the platform intelligence.
	  • Build the platform architecture (back-end and front-end of the application and website landing page) connecting the open API of the transport operators with the MaaS operator.

Costumers/ Users	**1.** Provide input of travel behavior and patterns, service design, willingness to pay, acceptance and travel preferences. **2.** Based on the business model of the MaaS provider (B2C, B2B or both), costumers could be individuals, corporate or both.

EXTENDED ENTERPRISE STAKEHOLDERS	**What they need to provide to enable MaaS?**
Payment Service Providers (PSPs)	• Provide payment solutions to the MaaS provider so users can pay for their MaaS purchases with credit card, debit card, Paypal account, etc. and transport operators can receive their respective ticket revenue. • Guaranteed ticketing technologies can manage combined ticketing to avoid users to deal with holding and paying for more than one ticket for the whole journey. Be responsive to ticket cancellations. (Kamargianni & Matyas, 2018)
Insurance providers	• Provide with insurance to the MaaS provider in case costumer claims their passenger rights and compensation over a trip that he or she paid but the transport operator was unable to respond to the request in the given time window. (Kamargianni & Matyas, 2018) • The role of this stakeholder is still unclear within the MaaS ecosystem since the MaaS operator could assume the monetary compensation on their entire expense. (Kamargianni & Matyas, 2018)

BUSINESS STAKEHOLDERS	What they need to provide to enable MaaS?
Regulators & Policy Makers	• Provide open standards and interoperable data formats for the APIs • Provide policy frameworks and recommendations for the sustainable development of the market, fair competition, financing, passenger rights, privacy and security, service quality standards, social inclusion and safety. • Provide policy framework at a european level, but with open data standards managed by an international organization (e.g: MaaS Alliance) that enable scale-up capabilities for the MaaS Provider like global roaming. (Kamargianni & Matyas, 2018) **3.** Give license to MaaS providers by regulating minimum standards they must have in order to operate in the area and avoid legal fights between them and traditional operators like taxis-Uber case.

Investors	• Private investors:
	  • Provide with the seed and growth investment necessary to establish MaaS firms and grow MaaS market.
	• Public investors:
	  • Redirect public transport subsidies (i.e. concessionary travel schemes) to MaaS operators as it is assumed that they could better match supply and demand saving as such public money and reducing bureaucracy.
	  • Redirect sustainable mobility grants and subsidies to MaaS providers since its assumed that they contribute to sustainable development by providing sustainable transport options that reduce car ownership and CO2 emissions inside cities.

Added value that MaaS operators gives to core stakeholders

A. To Mobility Service Providers (MSPs)

1- Market share increase:

Via the MaaS operator, the MSP has the opportunity to access a wider market and increase their market share, grow their revenue from previously unreachable costumer markets and increase the level of satisfaction of their customers. (Kamargianni & Matyas, 2018) This could be a solid convincing point to bring on board the MSP.

2- Fast response to full capacity:

The MaaS operator could optimize demand and supply by knowing in real time the demand and the capacity of transport operators. Specially in peak hours where the MaaS operator could redirect their demand to other transport operators and avoid passenger satisfaction due the full capacity situations. (Kamargianni & Matyas, 2018)

3- Free-data exchange:

The MaaS operator serves also as a travel data generator receiving richer data on travel and traffic demand patterns and dynamics. Respecting data privacy and not sharing information of other competitor MSP, a partnership could include free-data exchange of:

- traffic flows
- travel times
- travel speed
- user's location
- top journeys and travel patterns
- top departures and top destinations
- first-and-last mile data
- mode of transport usage
- use of other services during the trip

for a better travel management service provision, travel demand forecast and provide higher and precise levels of service to travelers (A. Polydoropoulou, et al. 2019)

4- Shake the passenger transport market

The MaaS operator creates potential for competition with engaged transport operators leading to improved levels of mobility services. (Kamargianni & Matyas, 2018)

B. Regulators and policy makers

1. Provides opportunities for more efficient use of transport management tools and resources/data to meet the needs of citizens by giving travel behavior reports to the City Hall.
2. Contribute to a more effective redistribution of the government's mobility subsidies.
3. MaaS operators (in case of private firms) will pay taxes generating income for city governments.

2.3 MAAS PLATFROM FEATURES

This section will review literature about the digital interface necessary to offer a MaaS service. This support documentation is important because it gives crucial inputs to better decide what platforms, features and design are needed in order to deploy a proper MaaS solution for tourists.

SIMPLICITY

In terms of devices, there is not enough documentation if tourists would access a Maas service through smartphone, tablet or desktop devices. Nevertheless, most authors agree that MaaS users should be able to be accessed mainly by smartphone because of the following main reasons:

1. In terms of convenience, transportation booking should be accessible through a portable, on demand and instant device where they can book their urban trips right-on-the-moment (Ecolane, 2019).
2. In terms of tourism market, leisure tourists carry more times their smartphone (85%) than their laptop (50%) when they go for holidays. Business tourism have both behaviors, they carry more times their mobile (88%) than their laptop (82%) (Foxe, 2016).
3. In terms of booking there is a growing trend, 48% of tourists say they are comfortable researching, booking, and planning an entire travel experience on a mobile device. (Google Travel Study, 2018)
4. In addition, a survey done by Google to tourists shows that 85% of them carry their phone while travelling. (Google Travel Study, 2018. In conclusion, smartphone devices might be more convenient to solve travel needs in urban environments.

ADAPTABILITY

In terms of MaaS smartphone platforms, there is two options to develop: a mobile responsive website or a native app. Again, there is lack of documentation on which platform should be more convenient for a MaaS provider. For example, Matyas& Kamargianni, M. (2018) states that the integrator should provide the access through a digital interface, allowing them to seamlessly plan and pay for mobility, but it doesn't specify what kind of interface.

A comparison between brands (*benchmarking*) is a good exercise to know about the strategies behind leading MaaS platforms around Europe when they must reach their users. Here a comparison table of the current European MaaS operators in terms of their mobile interfaces :

Table 4 – Benchmarking of the MaaS operators' platforms in Belgium and the rest of EU-27

MaaS Operators present in Belgium	**Mobile Interfaces**	
	Native App	**Responsive Website**
1. Whim (MaaS Global)	YES	Only for presence
2. Google Maps	YES	Fully functional
3. UBER	YES	Only for presence
4. MOOVIT	YES	Only for presence
5. SKYPR	YES	Only for presence
6. OLYMPUS	YES	Only for presence
7. SMOP	NO	Fully functional
MaaS Operators in the rest of Europe (Polydoropoulou, et al.2019)		
8. UbiGo (Stockholm)	YES	Only for Presence
9. Switchh (Hamburg)	NO	For registration
10. Kyyti (Helsinki)	YES	Only for Presence
11. Nugo (Italy)	YES	Fully functional
12. Jelbi (Berlin)	YES	Only for presence

As we can see in the brand comparison, current MaaS operators use their website to have web presence and to re-direct users to their app platform. According to Fang et al (2017), native apps have the following advantages that makes the MaaS service more convenient: higher engagement, higher user experience and personalization functionalities, higher speed in transactions, higher travel behavior data collection, possibility to push notifications to the end user. (MacHale, 2018) and possible offline capabilities. (Fang et al, 2017),

APP FRONT-END

The following table summarize the essential features a MaaS provider should develop in their front-end according to the essential MaaS of the previous European MaaS platforms,

Table 5 – Essential features that should have MaaS app platform

MAAS COMPONENTS	MAAS ESSENTIAL FEATURES	DESCRIPTION
INFORMATION	**1. Route-search tool**	-Easy to navigate: Origin, Destination, filters, algorithms showing combined modes and trip legs
	2. Reliability of information	-At least the ability to show public transport timetables and real-time delays -No hidden extra fees for the user
	3. Roaming capability	-The ability to access mobility services wherever you are, so the app can pull and grant you access to local mobility offering
BOOKING	**4. Integrated ticketing across modes**	-One ticket for one trip leg or for all trip legs
	5. Attractive pricing	-Bundling pricing (Subscription Plans) -Pay as you Go (according usage per time/distance)
	6. Integrated Payment	-Simple, secure & accepting all payments methods - Immediate stamp of ticket after payment
USER CENTRIC	**7. Easy-to-use functionality**	-Simple and fast end-to-end booking service. -Excellent user interface(UI) & user experience (UX)
	8. Refund and Insurance Management	-Call center 24/7 -Easy refund process to the user and to mobility provider in case of overuse of the mobility service
	9. Privacy and Data Protection	-Compliance to GDPR for data privacy -Privacy Policy and compliance to the Terms and Conditions of the transport operators

APP BACK-END

According to Matyas & Kamargianni (2018), the incoming API information needs to go through an API gateway, where the traffic is filtered according to access control and safety while the metrics are

captured and logged. The traffic is then redirected and routed to the appropriate area of the MaaS and data providers' back-end systems. In Appendix 1 is located the process diagram of a Booking API that was designed by MaaS Global to explain the life-cycle of an individual trip from the MSP viewpoint. The understanding of this is key to establish a partnership agreement between both the MaaS operator and the MSP. (MaaS Global, 2020)

2.4 MAAS BUSINESS PLAN LITERATURE

The final outcome of this master thesis is to provide a business plan that convinces investors and partners that launching a tourist MaaS provider in Brussels is **feasible, profitable, scalable**. Therefore, in order to bring qualitative data and metrics, this master thesis will apply the Business Model Canvas (BMC) methodology as a preparation of a further lean start up business plan in terms of the necessary information, content and analysis related to further marketing, operational, financial and management plans (Tokarski et al, 2017). This model was proposed by Alexander Osterwalder and Yves Pigneur in 2010 in their book "*The Business Model Generation*" in which serves as a tool to search what is the best business model to implement an idea. It helps to map, discuss, design and test new business models and hypotheses. The BMC tool uses nine basic building blocks that fit all together in the same canvas and it helps entrepreneurs and business senior executives to validate a need on the market.

2.4.1 THE BUSINESS MODEL CANVAS (BMC)

The nine building blocks have to be filled out in the following order:

1. **Customer Segments:**
    - Refers to all the people or organizations for whom value is created. Two types of costumers: simple users (i.e: tourists) and paying customers (i.e: MSP).
    - They reveal what is the job that needs to be done because nobody in the market is solving it.
2. **Value Proposition:**
    - Refers to the bundles of products and services that create value for the costumers.
    - Refers to what we offer to get the job done.
3. **Channels:**
    - Describes through which touch points you are reaching, interacting and delivering value to customers.
    - Related to MaaS, the channels include the way the MaaS operator communicates with and reaches its customer segments to deliver the value proposition. (Polydoropoulou, et al.,2019)
4. **Customer Relations:**
    - Refers to the type of relationship you are establishing with your costumers.
5. **Revenue Streams**

- It makes clear how and through which pricing mechanisms your business model is capturing value.
- For example, the revenue calculation of the first year could be by multiplying the market share (number of reachable costumers), times repetition value per year, times price per unit, minus sales cost.

6. **Key Resources:**
   - Refers to the assets (physical, technological, intellectual and financial) that are indispensable in your business infrastructure to create, deliver and capture value
7. **Key Activities:**
   - Refers to the activities you really need to be able to perform well

8. **Key Partners:**
   - Refers to the key partners that can help you leverage your business model and help you to perform your key activities.
9. **Cost Structure:**
   - Once you have built all your business infrastructure then you have an idea on how much it will cost. (Osterwalder & Pigneur, 2010)

THE STEP-BY-STEP OF THE BMC

The main dynamic of the BMC tool is that you sketch ideas in a piece of paper and paste them in each building block to discuss weather this input is accurate or not and how does it affect the other building blocks. If the idea is discarded, then simply you take out the paper from the canvas and iterate until you find the best strategy for each building block (Osterwalder, 2012). With different colored papers you can add new business models next to the original to help you compared which one is the best. The whole canvas performs as a duality, the right side is the front stage related to the costumer and the left side performs as the back-stage that enables the front stage. A quantitative BMC could include figures by showing number of costumers, number of users, price per unit, amount of sales, etc. According to Osterwalder (2012), the whole BMC is a prototype exercise, full of guesses and hypothesis but with advantage of helping to test ideas before building them.

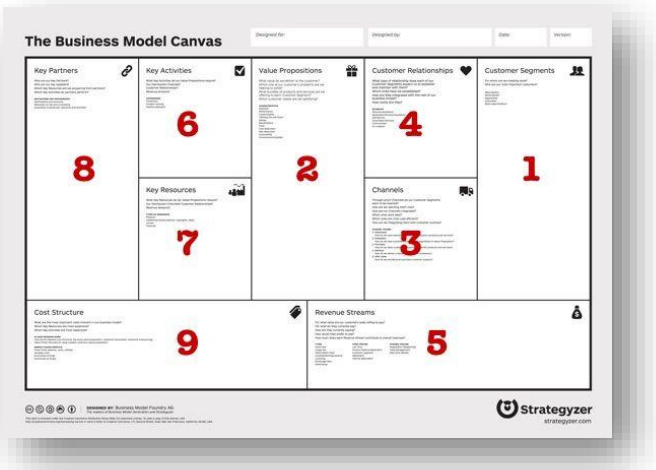


Figure 4 – The BMC step-by-step (Osterwalder & Pigneur, 2010)

LEVELS OF THE BMC

As part of a Stanford University conference in 2012, Silicon Valley, USA, Steve Blank and Alexander Osterwalder contributes in the BMC theory by adding the ability to go into a time axis trough all the building blocks with the objective to strength the costumer relation process. Here the four levels of the BMC:

1. The first BMC level is brainstorming and filling out the canvas pieces. However, this is just a simple checklist because it only tries to make a fit between costumer and product. (Blank, 2012)
2. The second BMC level is what makes the difference, in this level is necessary to do a storytelling in which you simple-guide the investors and show them the connections between the different pieces of the canvas. According to Blank (2012) the correct performance of this BMC level is what makes a company beat an existing competitor even if they have a better product in the market.
3. The third BMC level is when the entrepreneur puts aside its own BMC and starts to understand what Osterwalder (2012) called "patterns", which are business models with similar dynamics. This consists in mapping the BMC of larger and successful companies in your industry or in others, like Google, Netflix, Whim, UBER, etc. This helps to study different business models and capture the wisdom of what others have been doing that make their business model so successful.
4. The fourth BMC level tries to evolve from being a static document into a more dynamic tool, by testing your proposed business models across time. This exercise creates hypothesis to figure out what strategies actually works and what doesn't. (Osterwalder, 2012).

LINKING BUILDING BLOCKS

Osterwalder (2012) states that you can isolated two pieces of the canvas and makes the connections that are necessary in the second level and bring up ideas that makes the canvas more linked.

Costumer segment VS Value proposition pieces

For example, he isolated the costumer segment and the value proposition BMC pieces. He starts to list all the tasks that a customer needs to do in order to complete a "job" and fulfill its need. Then, he sketches the pains and gains that a costumer experiences when it tries to complete that job. All of these inputs are taken via observation or by surveying the costumer. Then, according to this costumer input, we have to build the value proposition by asking ourselves what we are offering as a response? For that, Osterwalder (2012) suggest that you can start designing the best product attributes that works as "pain relievers" to those costumers' pains and create the best attributes that works as "gain creators" to those gains your costumer is experiencing to fulfill its need. In summary, he suggests "find a need in the market and propose a solution. Not backwards" (Osterwalder, 2012)

Figure 5 – Finding the pains & gains (Osterwalder & Pigneur, 2010)

Costumer segment VS Revenue stream pieces

Another example of linking BMC pieces can be seen between costumer segments and revenue stream. So, by identifying what is the job that needs to be done and what are the pains and gains that the costumer experience to fulfill its need, Osterwalder (2012) suggest that you can connect the revenue stream by asking your costumers how much they are willing to pay if there is an alternative solution that can make that job done in an easier and more efficiently way. Their response is key to calculate the revenue stream.

2.4.2 MAAS PILOTS USING THE BUSINESS MODEL CANVAS METHODOLOGY

Polydoropoulou, et al (2019) and their paper "*Prototype business models for Mobility as a Service"* is probably the most related and updated scientific paper using the Osterwalder BMC to validate the creation of a MaaS provider. Their contribution to the literature lies on two main aspects that are highly for this master thesis. First, they contribute by developing a generic prototype business model for MaaS using the Osterwalder BMC to consider the full potential of the ideal of MaaS. Second, they conduct analysis on the systematic enablers and barriers of MaaS based on the systems of innovation framework (Woolthuis et al., 2005; Roumboutsos et al., 2014) in the three study areas: Greater Manchester, Budapest, Luxembourg City. They employed the Osterwalder BMC tool because is a technique that mostly researchers and practitioners use to describe, analyze and design a business model. However, before they start to design the generic BMC for MaaS, they collect data from workshops and interviews with 20 stakeholders in Budapest, 28 in Greater Manchester and 18 stakeholders in Luxembourg. These stakeholders where from public authorities, mobility service providers (MSP), IT and data companies, research institutes, transport consulting companies and other associates related to MaaS. The first result from the workshops was to identify the MaaS business ecosystem "champions", specifically those players who are key enablers of MaaS in their specific city. They conclude that the MSP's and the local public authority (regulator) are the key actors of materializing MaaS in these cities.

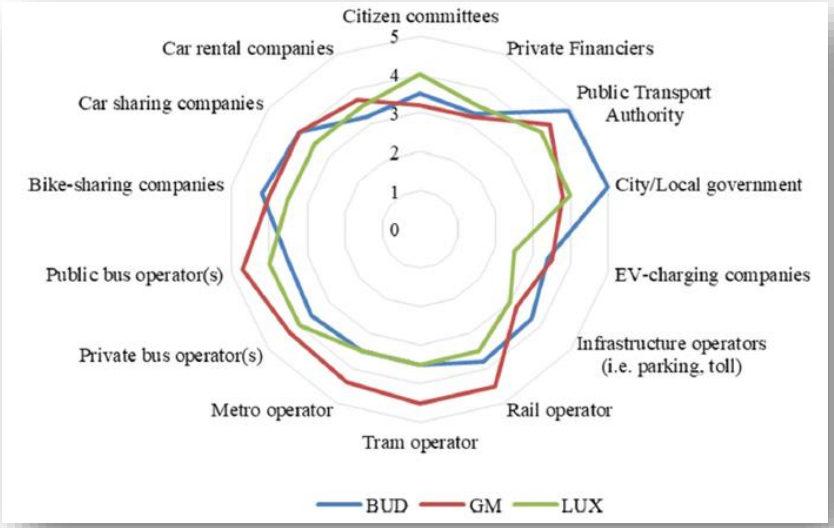


Figure 6 – Key actors of the MaaS business ecosystems in 3 pilots: Budapest, Great Manchester & Luxermbourg city. (Polydoropoulou et al, 2019)

Then, the majority of the stakeholders conclude that the public transport authority should be the one who takes the role as the MaaS operator, not only because gives trust in the data sharing but because it also establishes the regulatory framework to standardize the MaaS partnerships and APIs. However, later in the in-depth interview, they all said that they are not willing to undertake such a role because they are lacking the resources needed. This situation is clearly a barrier for MaaS deployments.

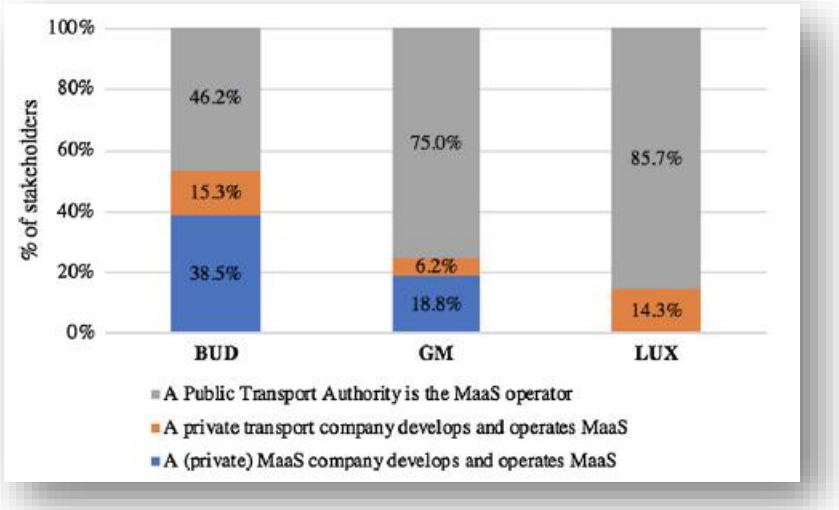


Figure 7 – Pilot responses of stakeholders choosing who should develop and operates MaaS (Polydoropoulou et al, 2019)

2.4.3 MAAS ENABLER FACTORS

Here a summary of the systematic MaaS enablers that Polydoropoulou, et al.(2019) extracted from the workshops and the in-depth interviews that helped them to build the MaaS BMC for these cities.

- **Enablers from the user side:**
  1. User mobility needs and preferences linked to the MaaS concept (mobility data analysis from public transport usage, car ownership, car annual trips, etc)
  2. Willingness to use a MaaS service
  3. Willingness to pay tickets via a MaaS service
- **Enablers from the MSP side**
  4. Willingness to share data (open APIs on: route planning, pricing data, booking, e-ticketing and payment)
  5. Willingness to cooperate (sign partnership agreements, NDA, etc)
  6. MSP capabilities (enough finance and human resources to manage an innovation related project and adapt their APIs and information systems)
- **Enablers from the Regulators side**
  7. Trusted MaaS regulatory framework (able to stablish standards for data collection, data management, data sharing, API interoperability, privacy and data security)
  8. Provision of high-quality infrastructure and technology (Passenger infrastructure, high internet connectivity, etc)
  9. Existence of city-societal values (subsidies to sustainable digital initiatives and anti-car usage policies to improve environmental benefits, public health, congestion, social equity)

The last contribution of Polydoropoulou et al (2019) is highly valuable for this master thesis. They prototype a generic BMC that describes the strategy that any potential MaaS operator should follow

to materialize the ideal MaaS and offer seamless mobility within a specific region or city. The BMC tool was used to prove how a MaaS operator could create, deliver and capture value to four costumer segments: individuals (commuters, locals, tourists, students, elders and families), corporate users, transport planners and policy makers. What is remarkable from this BMC is that they were able to indicate according to the workshops and interviews data the strategies that better fits to the specific city. For example, in the building of key partners, is more convenient to initiate partnership with bus and taxi operators in Greater Manchester and Luxemburg, than in Budapest where they find that is more strategically to partnership with public transport and shared mobility operators. Also, the value proposition in each city differs, for Luxembourg is valuable to offer a MaaS platform that can suggest cross border trips but for Greater Manchester and Budapest this is not the case, because they mainly prefer to book urban and suburban trips. In APPENDIX 2, the reader can find the three designed BMC for Budapest, Greater Manchester and Luxembourg cities.

2.5 LIMITATIONS & FINAL REMARKS IN THE LITERATURE REVIEW

In summary, conducting research about MaaS for tourists that has following limitations:

- The knowledge about the operation of the business model and knowledge about MaaS stays on the MaaS operator (Matyas & Kamargianni, 2018). There is no open source where researchers can find the price calculation method of the MaaS suscriptions, since MaaS operators might claim this expose their business models to competitors. A challenge that this master thesis pretends to achieve is to know the negotiation pricing details that Brussels MSPs manage nowadays when they partner with 3rd party ticketing provider.
- Another limitation in the literature is that there is still a lack of research about feedback (willingness to collaborate, negotiation terms, resources, etc) from key stakeholders like Mass MSP and Micro MSPs, IT developers and investors. According to Mathias & Kamargianni (2018) there is not enough qualitative and quantified evidence of their preferences acceptance of MaaS business models. This master thesis considers crucial bring industry feedback in order to contribute to the literature on MaaS.

In summary, reviewing literature about MaaS for tourists has these final remarks:

- The way MaaS will unfold in the future is still uncertain and depends on a series of technological, social, mobility and regulatory trends and developments. A. Polydoropoulou, et al. (2019)
- If MaaS developments is financed by car manufacturers (DAMLIER, D'IETEREN, BMW, TOYOTA) and car service providers (UBER) it could make MaaS evolves into a car-centric solution, this could have an adverse effect on road capacity and increase traffic congestion (Hensher, 2018; Mulley and Kronsell, 2018). Therefore, a critical issue under discussion is the importance of public transport in the delivery of MaaS (Hensher, 2017, 2018; Mulley et al.,

2018; Utriainen and Pöllänen, 2018) with the mission of understanding the cities needs and their users (Polydoropoulou, et al.2019)

- However, real-life applications of MaaS business models must address and adapt to the local conditions and unique particularities (such as infrastructure/technology, operators' capabilities, regulatory issues, social values) Polydoropoulou, et al (2019)

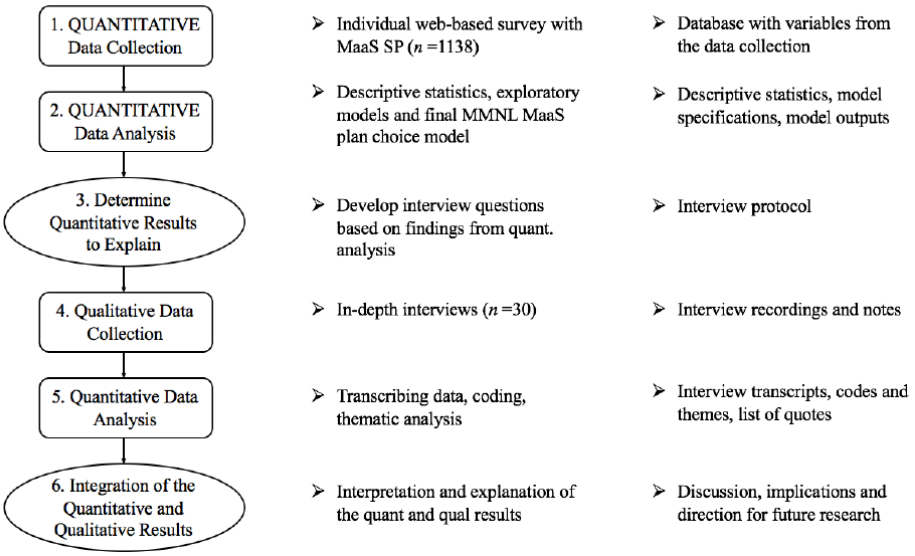
CHAPTER 3

METHODOLOGY

This thesis will have quantitative and qualitative data. For the quantitative data it is necessary to survey tourists and for qualitative data is necessary to interview key stakeholders of the MaaS industry in Belgium. The methodology design will be similar to the one used by Matyas & Kamargianni (2018) that's illustrated in the below graph. The difference will be in instead of six phases, this master thesis methodology will carry out these three main phases:

1. Quantitative data collection & analysis → via surveys
2. Qualitative collection & analysis → via interviews
3. Business plan elaboration

Figure 8 – Quantitative & qualitative methodology for a MaaS research (Matyas & Kamargianni, 2018)



The type of data collected would be related to knowledge and preferences of MaaS products, booking preferences, mobility service providers strategies to solve the end-to-end travel experience of tourists, differences and similarities of current MaaS providers offers, etc. Their responses will generate quantitative data in booking and travel behavior, MaaS preferences, key enablers, barriers and trends around the potential of creating a Tourist MaaS operator in Brussels

1.10.1 TARGET AUDIENCE

The first target audience that will be surveyed will be male and female leisure tourists from 18 to 50 years old that arrives at main arrival hubs in Brussels. Specifically, tourists who are taking public and shared transport to reach their accommodation and tourist destination during the period of April 2020. The second target audience will be about interviewing core stakeholders' representatives (MaaS Manager Directors, Sales Managers, Commercial and Partnerships Manager in charge of negotiating terms and partnership agreements with MaaS operators.)

PHASE ONE

The objective of this phase is to collect quantitative data to answer our 1st research question:

- *RQ1: "What are the main MaaS features that should be included in the design of an MaaS app platform to give added value to tourists?"*

Data collection methods

1. **Development of an App prototype**
   - An app prototype called SNEL will be designed with travel features, travel modes, journeys, rates, profile account, dashboard, etc. This prototype will be validated by tourists via online survey. This prototype pilot will be created with a software called AdobeXD, which is a free and user-friendly software for developers.
2. **Individual online survey.**
   - **TO WHOM?** → The segment of leisure tourist in Brussels that departs or arrives in the selected arrival hubs & to the testers of the Buffl pilot survey launch in April 2019.
   - **ABOUT WHAT?** revealed and stated preferences about MaaS and their willingness to use SNEL app.
   - **WHERE?** → The tourist will be approach in person at the main tourist arrival hubs (Airport Zavemtem, Airport Charleroi, Gare du Nord & Gare Midi bus stations and Brussels South train station)
   - **HOW?** → The online survey (using Google Forms) will be carried out individually with the help of tablet where tourist can respond their choices directly on the screen.
   - **HOW MANY?** → Between 50 -100 respondents, equally distributed among the five arrival hubs.

Data Analysis method→ A descriptive analysis will be used to analyze the needs, preferences and willingness to use values from the survey respondents.

Secondary Sources→ Statistics and reports from journals and scientific papers about MaaS and tourism. As well as MaaS providers websites and apps to compare their main competitive advantages and disadvantages in their app features.

PHASE TWO

The objective of this phase is to collect qualitative data to answer our 2nd research question:

- *RQ2: "According to core MaaS stakeholders, what are the key enablers and barriers that should be addressed to partner with a Tourist MaaS operator in Brussels?".* This will be carried out via interview questions to stakeholders that will help to explain quantitative results gathered from the survey to tourists.

Data collection method→ Semi-structured interviews to core stakeholders

- **TO WHOM?**

  Mobility Service Providers (MSPs): B2B sales Manager, MaaS directors or MaaS product development managers

  1. Bus, Metro, Tram: STIB Brussels
  2. Rail: NMBS
  3. Cross border Coach: Flixbus
  4. Cross border Train: Thalis

5. Bike sharing: Villo bike, JUMP bikes (UBER)
6. E-scooters: Dott, Circ
7. Ride hailing: Uber

- **Investors:** representatives of corporate or angel investments in Belgium interested in mobility solutions.
- **IT Developers:** freelancers or corporate IT developers in Belgium giving feedback on costs calculation and tools required to develop a MaaS provider
- **3rd Parties:** companies in the Brussels tourist industry interested in selling their products in SNEL platform. (i.e: Brussel Card)
- **Transport Public Authorities (PTAs):** regulators that can provide feedback on the frameworks on which this app could have success and could be subsidize.

- **ABOUT WHAT?** → crucial elements to establish partnerships like data sharing requirements, willingness to partner, barriers to partner, pricing terms, preferred revenue model and all necessary inputs to partner with a tourist MaaS platform.
- **WHERE?** → Interviews will be carried virtually, in the office of the stakeholder or in industry events.
- **HOW?** → The interview will contain a semi- structured questionnaire with open and closed questions

Data Analysis method→ From the notes and the recordings, data inputs will be transcriptted to evaluate matches and mismatches with tourist survey results and categorized into their respective BMC component

Secondary Sources→ Statistics and reports from MSPs reports and main website & app information

PHASE THREE

The objective of this phase is to elaborate a business plan proposition using the quantitative data of the tourist survey and quantitative data of the stakeholder's interviews and be able to answer our 3rd research question:

❖ RQ3*"What is the business plan that a Tourist MaaS operator should implement to compete with larger MaaS operators in Brussels? ".*

The tool we are going to use is the Osterwalder's Business Model Canvas.(BMC)

Data collection method→ Receive training on value proposition validation via startup workshops

- **FROM WHOM?**
  - VOKA Vlaams Bravant Leuven
  - Student Start up Limburg
- **ABOUT WHAT?** → Learn how to validate a business idea by elaboration an Osterwalder's BMC (Receive feedback of how to create a business plan)
- **WHERE?** → Offices in Leuven.
- **HOW?** → participating in the workshops and getting insights.

Data Analysis method→ Design of a lean startup business plan to create SNEL→ Tourist MaaS operator in Brussels

Secondary sources → Reports and scientific papers about the 9 components of the Osterwalder's BMC: value proposition, costumer segments, distribution channels, customer relationships, key resources, key partnerships, key activities, revenue streams cost structure.

CHAPTER 4

RESULTS

This chapter contains costumer and industry feedback collected via surveys and interviews. This feedback helps to shape the business plan, test business hypotheses *on-the-go* and explore the feasibility of launching a *Tourist MaaS operator* in Brussels.

4.1 SECTION 1. SURVEYS → TOURIST FEEDBACK

The feedback from surveys will help to address the first research question.

- **RQ1** : *What are the main MaaS features that should be included in the design of an MaaS platform to give added value to tourists?*

In total 3 pilot surveys were launched since the beginning of the project in April 2019. The first two were elaborated through BUFFL app survey platform. This is a tech Belgian startup that gave a 3-day training about business model canvas (BMC) validation at the 2019 VOKA Student Bootcamp. The author of this master thesis participated in the 1-week event and was awarded with 3rd place of the contest using SNEL MaaS operator value proposition. One of the advantages of the BMC validation training was to launch two market instant surveys via their BUFFL app for free. Basically, their service is to provide instant customer feedback to clients who wants to test value propositions, this feedback comes from their app users that fills up online surveys in exchange of discounts from shops, restaurants and other partners. The results and findings from this two BUFFL surveys helped to build the parameters and questions of the third pilot survey that was launched in January 2020.

The 3rd pilot survey targeted leisure tourists arriving at three main public transport hubs in Brussels. (Airport Zaventem, Brussels Zuid and Brussel Central train stations) Basically, the aim was to ask them about their travel behavior, mobility platforms, preferred SNEL features and willingness to use SNEL app demo (if exists) for their stay in Brussels. A 4thsurvey was planned for April 2020, with the intention to validate the new experiments and modifications done in the BMC thanks to the on-going industry feedback. Unfortunately, the planning for this survey was forced to be cancelled due to COVID-19 crisis since it was unfeasible and forbidden to survey tourists during closed borders, travel ban, social distance and lockdown measures. The 3rd survey questions can be seen in APPENDIX 3.

Due to budget, timing and unfortunate circumstances, is obvious that these survey results has representativity limitations due to the small sample of testers; however, their feedback provides valuable insights and hints to understand the factors by which tourists are prioritizing their mobility decisions when they arrive in new urban environments for leisure purposes.

4.1.1 MAIN RESULTS

1st Survey → Date: 15th April 2019 | **Testers**: 105 | **Age**: 18 – 35 years (80%)| **Profile**: students (100%)

3rd Survey → Date: 16th January 2020 | **Testers**: 15 | **Age**: 18 – 35 years (75%)| **Profile** : tourists (100%)

Aim→ Collect tourist feedback on **travel behavior** such as:

A. Preferred travel modes when visiting a new city as a tourist
B. Issues and frustrations using those modes while visiting a new city
C. Issues experienced when searching and booking the best mobility choice

4.1.1 MAIN RESULTS

1ST SURVEY + 3RD SURVEY

Table 6 – Preferred travel modes as TOURIST

TOP	Mode	1ST Survey	3rd Survey
1	Train|Tram|Bus|Metro	44%	45%
2	Walking	29%	28%
3	Car Solutions	15%	17%
4	Bike	10%	7%
5	Other	2%	0%
6	E- scooter	1%	3%

Table 7 – Walking issues as tourist

TOP	Walking issues	1ST Survey	3RD Survey
1	Difficulties of getting directions	46%	13%
2	Language difficulties	23%	6%
3	No issues	0%	50%
4	Unclear local public transport information	14%	13%
5	Exhausting	6%	19%
6	Long distances & travel times	11%	0%

Table 8 – Public Transport issues as tourist

TOP	Public Transport issues	1ST Survey	3RD Survey
1	Unclear local information (i.e: bus stops location, routing, availability, safety, weather)	37%	23%
2	Unclear ticketing information and complex booking	16%	19%
3	Price too expensive	12%	19%
4	Language difficulties	14%	15%
5	Other issues	12%	15%
6	Crowdness & lack of comfort	9%	8%

Table 9 – Biking & e-kick scooter issues as tourist

TOP	Biking + e-scooter issues	1ST Survey	3RD Survey
1	Unclear & complex booking information	35%	14%
2	I don't bike or use e-scooter	0%	33%
3	Difficulties of getting directions	26%	0%
4	Language difficulties	13%	14%
5	Dangerous or crowded traffic	13%	14%
6	Other issues	9%	14%
7	Availability nearby	4%	10%

Table 10 – Issues when searching for best mobility mode as tourist

TOP	Searching issues	1ST Survey	3RD Survey
1	Information is in another language	40%	18%
2	Local information is not clear (i.e: traffic signs, routes, transport details, suggestions)	30%	24%
3	Information is not accesible without internet	11%	29%
4	Pricing and ticketing information is not clear	8%	24%
5	Information is not updated and website/app is not user friendly	11%	6%

Table 11 – Issues when booking best mobility mode as tourist

TOP	Purchsing issues	1ST Survey	3RD Survey
1	Ticket pricing is too expensive and unclear	48%	42%
2	Installation of too many mobility apps for every single operator	20%	42%
3	Booking process takes too long and is not user-friendly	32%	17%
4	When requests my ID data (storage of credit card and personal information)	0%	33%
5	I have no problem to pay tickets online	0%	25%

4.1.2 MAIN RESULTS

2ND SURVEY + 3RD SURVEY

2ND Survey → Date: 16th April 2019 | **Testers**: 101 | **Age**: 18 – 35 years (75%)| **Profile**: students (100%)

3RD Survey → Date: 16th January 2020 | **Testers**: 15 | **Age**: 18 – 35 years (75%)| **Profile** : tourists (100%)

Aim→ Collect tourist feedback on **mobility platforms** such as:

A. Preferred mobility platforms when visiting a new city as a tourist
B. Preferred features showed in SNEL app demo video
C. Willingness to use SNEL app (if exists) for their future trip planning and booking.

Table 12 – Preferred mobility platforms as TOURIST

TOP	Routing app	1ST Survey	3RD Survey
1	Google Maps	56%	93%
2	Waze	23%	0%
3	The local public transport app	18%	0%
4	Citymapper app or City2Go	3%	7%
5	WHIM app	0%	0%
6	SKIPR app	0%	0%

Table – 13 Preferred features showed in SNEL app demo video

TOP	Preffered features of SNEL app	1ST Survey	3RD Survey
1	Easy to choose the cheapeast and muiltimodal trip	16%	32%
2	Possibility to book and pay without installing additional apps	14%	32%
3	Easy to search route from origin to destination	14%	21%
4	Real time information according delays and weather conditions	14%	11%
5	Easy route map and navigation	15%	4%
6	Content & route suggestions to restaurants and activities happening that day	9%	Not asked
7	The design of the app	6%	Not asked
8	A one-stop app solution for mobility needs when you go to work or you visit a new city	5%	Not asked
9	The option of accumulating points to be exchangeable of free rides	4%	Not asked
10	The option to manage my tickets	4%	Not asked

Table 14 – Willingness to use SNEL app (if exists) for your future trip planning & booking.

TOP	Willigness to use SNEL app	1ST Surve	3RD Surv
1	Probably YES	39%	50%
2	For sure YES	18%	43%
3	MAYBE, I need more information	26%	7%
4	Probably NO	16%	0%
5	I don't understand the concept	2%	0%
6	Definitely NO	0%	0%

4.2 SECTION 2. INTERVIEWS → INDUSTRY FEEDBACK

The aim of collecting industry feedback has the purpose of sensing the Belgian MaaS market and validate hypotheses stated in the business plan that is proposed in this master thesis.

The feedback from the interviews will help to address the 2ND research question.

- **RQ2** : *According to core MaaS stakeholders, what are the key enablers and barriers that should be addressed to partner with a Tourist MaaS operator in Brussels?*

This industry feedback was taken from **12 representatives** in which their role within their organization is to take decisions regarding MaaS solutions and B2B partnerships such as MaaS program coordinators, MaaS experts, partnership managers, operations managers and city managers.

- **2 Belgian Public Transport Operators:** De LIJN / STIB
- **4 micromobility operators**: DOTT / UBER / LIME/ BIRD
- **4 Regulators:** DG Connect – European Commission / Flemish Ministry of Mobility and Public Works (MOW)/ City of Antwerp / PTA – Finland - Ministry of Transport & Communications
- **1 industry group:** MaaS Alliance

Unfortunately, representatives from travel agencies (i.e: Visitbrussels.be, Booking.com, Skyscanner.com, Connections.be) bike services (i.e: VilloBike, JUMP) and internet providers (i.e Telenet and Proximus) were approached via email from February 2020 till May 2020 but they didn't respond to the interview invitation, they were not available due to COVID-19 priorities or simply they were not interested.

Here the interview results:

- 5 face-to-face interviews were held during the MaaS Alliance Plenary on February 2020. **(*REMARK:** The author of this master thesis did an internship as the assistant of the Secretary General of the MaaS Alliance from February 2020 till May 2020)
- 1 face-to-face interview was held in a e-scooter company warehouse
- 3 virtual interviews were held via Skype from April 27 to May 4th
- Duration: ~10 min for face-to-face interviews & ~1-hour for virtual meetings via *Teams.*

4.2.1 Data analysis method: Questions categorized in BMC components

At least 16 key questions were asked to the participants, each question is key to give feedback according to each BMC component. The objective is to build a business plan based on their industry feedback according to each specific BMC component and visualizing the MaaS player response for each of the questions. The whole interview exercise resulted in 4 BMC iterations, the business plan was built on-the-go, meaning that every time was fine tuning and improved according to the feedback provided by the previous participant. **This is the first empirical evidence ever of industry feedback related to the feasibility of launching a tourist MaaS operator in Belgium.**

Disclaimer

The name of each representative will be kept confidential and anonymously in order to respect their personal opinion and avoid putting in danger the image of the organization they represent. Their personal opinion do not necessarily reflect the position of the organization they represent. This industry feedback has only academic purposes and the intention is to objectively sense the MaaS market without prejudicing any MaaS organization or its representatives.

Table 15 – Interview questions to the MaaS representatives of Brussels

BMC Component	QUESTIONS
COSTUMERS	**1.** About TARGETING the tourist market? **2.** About the TIMING to introduce MaaS solutions to tourists?
CHANNELS	**3.** About through what channels I can REACH my MaaS costumers ?
VALUE PROPOSTION	**4.** About offering a MaaS solution for TOURISTS **5.** About how relevant is MAAS VALUE PROPOSITIONS nowadays ? **6.** About how clear and intuitive is the APP DESIGN? **7.** About the best way to BUILD a mobility bundle? **8.** About the CITY CARD OFFERING? **9.** About the DAYPASS TICKET OFFERING? **10.** About the MICROMOBILITY VOUCHERS OFFERING? **11.** About offering ADDITIONAL SERVICES apart from fixed bundle? **12.** About the ROAMING capabilities **13.** About how user friendly is the TICKETING SOLUTION I am offering? **14.** About the benefit of getting TRAVEL BEHAVIOR DATA?
KEY PARTNERS	**15.** About PARTNERING & SHARING DATA with a Tourist MaaS app? **16.** About what you OFFER in your data sharing agreements? **17.** About what REQUIREMENTS you ask in your data sharing agreements? **18.** About partnership with the OFFICIAL CITY AGENCY? **19.** About TRACTION steps the MaaS operator can do to proof they can bring business? **20.** About allowing 3rd resellers (Booking.com) resell tickets on behalf of the MaaS operator?
REVENUE MODEL	**21.** About negotiating a COMMISSION? **22.** About allowing the MaaS operator TO DO BUNDLES with your tickets? **23.** About allowing VOLUME PRE-PURCHASE & terms (nonrefundable, non-expirable, fully sold until activation)? **24.** About getting profit from BUILDING mobility bundles? **25.** About the EXTRA REVENUE STREAMS apart from the reselling ticket commission?
COST STRUCTURE	**26.** About the COSTS OF THE INTEGRATION with MSPs and other partners?
KEY RESOURCES	**27.** About how interoperable is your BOOKING back-end do an integration with a MaaS operator? **28.** About how interoperable is your TICKETING back-end do an integration with a MaaS operator? **29.** About how interoperable is your PAYMENT back-end do an integration with a MaaS operator? **30.** About STANDARDIZATION of better interoperability in routing, booking, ticketing a payment back-end?
KEY ACTIVITIES	**31.** About the key ACTIVITIES I MUST VALIDATE before I start investing money?
COSTUMER RELATIONSHIPS	**32.** About how to GET, KEEP AND GROW costumer base?

Table 16 – Industry feedback on costumers - Q1

Q1: About good TIMING & TARGETING the tourist market?		
MSPs		
About <u>TARGETING</u> the tourist market **R1- STIB** → *" - The focus of STIB is also the tourist, we need the tourists, we need this kind of costumers. We are aware about their ticket payment obstacles and that's why we are launching, in mid-June, a EMV payment system in the metro toll scanners"* **R2- DE LIJN** →*" From my side, I got the principle, I am certain the tourist will be interested on public transport deals, because they have been buying this kind of services from the travel agencies, so, the principle stands, is correct."* **R1- DOTT** → *"Regarding the tourist market, our main strategy right now to serve the tourists is supplying them with scooters in touristic areas"*		**About the <u>TIMING</u> to introduce MaaS solutions to tourists** **R1- DE LIJN** → *"You might be <u>too early</u> to offer this value proposition to tourists. Especially after COVID crisis, where you find airlines like Lufthansa estimating a demand reduction by 75% and only coming back to normal after 2023 or 2024…..Also, in order for governments to apply urban travel restrictions , travel capacity reduction must go by at least 30%, plus people will have be afraid of jump again into public transport. The question is when?"* **R2- DE LIJN** → *"Yes the JUMP ticket digital transition could be for your app but giving the situation right now [COVID -19] there will not be tourists willing to use that ticket soon, so is good that we have some time."* **R1- DOTT** → *"Definitely, the tourists is a big market for us, because it gives added value, but I am not sure if for MaaS would be part of our main topic"*
MaaS Alliance	COSTUMERS	**Regulators**
R1- MaaS Alliance → *N/A*		**R1- MOW Flanders** → *N/A* **R1 – Antwerp City** → *N/A* **R1 – PTA Finland** → *N/A*

Table 17 – Industry feedback on channels– Q2

Q2: About through what channels I can REACH my MaaS costumers?		
MSPs		
R1- DE LIJN →*"A full integration with 2nd resellers like Booking.com is not going to be easy because you will have to go through a lot of technical and contractual difficulties to implement that.* **R1- DE LIJN** → *"But what I think would work to pull costumers to your platform is to <u>offer free promotion codes</u> in those travel agency websites"*		*So, when the tourist gets a promo code, they can download your app and redeem that promo code to pay for daypasses and tickets at discounted price that you are offering in your platform. Once you have the costumer there you can offer them pay as you go or tailored subscriptions."* **R2- DOTT** → *N/A*
MaaS Alliance	CHANNELS	**Regulators**
R1- MaaS Alliance → *"You could consider that your B2B costumers could be travel agencies from the Asian market, such as travel agencies bringing Japanese and Chinese visitors. You could research if there is a local travel bureau assisting them here in Brussels, I don 'know."*		**R1- MOW Flanders** → *"I think in MaaS Global they will generate money from the reselling, but next to that they will have their own car service"* **R1 – Antwerp City** → *N/A* **R1 – PTA Finland** → *N/A*

Table 18 – Industry feedback on Value Proposition– Q3

<table>
<tr><th colspan="3">Q3: About offering a MaaS solution for TOURISTS</th></tr>
<tr><th colspan="3">MSPs</th></tr>
<tr><td colspan="2">R1- STIB → “Yes. It was very interesting to hear your value proposition, was very complete and very open discussion. I appreciate that. Your project is very interesting and we certainly we will have contact in the future”

R1- DE LIJN → “I think you have a good proposition by offering MaaS to tourist for two reasons.1 They have more disposal time to accept combining modes for their journey. 2. They own a car at the city they are arriving” “I think that offer public transport packages to tourist is a good concept, I just don’t think is extremely new because in bigger cities they have, the question is how you are going to apply it “

R2- DE LIJN →“What makes you unique? I worked for Thomas Cook travel agency for 5 years, re-selling public transport tickets or digital city cards via travel agencies already exist as additional service, so if the service itself already exist, what exactly do you offer new and an unique?”</td><td>R2- DOTT → “Every time I go to new city, I normally get a bike, because it gives me freedom, I don’t have to follow a schedule. I am not looking what is the best mode to get that place, I am more choosing which mod can take me more efficiently to that place, spending, time and less cost, allowing me to enter small streets, etc thesis.”

R2- DOTT →……”I think you have a valuable thesis because if you proof that this business model can work, then is a successful thesis, but also if at the end it doesn’t it work and you explain why, it will be also a successful thesis”</td></tr>
<tr><th>MaaS Alliance</th><th>VALUE PROPOSITION</th><th>Regulators</th></tr>
<tr><td colspan="2">R1- MaaS Alliance → “Yes, as this is your master thesis you are very in the core of the biggest issue in MaaS which is the willingness of core MSPs to get on board, it is demonstrating the real life very well.
R1- MaaS Alliance → “In terms of your business plan. Well, so far it looks good. I cannot say that it will work out but you have the right components and you are also facing the real challenges that are out there in real life. If the business model do not work at end, would be because of certain facts but as business plan is worth of trying”</td><td>R1- MOW Flanders → “At the moment, your idea is not feasible, because you don’t have access to more than half of the mobility providers that are around you. Micromobility providers a not sharing their APIs”
R1 – Antwerp City → “What we do in Antwerp is that we sell the Antwerp card in which gives the tourists the access to certain number of museums in Antwerp and public transport is included. A combi ticket”

R1 – PTA Finland → N/A</td></tr>
</table>

Table 19 – Industry feedback on Value Proposition– Q4

Q4: About how relevant are MaaS value propositions to your organization?		
MSPs		
R1- STIB → *Unfortunately , I must say that until now I have never saw a revolution in the MaaS solutions, is always the same. For example, in the past, we had a lot of car shared companies and now we have 3 car shared remaining. I am almost sure that this will happen the same to MaaS solutions, having 15 MaaS applications and then only 2 will remain.* **R1- STIB** → *- I think the car shared companies realized that there was not business case for that, was too complex, there was no possibility to generate good income for this kind of service. An for MaaS solutions is also hard, because if you don't have the very best app, users will skip it and delete it from their smartphone. We have a lot apps in our smartphones. When you test it, you can confirm if its good, and if its not good its deleted.*		**R1- STIB** → *I think that when you launch an application in the market you must very sure that is functionally and user friendly good. If you lunch something that the user might find as obstacle, you will see a competitor that is offering something better and then your app will be deleted. That's a problem of that kind of digitalization. You must be sure you must lunch a very good service.* **R1- STIB** → *- In order to give a seamless solution, you first guarantee that you solve the current technical limitation like the transition that we are doing of tickets to digital environments.*
MaaS Alliance	VALUE PROPOSITION	**Regulators**
R1-MaaS Alliance → *- N/A*		**R1- MOW Flanders** → "*You cannot compete with Google Maps. We see that a lot of this offers has been created but they are actually not based on a problem that is user-driven. What you need to think about when you create a startup is to tackle what is the problem the user is having that he needs to solve (time, money), so your startup should not offer a solution of mobility in which all mobilities are in one, because the costumer actually it doesn't need that."* **R1- MOW Flanders** → "*MaaS routing service is not viable, because today to be honest, 88% of the people in the market use Google Maps, so how you are going to compete with that? Google Maps has all my history, my identity, is personalized, it know where my home is, where my work is, it knows everything about me, so there is nobody can compete with their routing service"* **R1- MOW Flanders** → "*MaaS is data driven business model in which data is shared for better environmental impact to cities"* **R1- MOW Flanders** → "*I don't see a modal shift happening in the short term. We see in the market that the modal shift is just flat as it can be. We have mobility budget in Belgium or exchange of cash if you use to public transport and these initiatives are not working , because it is very difficult to compete with the best mobility service possible which is your own car, that's what see in the market. Everybody thought that the whole population will be shifting to shared services and that is not happening in the short term"*

Table 20 – Industry feedback on Value Proposition– Q5

Q5. About app design, city card and micromobility vouchers?

MSPs

About how clear and intuitive is the <u>APP DESIGN?</u>

R1- STIB → *- "Yes. What you showed me seems very intuitive, even if its only an app visualization. Maybe, what you showed was a little bit too complete, at the end ok, you have the routing, the booking, the ticketing, and then you have the possibility to have other different services like the wifi internet, food and package delivery and so, maybe is too complex but it depends, sometimes in intereting for some people. I must say that all the MaaS application that I saw until now are almost the same, even our MaaS application at STIB, it has almost the same screens: route possibilities, price, time, and extra information and so on. Is always the same scheme.*
Yes you are in the correct direction in the end to end."

R1- DE LIJN → *"Is not up to me to provide feedback on app design. It looks ok to me because it looks simply to use, what it is difficult is when combine different modes, I think you still have work to do in how better visualize that. Apart from that quite clear to me. Is huge assumption that in your model you have to guarantee that the traveler can identify the difference between operators and across modes."*

About the <u>CITY CARD OFFERING</u>

R1- STIB → *- At STIB, we certainly see that tourist likes this kind of city card and public transport combination. Actually, visitbrussels.be was the one interested in having public transport as part of their Brussels card bundle. For us in not priority, but is a interesting offering.*
R1- DE LIJN → *For De Lijn it doesn't matter, is more on your side. We provide you the tickets and is up to you to combine it to any sort of product.*

About the <u>MICROMOBILITY VOUCHERS OFFERING</u>

R1- DE LIJN → *I also have some doubts about the voucher to be honest, I think changing platforms from one to another, I don't think this would work very well, I understand that would don't at moment too much notoriety but I would still what is possible there.*

About offering <u>ADDITIONAL SERVICES</u> apart from fixed bundle.

R1- DE LIJN → *I think your business would not work if its only targeting tourist, but it could work if you add the leisure passengers and tourists as your main audience. For example, me searching how to get to a shop, me searching how to get to a museum, in a weekend or after work or any moment.*

MaaS Alliance | VALUE PROPOSITION | Regulators

About the <u>CITY CARD OFFERING</u>

R1- MaaS Alliance → *"Each bundle is good, It will depend if I am visiting the city for the first time, then probably I would choose the city card offering. However, if I have already visit several times this city or I am just visiting friends then I probably would choose without the city card offering.*

About the <u>MICROMOBILITY VOUCHERS OFFERING</u>

R1- MaaS Alliance → *"Is interesting. What is the added value for the costumer if he pays for 10 euros vouchers? You should consider to constantly give workshops to the taxi companies in order to train and inform their taxi drivers that the users can pay with vouchers as payment method in exchange of the ride. To avoid a confused situation and language issues that can result in bad experience for the tourist.*

About the <u>CITY CARD OFFERING</u>

R1 – Antwerp City → *"Depends in the added value, I think for Antwerp is 5 euros extra if you want to add public transport to the Museum pass, that's a very limited margin. But I can imagine that if you do it for events or bigger tours then you can play with your budget a bit more*

R1 – PTA Finland →

Table 21 – Industry feedback on Key Partners– Q6

Q6: About PARTNERING & SHARING DATA with a Tourist MaaS app?		
MSPs		
R1- STIB → *- "When I see your project, I think is interesting, but you will have to wait until we have our full day tickets into a digital environment that one day will allow to integrate in your app. I think by 2021 we will be able to sell our full day passes as digital tickets. Its STIB objective to have a ticket digitalization by 2021"* **R1- STIB** → "*You should know that we are developing our MaaS pilot for the B2C and will start normally in June with the testers, at the moment we have 2000 testers that will use the MaaS pilot….As I told you, we will launch a new system to open the gates, we don't want to use our own MOBIB card API that other partners are using. The mobib card is not user friendly, we don't want to use that kind of system, we want to use our own system to open the gates"* **R1- DE LIJN** → *" You have to check our open standard and see if its ok for you. I think is more appropriate for your target group to offer and integrate the JUMP ticket, which allows you to travel multimodally within the region of Brussels. Check it out."*		**R2- DOTT** → *"I see an integration to a MaaS platform maybe in the next 12 months or more….Our willingness to integrate DOTT scooters into a MaaS platforms depends on many constraints that at the end it looks impossible. But, for example, if it's perfectly safe that we know that our data is not used by the competition, then probably yes.* **R1- UBER** → *"For the moment, I don't think so, at UBER we are trying to position ourselves as MaaS operator, for commuters and for Tourists, we provide ride hailing Uber cars, JUMP electric- free floating bikes and lime e-scooters, all of them already operating in Brussels ….At the moment, at UBER we see difficult to integrate our services with a third party due to concerns in the payment integration…….In terms of costumers, all MSPs we are trying to build their own customer base, so is quite hard we redirect our customers to a third party"* **R1- BIRD** → "*Hey Erick. Thank you for your message, but at the moment we are not open to any partnerships with other mobility providers"*
Regulators	KEY PARTNERS	**Regulators**
R1- MOW Flanders → "*The Belgian PTOs are willing to open up their tickets, but the micromobility providers (bike, scooters and ride sharing) they are not opening their APIs. ….For example, at moment, an integration with DE LIJN seems feasible, but micromobility integration I don't see that happening in the short term. I don't think a MaaS platform that integrates micro mobility providers is realistic since this companies are not reselling tickets to third parties, at this moment in Belgium"*		**R1- MOW Flanders** → "*Everybody wants to own the costumer, they want to own the costumer as MaaS provider in which they offer all kind of services, so they are looking into a closed model. They don't want to lose their costumers by opening up to others. Is clearly evident when you see in their apps that they are not working together".* **R1 – PTA Finland** → "*In Finland, the legislation obliges every MSPs to keep the data and give access to data via ticketing API and payment API. But there some issues, because the actual relationship between the MaaS operator and PTO are based on commercial contracts, so they have to negotiate that as well.*

Table 22 – Industry feedback on Key Partners– Q7

<table>
<tr><th colspan="3">Q7: About what you OFFER in your data sharing agreements?</th></tr>
<tr><td colspan="3">MSPs</td></tr>
<tr><td colspan="2">R1- STIB → “About sharing and integrating routing data is absolutely not a problem, you just need to sign an open data contract with us and is free. …You did a good summary of all the integration needed with the different partners. As first step, we sign with you a routing integration contract showing real time of STIB vehicles and schedule. Second, for the ticketing integration I would wait for the digital tickets that we will develop and finish by 2021”

R1- DE LIJN →“In De Lijn we share standardized data [routing and ticketing] to any operator you wishes free access and integration of the De Lijn offer, but as long as you respect the conditions and criteria we set.</td><td>R2- DOTT → At DOTT, we only share our data to the Brussels Mobility Department. We don’t share any API to anyone. The headquarters of DOTT haven’t decide any API sharing policy to 3rd parties. We could share a Booking API for the scooter’s reservation on 3rd party platforms but is up to the HQ to decide.

R1- LIME → “Hi Erick, Thanks for your request. Unfortunately, we don't do full MaaS integration (no payment integration) currently. We can however, when your app is created, think about partial integration of Lime. Best regards</td></tr>
<tr><td>MaaS Alliance</td><td>KEY PARTNERS</td><td>Regulators</td></tr>
<tr><td colspan="2">R1- MaaS Alliance → “Yes, as this is your master thesis you are very in the core of the biggest issue in MaaS which is the willingness of core MSPs to get on board, its demonstrating the real life very well. In terms of your business plan. Well, so far it looks good. I can not say that it will work out but you have the right components and you are also facing the real challenges that are out there in real life. If the business model do not work at end, would be because of certain facts but as business plan is worth of trying”</td><td>R1- MOW Flanders → For example, De Lijn has open their APIs . The Lijn is open for data sharing, we have open our APIs. There is GTFS real time that any MaaS operator can collect . For example, you can easily integrate to get the tickets of de Lijn. De Lijn already has a number of partnerships in place
R1 – Antwerp City → “What we do in Antwerp is that we sell the Antwerp card in which gives the tourists the access to certain number of museums in Antwerp and public transport is included. A combi ticket”</td></tr>
</table>

Table 23 – Industry feedback on Key Partners– Q8

Q8: About what REQUIREMENTS you ask in your data sharing agreements?		
MSPs		
R1- STIB → *" The contract is not very light, is 30 pages and we request a solid and long-term business plan, compliance to the technical aspects and constant reporting to STIB* **R1- STIB** → *" In <u>business plan,</u> we check the financial projections, the solidity, strong commercial and financial partners like VisitBrussels.be and Brussels Mobility, we don't want to sign an agreement with MaaS operators that will disappear in 1, 2 or 6 months. We ask a solid and long-term business case with break-even planning, revenue planning from other partners and sources of financing"* **R1- STIB** → *"In <u>technical aspects</u>, all the systems and data that you used a MaaS partner must be checked by our IT people. Is very important that the MaaS operator follow all the technical rules that we provided.* **R1- STIB** → *"In <u>reporting</u>, we check about the specific data you used from us and so on; about your partnership planning, the existing and the future partners you will have and about the different combination of mobility used by your users and so on"* **R1- DE LIJN** → *"With De Lijn, to make an agreement you need be an established company.... Be aware about the fact that we are moving to nominative ticketing, which means that we will be asking the name of the person that is travelling and you must collect and provide us with that information at the moment they purchase the ticket. We will sell you a ticket in the moment you have a buyer with a expiry date of 1 year.*	**R1- DOTT** → *"About Listing criteria → Not only the MaaS operator should contain DOTT in the scooter listing, but also we need to be sure that the same criteria of visibility and prioritization in your MaaS app is applied equally to another scooter competitor also present in the app. For example, if the algorithms are showing Lime scooter first, is it because they pay you more money? their scooters are actually closer to the user? OR what criteria?* **R1- DOTT** → *About data encrypted → We only would agree if we see that is impossible for the competition to see which data is coming from whom. All data needs to be confidential to be sure Lime is not receiving valuable, recurring and formatted data from us via the MaaS operator…. How do you keep our secrets away from our competition and how we make sure our ticketing and booking system is safe?* **R1- DOTT** → *I see positive if cities start making compulsory MSPs to share their data in order to renew their license, this could bring a societal benefit in terms of the decrease of cars in the street"* **R1- UBER** → *Well, we partner with City Mapper and SKIPR, but this are always bilateral negotiations. We are working in a partnership with SNCF app of France so we can offer UBER cars inside their app.* **R1- UBER** → *At the moment we provide third parties a deep link integration which provides redirection interoperability between our partner app and Uber app. Deep links are simply URLs that redirects users to the Uber app.*
MaaS Alliance	KEY PARTNERS	**Regulators**
R1- MaaS Alliance → *"I recommend that when you buy the tickets from the MSPs you must accept their sales and pricing terms, since is better not to try to negotiate with them for any privilege or preferential rate. Just buy their tickets in bulk following their terms, if they allow it."*		**R1 – PTA Finland** → *Not always is a win-win situation. because some PTA doesn't see the actual benefit of joining the MaaS operator. Therefore, the success on sharing the data relies more in the negotiation of the commercial agreement since they have to negotiate the revenue share and price settings.*

Table 24 – Industry feedback on Key Partners– Q9

Q9. About partnership with CITY CARDS & TRACTION steps

MSPs

About partnership with the <u>OFFICIAL CITY AGENCY.</u>

R1- STIB → *" I must check with our legal team, but I am sure you will have to sign two different contracts, you will have to sign one with Vistbrussels.be to sell the brussels card and you will have to sell a contract with us for the resell for the full day tickets."*

R2- DE LIJN → *" You could look into what Transport for London has done with travel agencies by allowing them to re-sell their oyster card. Find a contact there and see how they do it. This card are digitally available so it could be a useful case to look into it.*

About allowing 2nd resellers (Booking.com) to resell tickets <u>ON BEHALF</u> of the MaaS operator

R1- DE LIJN → *" It is complex. We allow it but I would not advice it yet. I am not against it, but just it seems to strict in this context, that could require even changes in our data strategy for a global context. The contractual set up requires high investment and time…To be honest, I think that NMBS would even more reluctant than De Lijn in this*

About <u>TRACTION</u> steps the MaaS operator can do to proof they can bring business

R1- STIB → *"-The event pass could be a solution to partner with STIB. But at this moment, for the tourist market, the event pass is only used and resell to VisitBrussel.be, so that's why I recommend you to contact VisitBrussels.be because I will not sign a contract with another partner for the tourist market if I don't see first an agreement with VisitBrussels.be. They are our main partner. If we do something for the tourists, we will do it with VisitBrussels.be or if they tell me that is OK to find an agreement with another partner, then yes.*

R2- DE LIJN → *"Good. Your micromobility vouchers strategy looks like a step up for further payment integration, basically to proof to the micromobility providers that you can bring costumers to their apps.*

MaaS Alliance

R1- MaaS Alliance → *N/A*

KEY PARTNERS

Regulators

R1- MOW Flanders → *N/A*

R1 – Antwerp City → *N/A*

R1 – PTA Finland → *N/A*

Table 25 – Industry feedback on Revenue Streams– Q10

<table>
<tr><th colspan="3">Q10. About negotiating a COMMISSION with the MSPs</th></tr>
<tr><th colspan="3">MSPs</th></tr>
<tr><td colspan="2">R1- STIB → " - The second problem that I see is the price. Because <u>we don't give commission</u> to any of our partners. All the prices at STIB are fixed, this means that a re-seller must resell STIB tickets at the same price we are selling them out at our counters and vending machines. There is absolutely no question of discount of STIB tickets. ….. The price of the STIB tickets is written under Brussels law, which has all the prices that STIB should sell their tickets. We cannot change this price. "

R1- DE LIJN →"Yes, De Lijn sells and <u>gives a commission</u> that corresponds more or less to the costs to process the payment [transaction costs]. The paper card also produces a handling cost and production cost. For example, for a m-ticket that currently cost 6.60 at De Lijn we pay a commission to MaaS operators of around 1.8 euro. "

R1- DE LIJN →" Therefore, what you should probably do is to make sure that the commission you ask is lower that this variable cost for issuing a paper ticket (either city card or daypass). In that sense nobody loses, and the costumer has a digital alternative, but if your cost is higher than the production and handling costs that it takes to issue a paper version, then I think your price will be higher, and your costumer will not buy it.</td><td>R2- DE LIJN → "The problem that I see here is having multiple commissions on top of each other charged to user, where you pay a commission to the city cards provider and then travel agency (booking.com) will pay you a commission, making the price not attractive for the user."

R2- DOTT → "We are open to negotiate a commission revenue model but need to make a proper estimation for each commission option you have available and then see which of them will be the most efficient for both. The decision has to be based on cost estimation rather simply setting a random percentage coming from the negotiation. ….Of course, we will ask the less commission as possible. For example, paying 15% of rides revenue to a MaaS operator is impossible"</td></tr>
<tr><td>MaaS Alliance</td><td>REVENUE STREAMS</td><td>Regulators</td></tr>
<tr><td colspan="2">R1- MaaS Alliance → "To be honest, in your volume pre-purchase model getting a 30% discount per volume sounds very optimistic, but you can try. It would be very useful if you check the Belgian PTO ticketing regulation that could state that tickets cannot be sold at a reduced price. Then you will an obstacle to negotiate volume discounts.
R1- MaaS Alliance → "In the other hand, with the subscription revenue model, you have the advantage that you can play with the bundling features because <u>the final subscription price is not so transparent for the consumer</u> so it will be easy for you add a bigger margin. Also, there will fraction of consumers that will underusing the subscription and that will be benefit your profit. "</td><td>R1- PTA Flanders → "There is <u>a commission of 3%</u> on the DElijn tickets. Reselling tickets is not profitable for MaaS operators…..Today MaaS operators like Skipr are not having any revenue, they are having no profitability because is still in experimental discovery of new business"

R1 – PTA Finland → " In Finland, PTOs are not paying any commission "

R1 – Antwerp City → N/A</td></tr>
</table>

Table 26 – Industry feedback on Revenue Streams– Q11

Q11: About allowing BUNDLING & VOLUME PRE-PURCHASE

MSPs

About allowing VOLUME PRE-PURCHASE & terms (non-refundable + 1-year Expirable + fully sold until activation)

R1- STIB → *" -No is not possible. We don't have that kind of system where a partner buy from us a bulk of tickets upfront. First because we don't have digital tickets and digital ticketing system that technically allows that. At second reason is that the API that we have now is an API that allow the re-seller to buy just 1 ticket, the API doesn't give the possibility to buy a bulk and have a stock of digital tickets and then resell them. Is not possible. The API is only a way to sell tickets on a Mobib card format and under personalized basis…The only way to buy bulk of STIB tickets is in a paper format way. You can buy 10 000 one-way tickets but it needs to be paper tickets. "*

R1- DE LIJN → *" DE LIJN doesn't allow MaaS operators to pre- purchasing a bulk of tickets upfront and probably will not intend to do it in the near future. Actually, when you buy tickets in volume you have to state the names of the travelers immediately. All Belgian public transport operators have that position that you cannot pre-purchase tickets in volume. This is not allowed for us because those tickets funded by public money and we are not allowed to transfer to private companies. "*

About allowing the MaaS operator TO DO BUNDLES with your tickets?

R1- STIB → *Yes, we allow partners to include STIB tickets on their bundles, as we do with VisitBrussles.be by allowing them to offer full-day passes inside their Brussels Card. But we must guarantee that our official price is fixed and respected. With your other MSPs you can change their ticket prices if you have an agreement with them, but with STIB we don't allow that"*

R1- DE LIJN → *" We are changing our bundling policy. Today we are not allowing MaaS operators to take De Lijn tickets and bundle them next to other mobility services, this will be changing in the future contracts, but it depends in developments and changes we are doing at De Lijn. At the moment we only allow the MaaS operator to be a transaction broker by facilitating the purchase of single tickets"*

MaaS Alliance

About allowing VOLUME PRE-PURCHASE & terms (non-refundable + 1-year Expirable + fully sold until activation)

R1- MaaS Alliance → *"I recommend that when you buy the tickets from the MSPs you must accept their sales and pricing terms, since is better not to try to negotiate with them for any privilege or preferential rate. Just buy their tickets in bulk following their terms, if they allow it…..For pre purchasing in bulk, sounds functional, specially lately how the Covid-19 crisis has severely affected the sales revenue of many MSPs"*

About allowing the MaaS operator TO DO BUNDLES with your tickets?

R1- MaaS Alliance → *"Therefore, you should establish the price of each bundle per day and then the final price will result from the multiplication of that price and the duration the tourist is going to stay ……Give flexibility by offering additional services apart from the fixed bundle where you can buy a De lijn day pass if the tourist decides to spend his second day of Belgium visit in Antwerp"*

REVENUE STREAMS

Regulators

R1- MOW Flanders → *N/A*

R1 – Antwerp City → *N/A*

R1 – PTA Finland → *N/A*

Table 27 – Industry feedback on Revenue Streams– Q12

Q12. About generating EXTRA REVENUE STREAMS apart from the commission?		
MSPs		
R1- STIB → *"Yes. I think that tracking in your MaaS platform the travel behavior of the Brussels card holders and STIB mobility modes they are using to get to their attraction sites is certainly very interesting "*	**R1- DE LIJN** → N/A **R2- DOTT** → N/A	
MaaS Alliance	REVENUE STREAMS	**Regulators**
R1- MaaS Alliance → *"I think you have identified the right streams there:* *1. Selling additional services* *2. Selling travel behavior data.* *3.Commissions from 3th parties advertising."* **R1- MaaS Alliance** → "*From the risk management point of view I see some risks related to selling additional services because when you are selling this service you are playing with pure margins. Therefore, it might be highly optimistic and highly risky to have an expectation of 30% of revenues coming from that stream* **R1- MaaS Alliance** → "*You could note that in your risk assessment or you could expect change the revenue distribution by setting 50% revenues from your core business (selling subscriptions) and 20% revenues from selling additional services., this could might be more realistic."*		**R1- MOW Flanders** → *"To be honest, today nobody is making much money in MaaS subscriptions….However, a potential revenue model for MaaS could be in the optimization of the transport/transfer offer, if you can pick up and you know the data of the users, their mobility needs, then you can save time up to 20% on the buses and the trams, and 20% in capacity…this a billion euro business case"….Additionally, as MaaS operator you might reduce the environmental impact of mobility like CO2, you can organize better sustainable transport by incentivizing the user that takes his bike to the city and so on. This is valuable for PTA and PTOs.* **R1- MOW Flanders** → "*For example, SKIPR is part of a bigger automotive group called D'leteren (importer of Volkswagen)--- They are financing this platform because their garage model of cars is changing in the market, in which people are not going to buy cars anymore or going to the garage to buy a service, so they thinking that this behavior is a threat to their business. Therefore, they invested half million in POPPY and SKIPR, to test new models that will change digital transformation of the traditional car business and that's why they create a MaaS operator .* **R1 – Antwerp City** → "*That is the million-dollar question. It seems a challenge for MaaS operators to generate revenues apart from the reselling ticket model… Well the profit is coming from additional services, selling MaaS subscription together with a car, therefore a combination between charging the MSPs and the users. "* **R1 – PTA Finland** → *That's actually the key question! At the moment there is not profitable business case even for MaaS global in which they actually are running up their operations entirely with their investors money…… At least that is the case in Finland, but might be possible that they getting economies of scale in the rest of markets they are present, Antwerp, UK and Vienna.*

Table 28 – Industry feedback on Cost Structure– Q13

Q13: About the COSTS OF THE INTEGRATION with MSPs & other partners		
MSPs		
R1- STIB → *N/A* **R1- DE LIJN** → *"MaaS operators like MaaS Global have a big cost while trying to do local integrations, this is burning their cash…. if you want to go to a global market you have to show scalability by not only solve all those local integrations, but also must have huge global consumer base, everything developed at an acceptable cost….for me, it looks impossible……They either must have all the mobility operators on board, but they can't do that at the global level, or they must invest in the common base.*		**R1- DE LIJN** → *Then is the chicken or the egg. Nobody would be willing to offer you services if you don't have costumers, and no costumers will be interested to buy you subscriptions if you don't have services….I don't think business models like MaaS Global would make it given the current dynamics of the market and what it happens in other industries. "* **R2- DOTT** → *N/A*
MaaS Alliance	COST STRUCTURE	**Regulators**
R1- MaaS Alliance → *" From a risk management point of view, you might be underestimating the cost it takes to integrate two transport platforms in order to make it operational. "*		**R1- MOW Flanders** → *N/A* **R1 – Antwerp City** → *N/A* **R1 – PTA Finland** → *N/A*

Table 29 – Industry feedback on Costumer Relations– Q14

Q14: About how to GET, KEEP AND GROW costumer base?		
MSPs		
R1- STIB → *N/A.* **R1- DE LIJN** → *N/A*		**R2- DE LIJN** → *N/A* **R1- DOTT** → *N/A*
MaaS Alliance	COSTUMER RELATIONS	**Regulators**
R1- MaaS Alliance → *" You can agree with the MSPs to channel and promote their services through a very active social media campaign where you give them lots of visibility and exposure via your channels, then maybe this marketing effort would be interesting, especially for micromobility providers.* **R1- MaaS Alliance** → *You can convince kick scoters providers to join your platform by allowing your consumers to use those extra rides left in the subscription to be usable in other cities where they have operation, so based on their ride experienced they get even familiarized with the brand and they will be more willing to use that service everywhere, so is entry and bringing new costumers potentially for the micromobility providers. "*		**R1- MOW Flanders** → *N/A* **R1 – Antwerp City** → *N/A* **R1 – PTA Finland** → *N/A*

Table 30 – Industry feedback on Key Resources– Q15

Q15: About data interoperability & standards as resources

MSPs

About how interoperable is your BOOKING back-end do an integration with a MaaS operator

R1- DE LIJN → *" For the Booking API you have to make it very clear to your users that for De Lijn it will not be available to reserve a seat. But for long distance buses like FlixBus or micromobility vehicles then a booking integration is justifiable"*

About how interoperable is your TICKETING back-end do an integration with a MaaS operator

R1- STIB → *" At the moment, we don't have a full digital ticketing API for MaaS operators. We are working on that with the MaaS pilot we are developing in which we are trying a new kind of digital tickets but is only a pilot….Absolutely, we have high willingness to move our ticketing system to digital environments. Of course, the Mobib card API is not user friendly. If I buy my tickets now, I would like to have them directly in a format of QR code or something, as NMBS and De Lijn are doing, but unfortunately with don't have that at STIB.*

R1- STIB → *"For example, with SKIPR and OLYMPUS , our ticketing is sold via Mobib car API which allows them to resell STIB tickets but only if the user has an existing Mobib card, also the user receives those STIB tickets 24 hours after the purchase in the MaaS platform. For the bus and tram the transfer could take even more the 24 hours.*

R1- DE LIJN → *"For the ticketing API, you need to request to be a common end supplier (MaaS operator) and you need to sign an open ticketing agreement that allows you to display a digital De Lijn ticket. You have to be aware that we are also obliged to do the ticketing integration in Dutch.*

R1- DE LIJN → *In the future, it will be ticketless integration in order to purchase our tickets the MaaS operator will have only to provide the name, the user ID, the date and time of the trip to make the user gain access to the mobility service with only showing their ID will be registered in our back-end system.*

How interoperable is your PAYMENT back-end for integration with a MaaS operator

R1- STIB → *We don't have a payment API, that allows us to receive the revenue directly and instantly after the costumer purchase the ticket from you….We manage the payment via invoice. When the ticket is purchased then this will create a booking in our system and then in a monthly base, we send an invoice to our partner with all the sales that they made during the month. ….Is really easy, the MaaS operator receives the money of the user and in the end of the month it pays our invoice.*

R1- DE LIJN → *We don't have a payment API. We send an monthly invoice to the MaaS operator for all the tickets they bought from us*

Regulators

KEY RESOURCES

Regulators

About STANDARDIZATION of better interoperability in routing, booking, ticketing, payment back-end

R1- EC DG-CONNECT → *"To make stakeholders to agree on working together towards standardization is not only by forcing the stakeholders, there has to be also an interest and benefit for them. For example, we are seen that from the automotive side there is interest because they have to built new business models, but they are pressuring the EU commission to regulate before they start investing….they sell cars but this is not increasing anymore"*

R1- EC DG-CONNECT → *"I can't say that the standardization will come in the next 5 years but is coming soon and stakeholders are waiting for the EU commission to take action.*

R1- EC DG-CONNECT → *"Standardization is urgent, we know that there is a huge demand for standardization, there is a team in the EU Commission that works on standards. But is not that easy, every player have their data in different languages …. Yes, that's what we are looking right now, to built a regulation that allows cities to ask for language standardization in the mobility data so all MSPs will have to comply"*

R1- EC DG-CONNECT → *Unfortunately, at the moment there is issues in interoperability because in the evolution of how things happened in the market, it was the micromobility who appeared first and then the aggregator [Maas Operator] who appeared later.*

Table 31 – Industry feedback on Key Activities– Q16

<table>
<tr><th colspan="3">Q16: About key activities to VALIDATE before raising funding</th></tr>
<tr><th colspan="3">MSPs</th></tr>
<tr><td colspan="2">R1- STIB → N/A
R1- DE LIJN → N/A
R2- DE LIJN → N/A</td><td>R2- DOTT → N/A</td></tr>
<tr><th>MaaS Alliance</th><th>KEY ACTIVITIES</th><th>Regulators</th></tr>
<tr><td>R1- MaaS Alliance → “ I think you should <u>start with the MSPs partnerships</u>, since they are the most critical players for you, make sure you figure out with all of them what is their ticket policy and if their ticketing system is ready for API sharing ….Yes, is true, without the partnership of STIB and NMBS you simply cannot deliver a MaaS service in Brussels”
R1- MaaS Alliance → Make sure you complete this integration agreement before you proceed with further investment…Because what is more important than having a different business model (i.e: MaaS for tourists) is making sure the integration of mobility data really works, since both commercially and technical activities could be complicated.
R1- MaaS Alliance → “it is a good strategy to get allies and support from stakeholders like VisitBrussels, Brussles Mobiliteit or Brussels City Hall by raising the concern that tourist in Brussels should move around in a more sustainable way. ….In that case, they might help you to convince the core MSPs to be more welcoming even if your service is not necessarily profitable for them, because the green image could be a political support coming from the City Hall.</td><td colspan="2">R1– MOW Flanders → N/A
R1 – Antwerp City → N/A

R1 – PTA Finland → N/A</td></tr>
</table>

CHAPTER 5

TOURIST MAAS OPERATOR BUSINESS PLAN –SNEL S.A.

The business plan that is going to be presented here will help us to address the 3rd research question:

- **RQ3:** *What is the business plan that a Tourist MaaS operator should implement to compete with larger MaaS operators in Brussels?*

LEAN START UP BUSINESS PLAN

Nowadays, there is two main types of business plan formats: the ***traditional*** and the ***lean startup***. The traditional business plan is a long and static document that usually includes a five-year forecast for income, profits and cash flow. This format is often required from investors and lenders that want extensive detail of the business idea, however, is not the handiest format to begin a start-up like the one we are proposing in this master thesis because of these main reasons:

- **Time consuming:** The traditional business plan format is highly time consuming to elaborate and to communicate, which is unpractical when you have to pitch and innovative mobility idea for 5 min or less to get the attention of stakeholders like MSPs and investors.
- **No customer feedback:** The traditional business plan format relies on the assumption that is possible to figure out most of the uncertainties of a business well in advance and before raise money and execute the idea. As a start-up this is an unrealistic assumption because at the end, costumers might react by stating that they actually don't need or want the product or most of its features. (Blank, 2013).

Therefore, we have decided that the methodology of SNEL MaaS business plan will be written under a ***lean start up format*** because of the following reasons:

- **Cost-efficiency:** it is summarized in a simple and one pager format that allows you to explain quickly to the stakeholders: thesis supervisors, MSPs, partners, investors and tourists.
- **Highly testable**: It triggers experimentation, iteration and validation that allows you to adapt and calibrate quickly your business model as you continually learn from costumers. Is highly flexible allowing to refine your business plan-as-you-go.

According to Steve Blank (2013), the methodology of building a lean start-up plan goes like this:

- **STEP 1:** The entrepreneur develops a **Business Model Canvas -BMC** (Osterwalder & Pigneur, 2010) which is basically a diagram of nine building blocks that presents untested hypotheses of the main components of a business plan.
- **STEP 2:** The entrepreneur performs a ***"costumer development* cycle"** with these steps:
  a. The entrepreneur takes the BMC and ask potential users, purchasers and partners for feedback [Chapter 4] on all elements of the business model, including product features, pricing, distribution channels and affordable customer acquisition strategies.
  b. The entrepreneur gathers the feedback and rapidly assemble minimum viable products (MVPs) to ask costumers for feedback if they are willing to pay for it. (Ries, 2011)
  c. The entrepreneur uses this costumer input by testing all hypothesis again and validate costumers' interests. If there is no interest, the startup can "**pivot"** by changing one or more hypotheses and start the cycle again by redesigning the offerings. (Ries, 2011)
  d. The entrepreneur creates minimal viable products (MVPs) by doing "***agile development***" which basically means to eliminate wasted time and resources by developing the MVP iteratively and incrementally.

- **STEP 3**: Once the product is refined enough to sell and all hypotheses were proved, the startup is ready for the next stage: **execution**. This leads into raising seed investment, develop the MVP, assemble a team and start spending on marketing and sales to gain traction and growth.

The lean startup business plan of this master thesis will focus only in ***STEP 1*** and ***STEP 2***. The following BMC contains the main hypotheses an entrepreneur should test in its business idea.

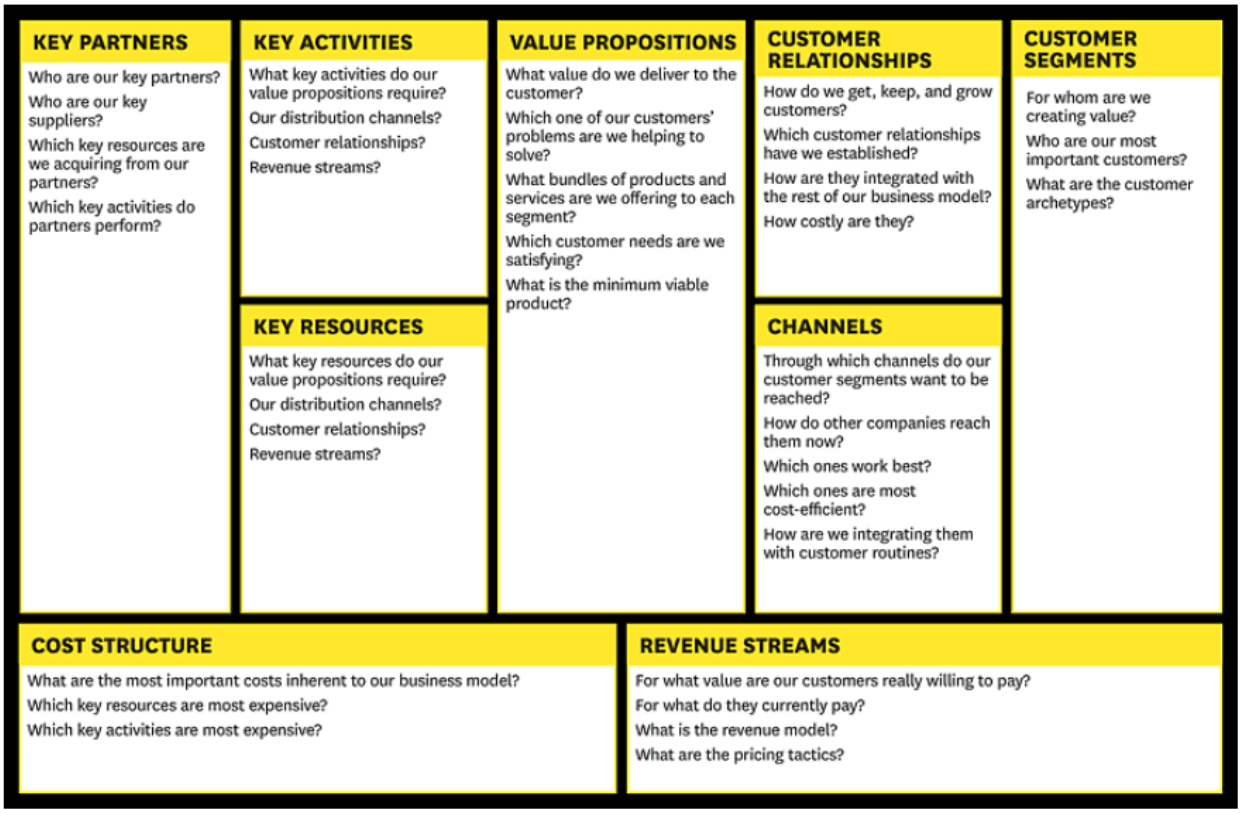


Figure 9 – Business Model Canvas hypothesis (Osterwalder & Pigneur, 2010)

Testing the MVPs

According to Eric Ries (2011), to came up with a ***lean value proposition*** you have to build and test MVPs, minimal viable products (MVPs), which are products-to-pay that are build, measured and learned via minimal amount of effort and least amount of development time. In MaaS, the MVP is not the app platform itself, since its free to download. The real MVP that we want to test among our end-users & costumers are the ***subscription plans*** via product bundling pricing strategy.

Advan-tages	1	**Maximize convenience:** costumers buy bundles when they see they can maximize their level of usage rather than buy those services separately, this decision results in higher convenience.
	2	**Saves money:** costumer saves money because they obtain tickets cheaper than purchased separately while promises a profit to the MaaS operator if it reaches a sustained sales growth and user acquisition
	3	**Complementary:** Customers are much more likely to buy items that complement each other.
Disad-vantages	1	**Bundle cost-price calculation is tricky:** you can build a bundle considering costumer willingness to pay or by summing individual unit price of each service and adding a profit margin. The second method was chosen in this business plan
	2	**Excess:** customers not always need all the products in a bundle while paying for all of them.
	3	**Transparency issues:** could be not transparent and be challenging to find a balance between the pricing decisions for the bundle you try to sell and the customers' total value for the items.

BUSINESS MODEL CANVAS (BMC)

VALUE PROPOSITION

Unlimited mobility in a tourist package

- Accessibility to unlimited urban mobility
- Convenience
- One-stop shop app experience
- Tailored for short stay
- High value for the money payed
- Savings in first & last-mile travel time
- Bundled mobility ticketing
- Personalization via additional tourist services
- High user experience platform

1ST MaaS service for tourists

CHANNELS

Individual Consumers
- Promo codes via Booking.com
- Access app via App Stores
- Awareness via Website & Social Media

Corporate Costumers
- Access via B2B website
- Support via 24h/7 post-purchase

COSTUMER RELATIONSHIPS

GET costumers
- Advertising on wholesale flight, accommodation & blog websites: (Skyscanner, Booking.com, TripAdvisor)
- Tourist industry events + Festivals

KEEP costumers
- Automated & Self-service booking fast app & website service
- Offer travel agency tours inside the app

GROW costumers
- Move to B2B Model
- Offer added services on first & last mile journeys during waiting time. (Deliveroo, Amazon, concert tickets, etc.)

COSTUMERS

– First phase –

B2C MODEL

1. **Individual Costumers**
   - International leisure tourist
   - Corporate tourist
   - National tourist

– Second phase –

B2B MODEL

2. **Corporate costumers**
   - HORECA (Ads)
   - Event organizers (Ads)
   - Government entities (Data)
   - Corporate clients (Data)

– Third phase –

Reselling bundles inside:

3. **Online travel agencies**
   - Booking.com
   - Flight ticket re-sellers
   - AirB&B

REVENUE STREAMS

Revenues from:

1. **Selling Tourist Mobility Bundles** → 11%
   – GO – Basic – Premium
2. **Selling ASOD** – museum tickets, daypasses, → 7%
   – Additional Services On-Demand:
3. **Selling tourist TBD reports** → 81%
   – Tourist Travel Behaviour Data
4. **Commission** from touristic advertising → 1%

END OF 3RD YEAR → 100%

COST STRUCTURE

Costs from:

1. **COGS:** paying MSPs tickets invoices + city cards invoices + Web& App infrastructure + Payment services → 19%
2. **SG&A:** Staff payroll, office rent, + marketing and sales costs → 80%
3. **CAPEX:** computers → 1%

END OF 3RD YEAR → 100%

KEY PARTNERS

1. City Card Providers
   - VisitBrussels.be – VisitAntwerpen.be, TheParisPass.com, etc.
2. Mass Mobility Service Providers (MSPs)
   - STIB / NMBS / DE LIJN
3. Micro Mobility service providers (MSPs)
   - E-Scooter (DOTT – LIME)
   - Bike (JUMP - VILLO)
   - Taxi (UBER)
4. Public Transport Authorities (Bruxelles Mobilité – MOW Flanders)
5. Online travel agencies (Booking.com, etc)
6. Payment Service Providers (Paypal)
7. Internet providers (Telenet – Proximus)

KEY RESOURCES

Human
- Staff of IT developers & designers
- Staff of legal & marketing

Intellectual
- Data from partners
- Software for app development

Physical
- Office co-working space

Financial
- 4 Investments Rounds till break-even

KEY ACTIVITIES

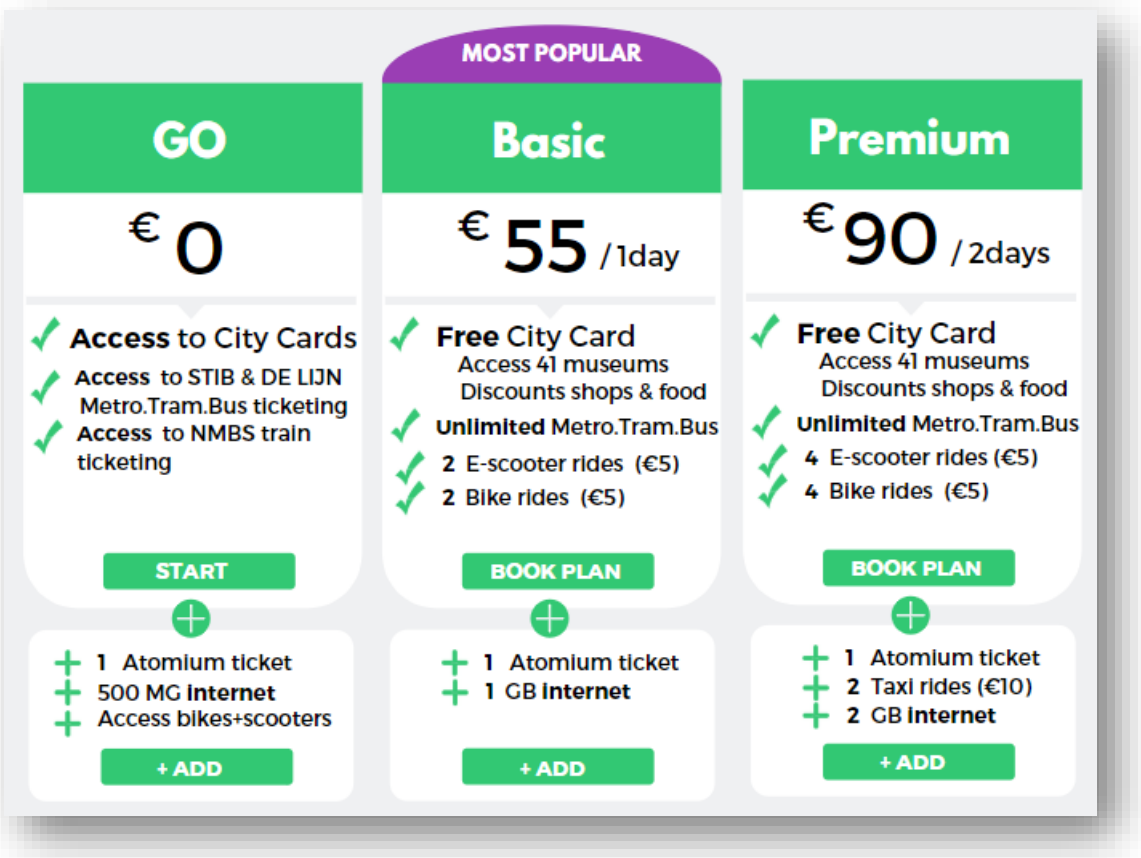
1. Get feedback from costumers and partners
2. Get City Card providers onboard (contract +APIs)
3. Get Mass MSPs onboard (contract + APIs)
4. Get Micro MSPs onboard (contract + APIs)
5. Assemble a team
6. Develop prototype
7. Recruit testers
8. Launch app
9. Marketing & Sales spending
10. App maintenance & provision

Figure 10 – SNEL Business Model Canvas

VALUE PROPOSITION

Definition → *Refers to the bundles of products and services that create value for the costumers. Refers to what we offer to get the job done. (Osterwalder & Pigneur, 2010)*

Figure 11 – The MVP → Minimal Viable Product



PRODUCT TO SALE:

Offer urban mobility plans + on-demand mobility services to tourists visiting Belgium. Channeled via online travel websites and promoted as an additional service included in their holiday package (next to accommodation, flight, tours, etc).

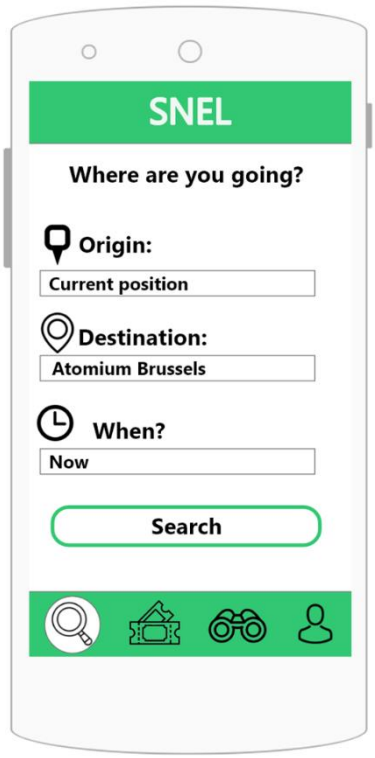
TOURITS MAAS SOLUTION → SNEL APP

The following prototype was designed by Erick Ovares using Adobe XD software, User Interface (UI) and user experience (UX) skills got from more than 1 year of hard work, costumer and industry feedback and validation. (Chapter 4)

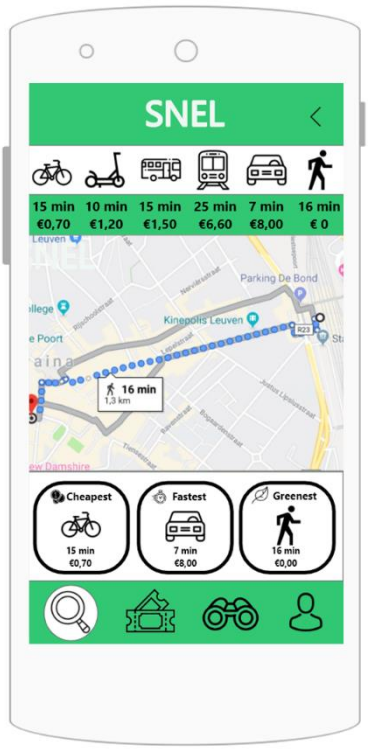
SNEL APP

Figure 12 - The full prototype video of SNEL app can be watched here: https://youtu.be/c4UqqltwSgc

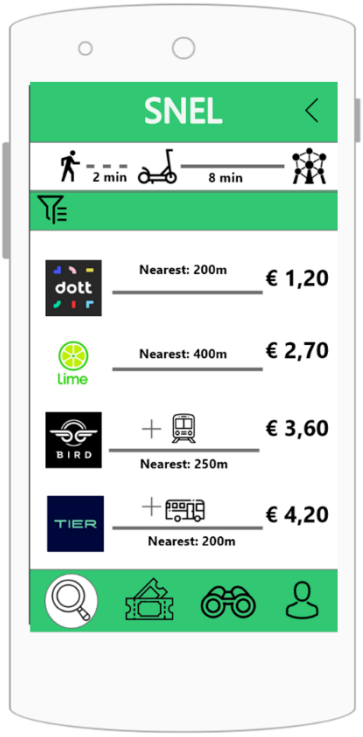
1.Search your attraction



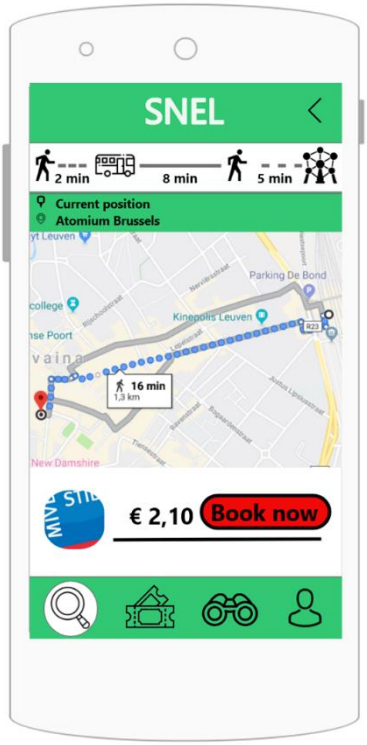
2. Choose best route & mode



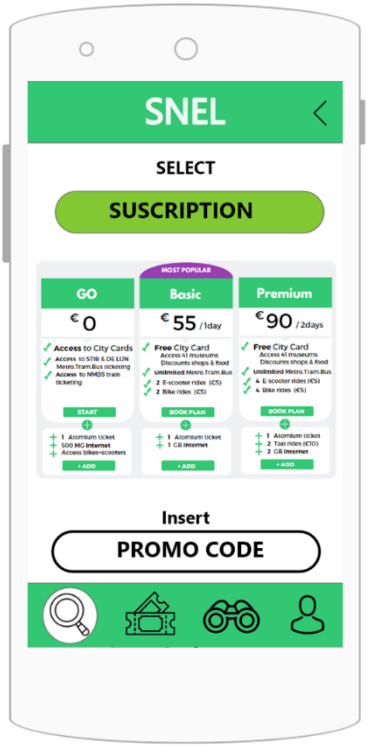
3. Choose multimodal trip according cheapest price



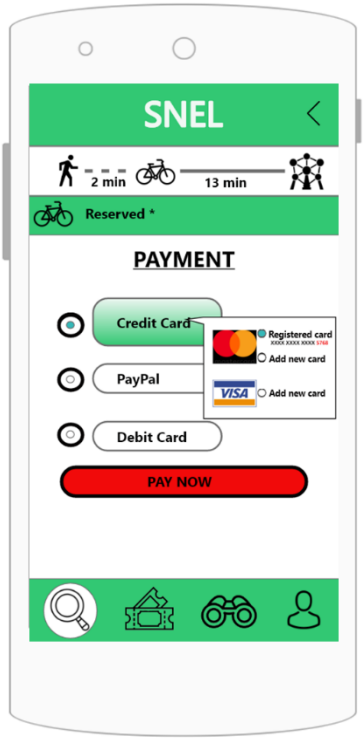
4. Book inside the app



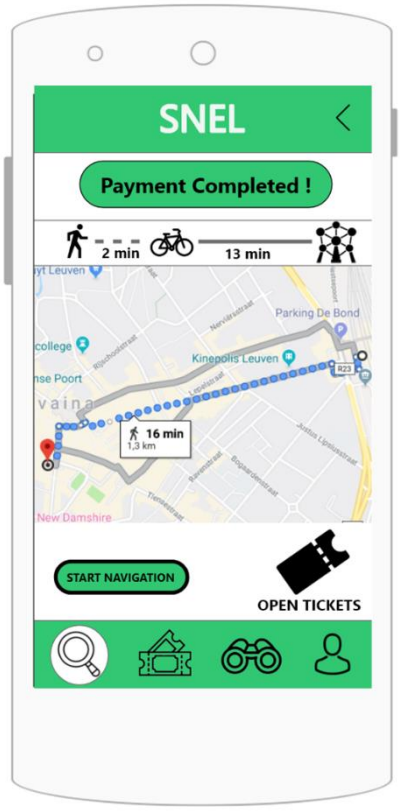
5.Pay a PLAN or Pay-as-you-Go



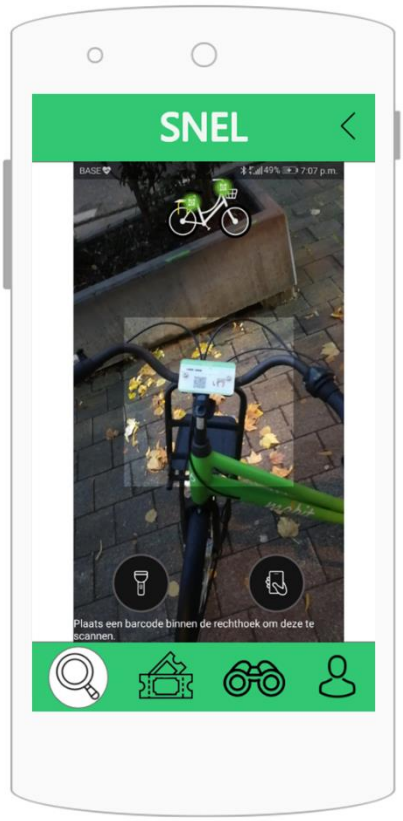
6. Confirm the payment



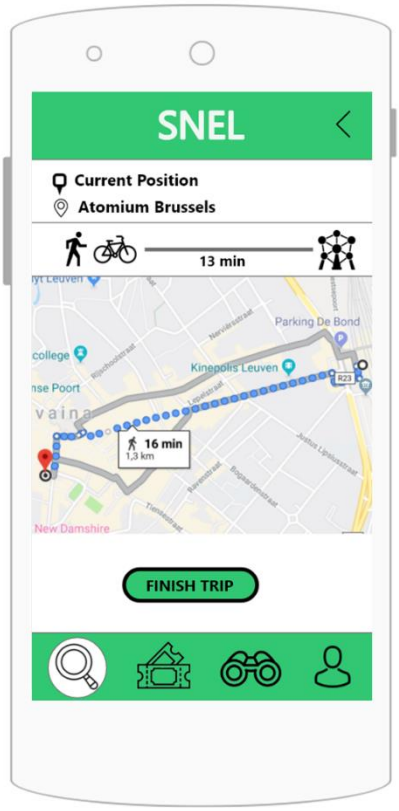
7. Start navigation



8. Activate ticket or unlock vehicle

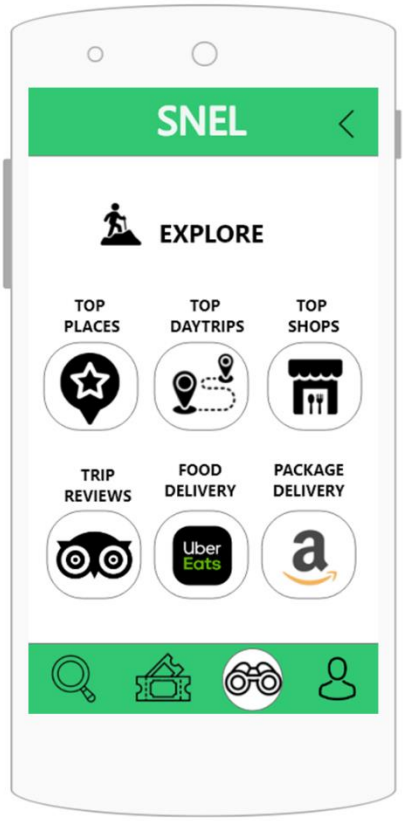


9. Finish your trip

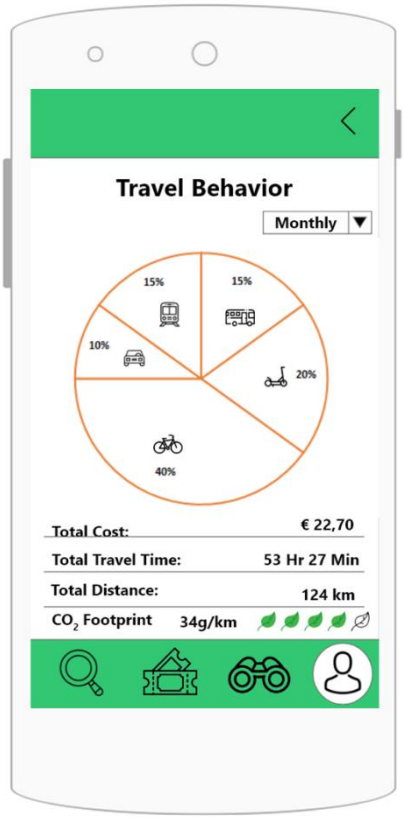


Review your tickets

Explore the city

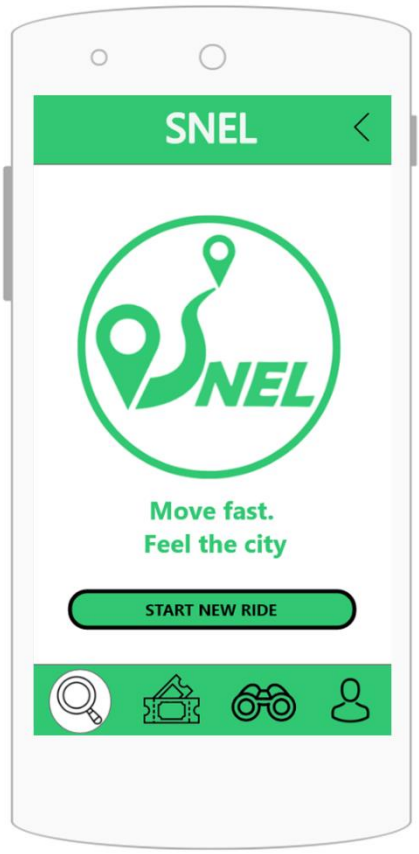


Check your travel behaviour



VALUE PROPOSITION

What are the costumer issues we are trying to solve?



1. Accessibility:

SNEL gives tourists multimodal options to access main public transport in an unlimited scheme. Additionally, gives them access to new micromobility modes they probably would not try out without the existence of the package.

2. Convenience:

SNEL saves time in their end-to-end journey, like ticketing time, queue time, ticket validation and saving time by providing suggestions on the most cost-efficient route and mode to get to their destination.

3. One stop shop app experience:

SNEL allows them to manage all the urban mobility, route planning, booking and ticketing through a single app, instead of downloading additional apps of every single MSP.

4. Tailored for short stay:

SNEL is the 1st MaaS service that offers urban mobility inside holiday packages for touristic purposes and for people visiting no longer that 2 or 3 days in Belgium.

5. High value for the money payed:

SNEL saves money allowing tourists to have all their tickets in a bundle product, which at the end is cheaper that buying all rides and tickets separately. Usage maximization at its core.

6. Savings in first-last mile travel time:

SNEL algorithms are built in a way to guarantee that suggested first and last mile trips are the shortest, cheapest and fastest to reach their hotel, their concert, their museum, etc.

7. Bundled mobility ticketing:

SNEL subscriptions are made within the principles of fair price and enough mobility for the period of stay. Once the subscription is activated by the tourist, all tickets are displayed in the ticket section of the app.

8. Personalization via additional tourist services:

In a later stage, SNEL app can offer additional tourist services linked to their recorded travel behavior and registered personal data by which the app algorithms calculate and offer them personalized services according to their needs like food delivery, concert tickets, e-commerce deals, trip advisory, all them available to be purchased in SNEL app.

COSTUMER SEGMENTS

Definition→ *Refers to all the people or organizations for whom value is created. They reveal what is the job that needs to be done because nobody in the market is solving it.* (Osterwalder & Pigneur, 2010)

1ST Phase
B2C Model

Leisure tourist

Corporate tourist

National tourist

2nd Phase
+B2B Model

HORECA & Shops

Public & private companies

Online booking travel agencies

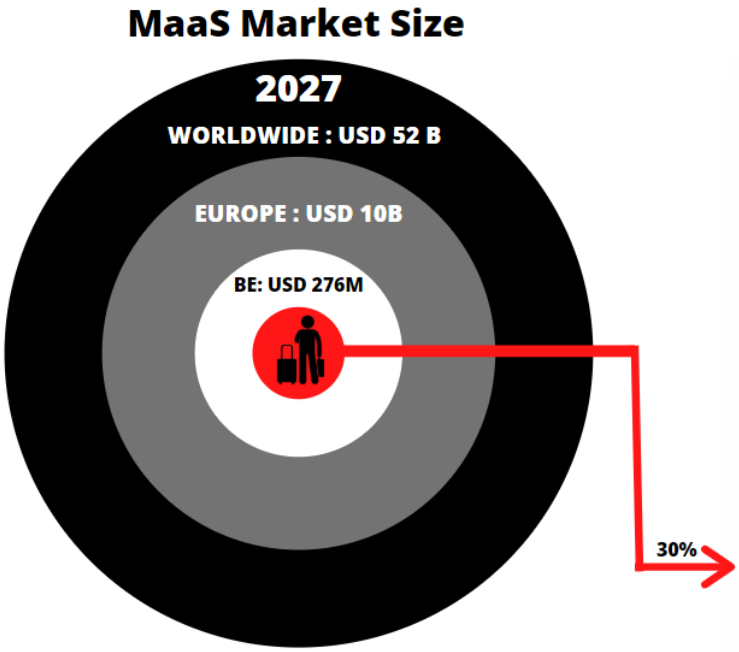


Figure 13 – MaaS market size by 2027

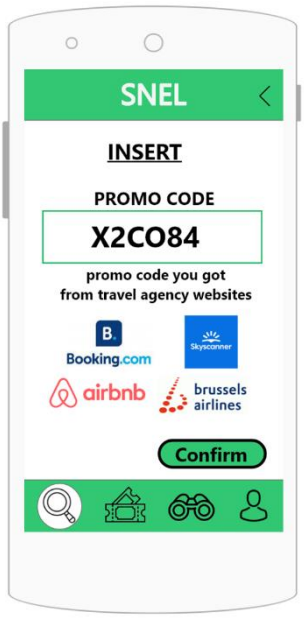
Table 32 – Projections MaaS Market per year till 2027

Our projections of MaaS Market Size for leisure tourism in Belgium	
2021	**714.420 €**
2022	**1.197.504 €**
2023	**2.503.872 €**
2024	**5.356.109 €**
2025	**12.553.380 €**
2026	**30.680.461 €**
2027	**82.837.244 €**

* Estimation based in Juniper Research (2020)

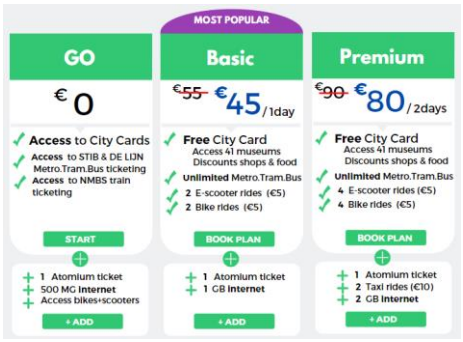
CHANNELS

Definition→ *The channels describe through which touch points you are reaching, interacting and delivering value to customers.* (Osterwalder & Pigneur, 2010)



INDIVIDUAL COSTUMERS

1. **Promo codes via online travel agencies**
   - In order to **pull costumers** to SNEL app we are partnering with online travel agencies and offer their customers **free promotion codes** as an additional benefit for their flight or accommodation purchase.
   - When the tourist arrives in Belgium, they can download the app and redeem that promo code to pay for daypasses and tickets at discounted price. Once we have the costumer there, we can offer them pay as you go or tailored subscriptions
2. **Access via App stores:**
   - SNEL app will be available to download for free on the App Store (iPhone) and the Google Play Store (Android).
3. **Awareness via landing website & Social Media**



- We will invest 500 EUR in a landing page that informs our end users (tourists) about our route planning, ticketing and additional services features. A "GET STARTED" button will redirect them to download the app
- We will invest 20 000 EUR per quarter in Marketing expense. For Brand awareness campaigns, we will invest 6 000 EUR in Facebook and Instagram app installs advertising.
- We will invest 13 500 EUR per quarter in Direct Response campaigns via advertising in Google Search traffic clicks and Google Keywords to acquire and engage tourists. Also, YouTube pages and Search Engine Tools will be also used.

CORPORATE COSTUMERS

1. **Access via B2B booking website →** the landing page will allow our corporate costumers to create a free account and purchase tourist travel behavior data (TBD) reports and purchase banners via monthly advertising affiliation plans to promote their service in SNEL app. In a 3nd phase, after investing in API integration and bilateral contracts, travel agencies would be allowed to re-sell BASIC and PREMIUM bundles to their customers. The app back-end will synchronize the data, so when the tourists downloads the app, all tickets will be available in their ticket dashboard.
2. **Support via 24h/7 post purchase →** We will give daily post-purchase support by outsourcing and training a customer service team that will answer claims, suggestions and receive feedback from travel operators and tourists. They will be trained to troubleshoot payment issues and execute refunds if necessary.

COSTUMER RELATIONSHIPS

Definition→ *Refers to the type of relationship you are establishing with your costumers. Deals with the strategies to get, keep and grow your customer base.* (Osterwalder & Pigneur, 2010)

GET COSTUMERS

1. **The promo codes** of 10-euro discount channeled via travel websites (i.e: Booking.com) is by far our best strategy to acquire costumers and motivate them to download the app.
2. **Advertising on wholesale flight, accommodation & blog websites**

- For costumer acquisition, we will pay for advertising on websites that travel agents normally visit when they build their holiday packages.
    - ***For flights*** → Partnering and paying advertising in aggregator airfare websites like Skyscanner.com, Momondo.com , Booking.com, Expedia.com, Kayak.com, etc.
    - ***For accommodation*** → Partnering and paying advertising in aggregator hotel websites like Booking.com, Trivago and shared private accommodation like AirB&B
    - ***For transport & tours*** → Partnering and paying advertising in global car rental websites like Sixt Car Rental, AutoRentals.com, Rentalcars.com and city card websites.
    - ***For tourist information*** → Partnering and paying advertising in global suggestions & travel blog websites like TripAdvisor, Get Your Guide, Lonely Planet, etc.

3. **Exposure in tourist industry events + Festivals**

For costumer acquisition, we will pay for advertising and visibility opportunities in:

- Tourism and transport industry events like → International conference on Tourism, Transport and Logistics, Brussels -August 2020-; European Tourism Day organized by the EU Commission, Brussels -May 2021-; The Bus World conference., Brussels -October 2020-. Additionally, on international festivals and concerts like Tomorrowland music festival, Boom -July 2021- Brussels Summer Festival, - August 2021.

KEEP COSTUMERS

- **Familiarization with our partners brand** → our social media campaigns will contain lots visibility and exposure of the brands of our mobility partners and their benefits. Micromobility providers could be interested in this effort since they are also in a brand awareness stage.[1]
- **Automated & Self-service booking website** → For customer retention we will invest data services that make our B2B website highly automated and integrated with our costumers' websites. Also we will guarantee our website is user friendly enough to be self service from the end-to-end of the booking process.

[1] Chapter 4. Industry feedback .TABLE 14. MaaS Alliance.

COSTUMER RELATIONSHIPS

- **Offer travel agency tours inside the app**
  - In the 2nd phase, we will retain our partners by allowing them to publish their top deals and top tours in a section called **EXPLORE in SNEL app** that allows the end users to book additional services in the app. For example, when a tour is booked in our app, SNEL team will manage the booking and payment settlement on behalf the tour operator, then we pay their invoice.

GROW COSTUMERS

- **Move to B2B business model**

In the 1st semester of the second year of operations, we will launch new revenue streams next to the bundles and on demand tickets. For example, we will invest in lead generation costumer agents to contact corporate prospects and offer them our new product: tourist travel behavior data reports. (TBD). According to the industry feedback, this is possible but has to be GDPR compliant in order to protect the privacy and personal data of our end-users. This B2B move allows us to grow our customer base, increase our user traffic, increase our market share and market valuation.

- **Monetizing the first & last mile waiting time:**

After having our break-even (2nd semester of the 3rd year of operations) we will hire a full-time *Machine Learning engineer* to invest in more app infrastructure and artificial intelligence to be able to offer additional services that are customized according to the location, personal information and journey pattern of our end users. For example:

When a tourist is waiting for its train, they can go to the EXPLORE section and find:

- Suggestions on Food delivery (UberEats, Deliveroo, etc): the tourist clicks on the promoted meal and is redirected to the company app or website, where is able to pay for the selected meal and order it directly to their accommodation address while waiting for the train.
- Suggestions on Concert & Museum tickets (TicketMaster.com/Europaticket.com/ Viagogo) the tourist clicks on the promoted concert ticket deal and is redirected to the concert organizer website or European ticket aggregators. After the ticket is purchased and while waiting for its train, a personalized multimodal itinerary can be suggested in SNEL app.
- Suggestions on Package delivery (Amazon.com /Bol.com) the tourist clicks on the promoted package deal and is redirect to the marketplace website.
- Suggestions on other services: services like Hotels deals, tour deals and long-distance transport deals.

An API will be in charge to connect both platforms and for every time we redirect the costumer to a partner platform, we earn 1-euro commission payed by the companies.

KEY RESOURCES

Definition→ *Refers to the assets (human, physical, technological, intellectual and financial) that are indispensable to make the business model work.* (Osterwalder & Pigneur, 2010)

HUMAN RESOURCES (PAYROLL)

Figure 14 – Organizational chart of SNEL start up.

TEAM SOTWARE SKILLS

- **CTO** → An experienced **Senior DevOps engineer.**

According to a job post from MaaS Global (2020) a DevOps engineer should have these main skills:

a. Minimum of 2 years of experience as senior DevOps engineer and experienced in AWS components and Serverless Framework.
b. Strong skills in Node.js from a back-end point of view, experience from working with back-end development is considered a plus.
c. Experience from test automation, CI/CD and pipeline building.
d. Experience and interest in cybersecurity.

ANDROID DEVELOPER → According to a job post from MaaS Global (2020), an android developer should have these main skills:

e. Minimum of 2 years of experience in building mobile applications (native Android apps).
f. Experience in developing and shipping one or more Android apps on Google Play Store.
g. Experience with Kotlin-based apps, RxJava, Dependency injection.
h. Deep understanding of Java/Kotlin and the Android SDK.
i. Experience in using REST style web services and location services.

KEY RESOURCES

IOS DEVELOPER → According to a job post from MaaS Global (2020) an IOS developer should have these main skills:

- ✓ Minimum 2 years of iOS development experience. 1-2 years of experience in store-published apps with Swift.
- ✓ Following the iOS development community closely to stay up to date. Demonstrated eye for details in building clean UX (e.g. in portfolio apps).
- ✓ Experience in location-based services (e.g. maps, location APIs, REST services).
- ✓ Experience in applying Agile Practices in iOS projects.
- ✓ Experience in test automation.
- ✓ Experience in using Machine Learning.
- ✓ Experience in mobility services; e.g. routing

BACKEND ENGINEER → According to a job post from TRAFI (2020), the MaaS software company who created JELBI app, a Backend engineer should have these main skills:

- ✓ Minimum 2 years of experience writing high-quality code in C#
- ✓ Experience building on the latest .NET Core stack
- ✓ Experience with Run .NET on Linux on container cluster
- ✓ Design distributed (micro)service architecture
- ✓ Experience working extensively with Amazon Web Services infrastructure
- ✓ Solve high concurrency challenges with Akka.NET
- ✓ Handle large amounts of data (BigQuery, Vertica)

FULL STACK WEB DEVELOPER→ According to a job post from WIND (e-kick scooter company) a Full-Stack Web Developer should have the following skills:

- ✓ A minimum of a master's degree in a computer science related subject
- ✓ SaaS / B2B / Multi-customer development and deployment experience
- ✓ Proficient in HTML, CSS, JavaScript, Jquery, etc., with a deep understanding of JS core technology, can quickly and efficiently achieve page requirements.
- ✓ Familiar with angular / react / vue one or more front-end frameworks.
- ✓ Familiar with angular5, react, nodejs is preferred.
- ✓ Familiar with page architecture and layout, have certain experience in CSS and JST performance optimization, multi-browser compatibility issues.
- ✓ Familiar with H5 development, have a good understanding of the h5 page adaptation of different platforms for IOS and Android.

MACHINE LEARNING ENGINEER (FREELANCE) → According to a job post from MOOVEL (2020) and from MOOVIT(2020), two leading MaaS operators, a Algorithms Backend-engineer should have these main skills:

- ✓ BSc/MSc (Phd a plus) in Computer Science/Electric Engineer/Math/Physics.
- ✓ More than 3 years of software development experience in JAVA or equivalent strongly typed programming language. Experience implementing routing algorithms in Java

KEY RESOURCES

- ✓ Experience in design , implementation, scale and monitoring a routing backend which provides vehicle, public transport and intermodal directions for our mobility apps and platform
- ✓ Experience designing and providing APIs around routing services
- ✓ Experience in building infrastructure and tooling for importing data into our routing engine. Experience in performing analysis to enable data driven decisions

Gross Salary calculation for full time & freelance payroll

To be able to simplify cost calculation and take real market salary information we are rounding the salary publication published by TRAFFI (2020) - (see job posting here), that according to one of their job posts the salary range for an IT position ranges from 2800 to 4200 Eur gross per month. According to UXdesignersalaries.com (2020) , the salary of UX designer in Belgium is 3780 euros gross per month. Therefore, taking into consideration those salary ranges, our startup resources limitation and the aim to bring competitive talented staff, we have decided that our salary rate will average around 2000 EUR gross salary per month for full time payroll and 1200 EUR per month for freelance payroll.

PHYSICAL RESOURCES

Coworking space: Brussels has the advantage of being international well-known hub for co-working spaces. Using Coworker.com(2020) you can find hundreds of buildings offering a variety of amenities. After doing some research we have chosen TRIBES coworking space called for the following reasons:

i. **Location:** TRIBES is located 5 min walking from Brussels Station, with high accessibility to core & micro-mobility service providers around the area.
ii. **Convenience:** Convenient locations are key to develop convenient value propositions like SNEL app. Convenient locations are key to attract the best talented workforce.
iii. **Employee-Consumer alignment:** The area has one of the high densities of ridership in all Brussels, which is key to make our start up staff feel our consumers travel needs in a daily basis. A co-working space that makes them see their work through the traveler's eyes, creating solutions for the entire experience, and thinking beyond its parts.
iv. **Affordable price:** the most affordable membership fee includes the access to hot desks which means that every employee can use all the facilities and desks of the building but do not the private offices or dedicated desks. The hot desk monthly price is 149 EUR per employee

Total cost: 1788 EUR/month to allocate 12 SNEL initial team members during the 1st year of operations.

KEY RESOURCES

INTELLECTUAL RESOURCES

1. **Mobility Service Providers (MSPs) data:**
   a. **Routing data** via API→ data related to transport network like week & weekend service schedules via GTFS, stops location, vehicle location, end-to-end route of each service,etc.
   b. **Booking data** via API→ data related to real-time vehicle reservation.
   c. **Pricing data** via API→ data related to fixed rates of each ticket or micromobility ride.
   d. **E-ticketing data** via API → data related to ticket information to allow the MaaS like logo, QR code and journey details same as a regular paper ticket.
   e. **Payment data** via API → data related to the payments the MaaS operator must perform every time is forced to re-purchase on-demand group of tickets or vouchers. Once the provision is done, payment can be sent to the MSPs and this shows that the transaction was cleared.
2. **Other Service Providers (OSP) data**:
   - **City card providers → Pricing and E-ticketing data** (data related to the QR code, the duration of the city card, the name of the user, the price, museum tickets and discounts included, etc.
   - **Booking and payment data integration** (data integration that allows the MaaS operator to purchase a city cards on-demand and payment integration to pay in invoices format.
   - **Payment Service providers (PSPs) data →** data related to the payment methods, currency fees, payment clearing and payment confirmation. Basically, facilitating each transaction.
3. **Software services for app/web development & maintenance**
   - **App/Web design services**: Premium subscription of User Interface (UI) and User experience (UX) software's to design the app prototype and develop the final versions.
   - **Map services** → Open street Map (is free) or API's of Google Maps (API is free until requests exceeds the $200 monthly credit, every request after that is charged- Google Maps (2020)

Cost of Web Services (LightSail Plan Amazon)	UNIT	Montly Plan	Q/ bill
AWS Virtual Server	EUR	240	720
AWS Database	EUR	230	690
AWS Load Balancer	EUR	18	54
AWS Block stogare	EUR	25,6	76,8
AWS Instant & Disksnapshot	EUR	0,05	0,15
Total Budget AWS Services		**514 €**	**1.541 €**

Table 33 – Cost of Amazon Web Services (2020)

   - **Amazon Web Services(2020)→ Server & Database services**: refers to how the MaaS app will store, retrieve and secure the data. Offline apps store all the data on the user's mobile device but MaaS apps are fundamentally online apps which means that in order to retrieve data it depends on access to an online server. The MaaS app backend systems must store and retrieve data like the personal, payment and travel information of the users, subscriptions information, MSPs network information, location-based information, etc. For example Uber uses two database providers: MySQL and MongoDB. (Solanki, 2020)
   - **Other software services**→ the rest technical requirements needed to develop SNEL app has to be determined once the CTO assembles the team of IT developers and starts to notice that in order to create a specific feature, a specific IT resources will be needed in order to build those features.

KEY ACTIVITIES

Definition→ *Refers to the activities you really need to be able to perform your value proposition.*

Steps to create a Tourist MaaS operator → SNEL S.A

1. **Get feedback from costumers and industry partners.**
   - ✓ We should develop a new survey with a bigger and accurate sample to give more representativity to the current issues and desires of the tourists that arrives at Brussels.
2. **Get the City Card providers onboard (contract +APIs)**
   - ✓ The official tourist agency of the cities are key to stablish a partnership with PTOs, they execute the tourist policy of the city and take commercial decisions on behalf of the tourist industry of the city. A tourist MaaS operator that wants to resell tickets from STIB must have the authorization from VisitBrussels.be.[2]
3. **Get the Mass MSPs onboard (contract + APIs)**
   - ✓ It's important to have several meetings with the MaaS program director or the final decision maker that signs the re-selling ticket contracts. Is highly important to follow their rules and data standards. The key for to obtain an MSP contract is to develop a solution based on their feedback, their IT capabilities and working together for a long term.[3]
4. **Get the Micro MSPs onboard (contract + APIs)**
   - ✓ These are difficult players to partners, but not impossible. For the long term they are trying to position themselves a MaaS operator (i.e: UBER) and they are trying to build their own customer base, so is quite hard they redirect their customers to a third party. But the 5-euro vouchers that the users can redeem as promo codes in their apps + the brand exposure in our social media campaigns could generate traction and trust to obtain a contract with micromobility providers. [4]
5. **Assemble a team** → See SNEL TEAM section in Key Resources section.
6. **Develop a prototype→** at least 2 functional prototype versions and ready for tests.
7. **Recruit testers →** For example, STIB recruited 2000 testers for their MaaS pilot that will launch in July 2020. (Brussels Times, 2020)
8. **Launch app →** the final version has to be perfect. All end-to-end features must work smoothly.
9. **Marketing & Sales spending →** we estimated a quarterly budget increase of 2% (1st Year), 4% (2nd year) and 8% (3rd year) for every marketing effort.

Steps to create a legal company in Belgium (D&D Group, 2020)

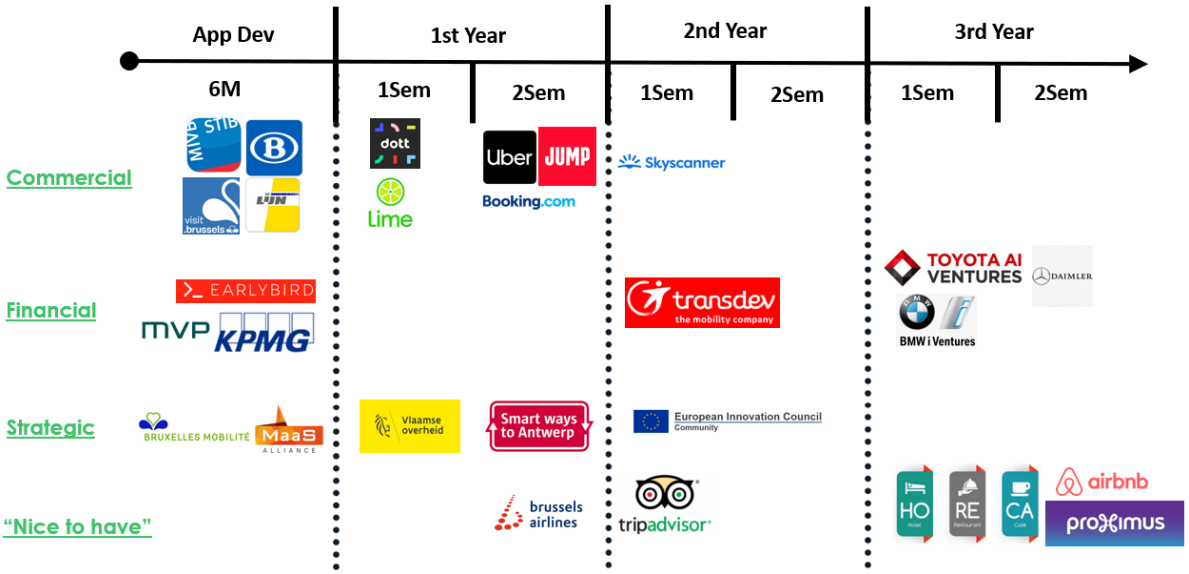
1. Activation of VAT number
2. Creation of companies/branches (SPRL, SA, SCS, etc)
3. Constitution of non-profit organisations (ASBL/ NGO)
4. Registration at the BCE (Banque Carrefour des Entreprises)
5. Registration for Social Security (self-employment)

[2] Chapter 4. Industry feedback .TABLE 9. STIB
[3] Chapter 4. Industry feedback .TABLE 8. STIB
[4] Chapter 4. Industry feedback .TABLE 6. DOTT / UBER/ LIME/ BIRD

KEY PARTNERS

Definition→ *Refers to the key partners that can help you leverage your business model and help you to perform your key activities.* (Osterwalder & Pigneur, 2010)

Figure 15 – Partnership planning for 3 years of operations of SNEL



Key Strategic partners

- ❖ According to STIB[5], De Lijn and MaaS Alliance[6] representatives if they partner with a tourist MaaS operator they would like to see endorsement or a letter of support from public organizations. The most important here is Bruxelles Mobilité, the regional public transport authority (PTA) from Brussels, which according to STIB representative, the initiative and instruction for STIB operator to develop their own MaaS pilot came from Bruxelles Mobilité.

Key Financial partners

- ❖ SNEL startup is seeking for seed investment from capital ventures (VC). The European Innovation Council (EIC) Business Acceleration Services (EIC, 2020) organized last May 14TH 2020 an online e-pitching with representatives from Earlybird VC, Munich Venture Partners, Robert Bosch Venture Capital GmbH, Siemens Venture Capital and WBX Ventures. These events helps to find strategic fit and match with the correct investor interested in mobility. In the 3rd year we are looking for a higher investment (more than 300 000 EUR) from automotive VCs like Toyota Ventures (Maas Global shareholders),BMW Ventures, DAMLIER (MOOVEL shareholders) to grow our additional service offering like internet, HORECA deals, accommodation matches thanks to our potential "Nice to Have" partners.

[5] Chapter 4. Industry feedback .TABLE 8. STIB
[6] Chapter 4. Industry feedback .TABLE 8. MaaS Alliance

KEY PARTNERS

Key Commercial Partners → MSPs and Visit Brussels

No commission revenue model, only data integration → One of the biggest achievements of our business model is to stop considering the MSPs as our paying customers and start considering them just as partners and suppliers of their mobility services and data. According to the Finnish PTA, De Lijn, STIB, City of Antwerp, MOW representatives[7], the current MaaS operators (i.e: MaaS Global, SKIPR, JELBI) are having none or very low profit margins from MSPs. In Belgium, De Lijn is the only PTO that is experimenting and giving 1.8 euro commission for every m-ticket sold. This is not enough. Therefore, it is necessary to cover all operational costs entirely with investors' money until we reach break-even in the 2 semester of the 3rd year. After that, the revenue streams will come from selling data reports of tourist travel behavior and advertising banners promoted in the app and payed by 3rd partners.

Table 34 – Willingness of MSPs and VisitBrussels to partner with a Tourist MaaS operator.

	WILLINGNESS TO PARTNER WITH A TOURIST MAAS OPERATOR	MAIN REQUIREMENTS TO PARTNER	WHAT INTEGRATION THEY OFFER	WHAT THEY DON'T OFFER
VISIT BRUSSELS	Not interviewed. But **probably yes**, since they resell BrusselCards to City cards re-sellers outside Belgium	Not possible to reach	An API integration to allow Brussels Card reselling with QR code	Not possible to reach
STIB	**Yes.** But after JUMP ticket digitalization in 2021. For the moment Event Pass is possible temporary solution for SNEL app	-Approval from Visit Brussels -Business plan -Compliance to the technical aspects -Reporting	-Free "Open data contract" for routing integration -ticketing only via EVENT pass -Payment only via invoicing, not API	-No commission -Tickets must be sold at same price -Volume pre-purchase is not allowed. -Only on-demand and nominal tickets (with the name of the traveller)
DE LIJN	**Yes.**	-Be a established company -Respect conditions and standardization criteria	-Commission of 1.8 euro -Free licensing agreement for statistical data or web services. -M-ticket re-selling contract	-Volume pre-purchase is not allowed. -Only nominal tickets on demand. -Re-selling DE LIJN tickets directly to re-sellers (i.e: Booking .com) is not allowed
NMBS & Villo Bike	Not possible to reach. **Probably yes** since they partnered with SKIPR.	Not possible to reach	Not possible to reach	Not possible to reach
DOTT	**Yes.** Your voucher method is interesting. But in 2021.	-Fair listing criteria - Data must be encrypted, secured -No reporting to their competitors	Only booking integration via deep link redirection to their app	Payment integration is not possible at the moment
LIME	**Yes.** But partial integration	Not asked	Only booking integration via deep link redirection to their app	No payment integration
UBER (Jump)	**Probably yes** in the future since they already partnered with CityMapper, SKIPR and SNCF (France)	They are open to bilateral negotiations.	Only booking integration via deep link redirection to their app	Not asked.

[7] Chapter 4. Industry feedback .TABLE 6, 7, 8, 9 10 & TABLE 12. PTA, De Lijn, STIB, City of Antwerp, MOW

REVENUE STREAMS & COST STRUCTURE

Definition REVENUE→ *Refers to how clear and through which pricing mechanisms your business model is capturing value. (Osterwlder & Pigneur, 2010).*

Definition COST STRUCTURE *→ Once you have built all your business infrastructure then you have an idea on how much it will cost. (Osterwlder & Pigneur, 2010).*

FINANCIAL PLAN

Business Model	UNIT	Expected Launch	ARPU	Expected Lifetime Value	Billing period	Retention rate
Revenue #1 .Bundles	EUR/#	1Sem/1Y	73 €	73 €	Daily	40%
Revenue# 2: Additional Services On-Demand (ASOD)	EUR/#	1sem/1Y	22 €	22 €	Daily	40%
Revenue# 3: Selling Tourist Travel Behaviour Data (TBD) reports	EUR/#	1Sem/2Y	1.000 €	20.000 €	Monthly	99%
Revenue # 4: Ads comission from 3rd Parties banners	EUR/#	2sem/2Y	2 €	400 €	Monthly	99%

TABLE 35 – BUSINESS MODEL (PROJECTIONS PER SEMESTER)

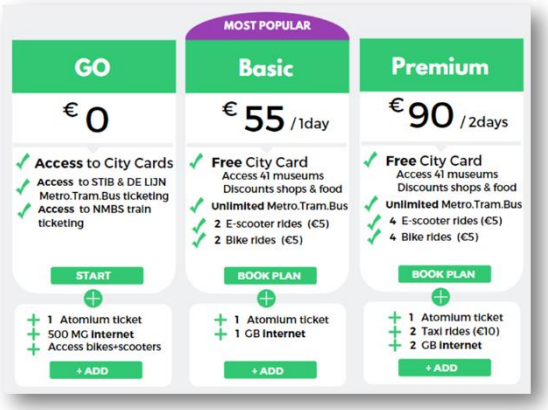
Business Model	UNIT	App Dev 1Sem	1st year 1Sem	1st year 2Sem	2nd year 1Sem	2nd year 2Sem	3rd year 1Sem	3rd year 2Sem
Market size for TBD reports	EUR	**TBC**	**TBC**	**TBC**	**TBC**	**TBC**	**TBC**	**TBC**
Market size for Ads banners	EUR	**TBC**	**TBC**	**TBC**	**TBC**	**TBC**	**TBC**	**TBC**
Market size for Tourist MaaS services	EUR	0	**357.210 €**	**357.210 €**	**598.752 €**	**598.752 €**	**1.251.936 €**	**1.251.936 €**
Addressable Market	%	0	**15%**	**25%**	**35%**	**45%**	**55%**	**65%**
Max. Addressed market	EUR	0	**44.651 €**	**80.372 €**	**194.594 €**	**254.470 €**	**657.266 €**	**782.460 €**
Proportion Buying Bundles	%	0	25%	25%	25%	25%	25%	25%
Addresable users (Bundles)	Users	0	153	276	669	874	2259	2689
Proportion Buying ASOD	%	0	75%	75%	75%	75%	75%	75%
Addrsable Users (ASOD)	Users	0	1.530	2.754	6.667	8.718	22.518	26.807
Total Addressable users	Users	0	**1.683**	**3.030**	**7.335**	**9.592**	**24.776**	**29.496**
Profit Margins								
Bundle# 1 Basic	%	0	0%	0%	5%	5%	6%	6%
Bundle #2 Premium	%	0	0%	0%	5%	5%	6%	6%
Additional Services	%	0	0%	0%	0%	0%	0%	0%
Organic App Traffic								
New app installs	#	0	4.208	7.574	18.339	23.981	61.941	73.739
Active App Costumers	#	0	**1.683**	**3.030**	**7.335**	**9.592**	**24.776**	**29.496**
Revenue # 3								
New T.B.D clients	#	0	0	0	44	51	68	92
Active T.B.D Clients	#	0	0	0	43	50	68	91
T.B.D monthly reports sold	#	0	0	0	**250**	**291**	**379**	**510**
Revenue # 4								
New Adv Affiliates	#	0	0	0	0	11	14	18
Active Adv. Affiliate	#	0	0	0	0	11	14	18
Banners published	#	0	0	0	0	**1872**	**2267**	**3051**

TABLE 36 - BUNDLING COST CALCULATION (PER MONTH)

→ for 1683 active users accumulated in 6 months

Ratio --> 1 Active User : 1 Products sold		
Active Users/Semester		**1.683**
Active Users /Month		281
Total products sold / Month		**281**
	Sales Share	**Q (Products)**
Bundle	25%	**70**
On demand	75%	**210**

				60%		40%	
				Q	42	Q	28
				Basic (1day)		**Premium(2days)**	
	Partner	**Product**	**Cost/ unit**	**Q**	**Final cost**	**Q**	**Final cost**
Fixed Bundle	*VisitBrussels*	***Free City Card*** *(Brussels card)*	Per day	1	28 €	1	36 €
	STIB	***Unlimitted Metro.Tram.Bus*** *(Event Pass)*	7,5 €	1	7,0 €	1	14 €
	DOTT	***E-kick scooter rides*** *(5EUR promo code)*	5 €	2	10 €	4	20 €
	JUMP (Uber)	***Bike rides*** *(5EUR promo code)*	5 €	2	10 €	4	20 €
				Total	**55 €**		**90 €**



Basic/ Month		**Premium/ Month**	
Q/ Month	**Cost/unit**	Q/ Month	**Cost/unit**
42	1.178 €	28	1.010 €
42	316 €	28	393 €
84	421 €	112	561 €
84	421 €	112	561 €
TOTAL	**2.335 €**	TOTAL	**2.525 €**
		TOTAL BUNDLE COST PER MONTH	**4.860 €**

	Sales Share/Group		**Partner**	**Product**	**Q/month**	**Cost/unit**	**COST**
ASOD **Additional Services On-Demand - CityCards - Mobilitytickets- 3rd Partners**	**30%**	40%	*VisitBrussels*	*Brussels cards 24h*	25	28 €	707 €
		25%	*VisitBrussels*	*Brussels cards 48h*	16	36 €	568 €
		5%	*VisitBrussels*	*Brussels cards 72h*	3	44 €	139 €
		15%	*VisitAntwerpen*	*Antwerpen Card 24h*	9	29 €	275 €
		10%	*VisitAntwerpen*	*Antwerpen Card 48h*	6	37 €	234 €
		5%	*VisitAntwerpen*	*Antwerpen Card 72h*	3	42 €	133 €
	50%	50%	STIB	*24h- Event Passes*	53	7,5 €	394 €
		30%	NMBS	Standard GO PASS ticket	32	6,6 €	208 €
		10%	DE LIJN	24h- Day pass (m- ticket)	11	6,6 €	69 €
		10%	UBER	10EUR promo code on UBER	11	10 €	105 €
	20%	80%	*VisitBrussels*	Atomium ticket	34	12 €	404 €
		20%	Proximus	1GB internet	8	4,0 €	34 €
				TOTAL	210		
						TOTAL ASOD COST PER MONTH	**3.269 €**

REVENUE STREAMS & COST STRUCTURE

Table 36

Finnancial Statement (by Semester)		App Dev	1st year	1st year	2nd year	2nd year	3rd year	3rd year
Income Statement	UNIT	1Sem	1Sem	2Sem	1Sem	2Sem	1Sem	2Sem
REVENUE	EUR	0 €	40.974 €	49.578 €	311.383 €	369.635 €	474.445 €	625.850 €
Revenue # 1: Bundles	EUR	0	24.495	29.639	37.657	45.565	55.658	67.346
Revenue# 2: Additional Services On-Demand (ASOD)	EUR	0	16.479	19.939	24.126	29.193	35.492	42.741
Revenue# 3: Selling Tourist Travel Behaviour Data (TBD) reports	EUR	0	0	0	249.600	291.133	378.760	509.660
Revenue # 4: Ads comission from 3rd Parties banners	EUR	0	0	0	0	3.744	4.535	6.102
COGS COSTS	EUR	3.236 €	45.996 €	55.655 €	67.342 €	81.484 €	98.596 €	119.301 €
Cost of Bundling	EUR	0	24.495	29.639	35.863	43.395	52.508	63.534
Cost of On Demand	EUR	0	16.479	19.939	24.126	29.193	35.323	42.741
Sales cost	**EUR**	**0**	**40.974**	**49.578**	**59.990**	**72.588**	**87.831**	**106.276**
Cost AWS Web Services	EUR	3.236	3.916	4.738	5.733	6.937	8.393	10.156
Cost of Payment Services	EUR	0	1.106	1.339	1.620	1.960	2.371	2.869
GROSS PROFIT	EUR	-3.236 €	-5.022 €	-6.076 €	244.041 €	288.151 €	375.849 €	506.549 €
SG&A COSTS	EUR	78.540 €	182.718 €	184.309 €	322.942 €	334.878 €	477.802 €	495.601 €
PAYROLL	EUR	69.600 €	129.600 €	129.600 €	254.400 €	261.600 €	386.400 €	393.600 €
CEO	EUR	0	12.000	12.000	12.000	12.000	12.000	12.000
Sales & Marketing Junior	EUR	0	12.000	12.000	36.000	36.000	60.000	60.000
Costumer Agents	EUR	0	0	0	7.200	14.400	21.600	28.800
CFO	EUR	0	12.000	12.000	12.000	12.000	12.000	12.000
Finance Associate Junior	EUR	0	12.000	12.000	36.000	36.000	60.000	60.000
CTO	EUR	0	12.000	12.000	12.000	12.000	12.000	12.000
Android Developers	EUR	12.000	12.000	12.000	24.000	24.000	36.000	36.000
IOS Developers	EUR	12.000	12.000	12.000	24.000	24.000	36.000	36.000
Backend Engineers	EUR	12.000	12.000	12.000	24.000	24.000	36.000	36.000
Full stack web developers	EUR	12.000	12.000	12.000	24.000	24.000	36.000	36.000
Machine Learning Engineer	EUR	7.200	7.200	7.200	14.400	14.400	21.600	21.600
Designer Apps	EUR	7.200	7.200	7.200	14.400	14.400	21.600	21.600
Designer Web	EUR	7.200	7.200	7.200	14.400	14.400	21.600	21.600
RENT	**EUR**	**8.940 €**	**10.728 €**	**10.728 €**	**21.456 €**	**22.350 €**	**33.078 €**	**33.972 €**
MARKETING & SALES	**EUR**	**0 €**	**42.390 €**	**43.981 €**	**47.086 €**	**50.928 €**	**58.324 €**	**68.029 €**
Direct Response Campaigns							0	0
Google Search traffic ads	EUR	0	12.120	12.610	13.509	14.611	16.733	19.517
Google keywords	EUR	0	15.150	15.762	16.886	18.264	20.916	24.397
Lead Generation deals (data selling	EUR	0	3.000	3.000	3.182	3.442	3.942	4.598
Brand Awareness Campaigns							0	0
Facebook ads for app instals	EUR	0	12.120	12.610	13.509	14.611	16.733	19.517
CAPEX	EUR	10.000 €	2.000 €	0 €	12.000 €	13.000 €	0 €	1.000 €
Computers	EUR	10.000	2.000	0	12.000	13.000	0	1.000
Telecom Equipment	EUR	0	0	0	0	0	0	0
Other	EUR	0	0	0	0	0	0	0
NET INCOME	EUR	-91.776 €	-189.740 €	-190.386 €	-90.901 €	-59.727 €	-101.953 €	9.947 €
								BREAK-EVEN
Investment Rounds to cover loss till Break-Even		91.776 € Round # 1	189.740 € Round # 2	190.386 € Round # 3		252.582 € Round # 4		
TOTAL INVESTMENT 3 YEARS								
724.483 €	**ROI**	-100%	-100%	-100%	-36%	-24%	-40%	4%
		LOW RETURN					HIGH RETURN	

REVENUE STREAMS & COST STRUCTURE

IMPORTANT FINANCIAL POINTS TO CLARIFY.

BUSINESS MODEL

- **The ARPU** refers to the average revenue per user. For bundles the average between Basic and Premium plans is 73 EUR and for ASOD is 22 EUR. The TBD reports (1000 EUR/unit) will be sold to corporate clients in the 1Semester of the 2nd year. Then the banners will cost 2 EUR per unit and the idea is to gain 18 corporate clients in our advertising Affiliate program by the end of 3rd year.
- **Total Addressable users→** This is our main trigger for the financial projections. As you can see in the *1Sem,* the idea is to address 15% of the MaaS tourism market after launch of the app. With an expected growth of 10% per semester. The number users per product are obtained by multiplying the expected proportion of bundles (25%) times the *Max Addressed Market* and then divided by its ARPU. The same procedure for ASOD. Therefore, the calculation of *Active App Costumers* results from summing *Bundle addressable users* and *ASOD addressable users*. That's how we obtained the 1683 active users marked in green.
- **Market size for TBD reports and Ads banners:** The reason why these markets have a TBC (to-be-confirmed) label, is because corporate client's markets are not in the scope of this master thesis since we only try to focus in the MaaS tourism market for individual users. However, at least it is important to identify it because we want the reader to imagine the magnitude and potential that MaaS operator could have to make money in the future if they access new markets besides MaaS markets. Every time there is a proposal for a new revenue stream a new market is open.

BUNDLING COST CALCULATION (PER MONTH)

- **Ratio → 1 active User : 1 Product sold:** the purpose of the projection is to assume that at least 1 active costumer will buy at least 1 product of SNEL. In a month that will be around 281 products with a proportion of 25% (bundles) and 75% (ASOD).

INCOME STATEMENT

- **COGS (Costs of Good Sold) :** it represents all the costs that are necessary to have in order to run our operation. The *Sales Cost* shows the amount we have to pay to our suppliers (MSPs, VisitBrussels, Atomium, etc). The cost of Amazon Web Services (AWS) was taken from the cost of their LightSail Plan (Amazon Web Services, 2020) and the Payment services was estimated from the fees per transaction that charges PAYPAL. (Paypal, 2020) **Gross Profit:** Is after we start to sell TBD reports that we expect a break-even on our gross profit (marked in white).
- **SGA (Sales, General and Administrative):** payroll represents 80% of our costs. This information is key to conclude that paying co- founders, IT developers and administrative agents are the main cashburning reason that experiences software companies such as MaaS operators.
- **Total investment needed in 3 years of operations→** 724 483 EUR collected from 4 different fundraising rounds along 3.5 years of operations of SNEL. After that, the company is sustainable to keep their costs under control and generate profit incrementally. This estimation can be calibrated any time but is important to notice that MaaS operator's profitability should be treated in mid and long term basis (3-5 years) and instead of focusing on tickets reselling profit only, MaaS operators should consider extra products to sold (i.e: TBD reports) as their main revenue source to reach break-even. (marked in green)

CHAPTER 6

CONCLUSIONS & RECOMMENDATIONS

In summary, this master thesis explored the business opportunity to launch a Mobility- as-a-Service (MaaS) app platform for tourists in Brussels so they can route-search multimodal trips, book tickets and explore touristic deals in the same platform. The following are main conclusions of this master thesis:

6.1 Conclusions # 1: About the research questions

- **RQ1:** This research question was partially answered. Not because the responses were not helpful but because there was representativity limitations. For example, the total sample surveyed (N=221) is not enough for market researchers and only 15 testers were surveyed on tourist arrival hubs, the rest were mainly students surveyed online. Nevertheless, the information was very helpful to identify their main mobility issues, trends, hints and prioritize the main features the tourists would like to have in an app platform that satisfies their mobility needs when they are visiting unknown urban environments.
- **RQ2:** This research question was completely answered. The author of this master thesis was very lucky to collect unique and valuable industry feedback thanks to his internship at the MaaS Alliance in Brussels from February 2020 to May 2020. In total, 12 representatives from 11 different mobility organizations were approached, the whole interview exercise resulted in 4 BMC iterations making the business plan to be built on-the-go, meaning that every time was fine tuning and improved according to the feedback and approval provided by the previous participant. This is the first empirical evidence ever of industry feedback related to the feasibility of launching a tourist MaaS operator in Belgium.
- **RQ3:** This research question was completely answered. The lean start business plan format was a very user-friendly business plan methodology. The input from the tourist and industry (Chapter 4) was key to iterate and built SNEL start up business plan on-the-go. Here some of the main achievements that justifies why this business plan can compete with larger MaaS operators in Brussels:
    1. The one-pager business model canvas (BMC)
    2. The value proposition of selling 4 MVPs in 3 years of operations: bundles, ASOD, TBD reports and advertising banners from 3rd parties.
    3. The tourist MaaS prototype self-designed with Adobe XD, with name and logo of SNEL startup.
    4. The planning in three phases to approach individual and corporate costumers
    5. The channeling strategy to pull costumers to install the app by giving away 10-euro free promo codes via online travel agencies like Booking.com.
    6. The team of 12 members and the detail of the software skills that they should have based on job posting benchmarking from leading MaaS operators like MaaS Global, MOOVEL, MOOVIT and TRAFI (JELBI).
    7. The planning of commercial, strategic and financial partners during the 3 years of operations.
    8. The expressed interest and willingness to partner in 2021 from the interviewed key commercials partners like STIB, DE LIJN, DOTT, UBER and LIME.
    9. The in-depth financial plan with projections of the business model, the bundle calculation, the income statement, the ROI and the break-even of 9 947 EUR reached after 724 483 EUR of investment during 3 years of operations.

6.2 Conclusion # 2: About the discussion between the literature review and the main findings.

From the literature review we can conclude that MaaS and seamless travel are key value propositions for tourists because it gives them accessibility, convenience and hassle-free multimodal connections that attracts travelers to the public transport and convinces to test micro-mobility services. Therefore, we share the conclusion that the main challenge to provide seamless urban mobility is solving the mismatch between the way in which customers approach trips – as single, end-to-end journeys – and the way in which transport authorities plan and allocate resources to various networks. (OECD, 2016).

The whole idea of testing a MaaS solution for tourists contributes to the MaaS literature given the fact that the landscape of the mobility market is radically changing [even after COVID-19]; new mobility schemes are emerging, new technologies are rapidly being adopted, while we may be experiencing a paradigm shift from ownership to usership. (Polydoropoulou, et al. 2019). The whole exploration of a MaaS business opportunity in Brussels should be exciting to readers, researchers and practitioners since opens the possibility to target a new market and expand the MaaS possibilities in Brussels and abroad.

6.3 Conclusions # 3: About the need to create a MaaS integrator in every European PTA

In the literature review, Kamargianni & Matyas (2018) identifies the key players that are distributed in three different layers of a business ecosystem. Nevertheless, this visualization lacks in explaining the actual dynamics that facilitates and hinders the access of MaaS operators to offer profitable value propositions to users. Therefore, from the MaaS Alliance internship and the SNEL business plan learning, this thesis concludes what in order to have a win-win market among all MaaS players there is a necessity to create a MaaS integrator, funded by every national PTA that relaxes the main MaaS gatekeepers (PTO, Micromobility) and manages all data & contractual integrations as a neutral, trustable and central body between MaaS operators and mobility data providers such as MSPs.

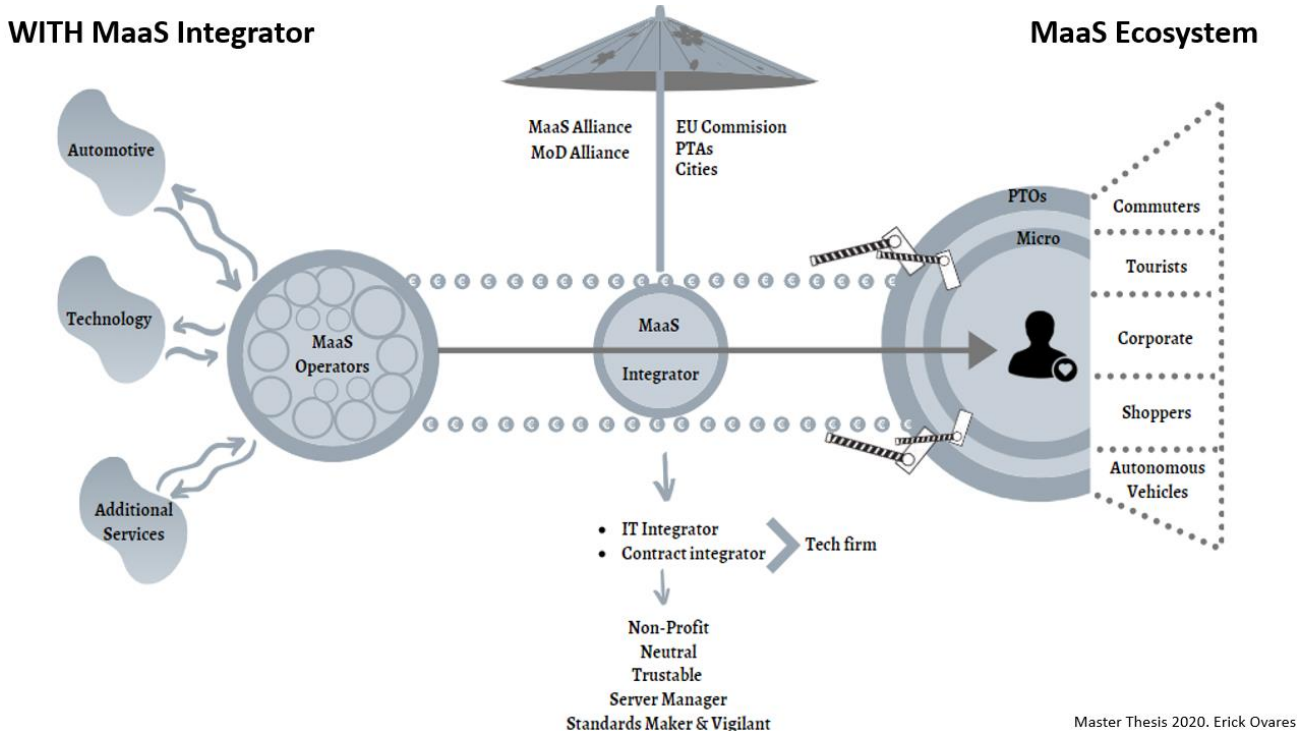


Figure 16 – Proposal of a win-win MaaS market having a MaaS Integrator funded by the PTAs as a neutral body.

RECOMMENDATIONS

6.4 Recommendation # 1: About COVID-19 and the feasibility, profitability scalability of building a Tourist MaaS Operator.

The business plan was not only built on the basis of industry and tourist feedback, but also exploring the possibility to finance a solid and sustainable MaaS startup that can survive during post COVID crisis and generate profit the earliest possible. Here the final conclusion of why building a tourist MaaS operator could be challenging after COVID-19 crisis.

- **Feasibility → Its contractual and technically feasible.**
  - The Belgian PTOs are ready for ticketing digital transformations. Brussels Mobilité ordered STIB in 2020 to develop their own MaaS pilot and testing phase will end in 2021. The toll technology that they will implement to open the metro gates will be EMV and QR code. If STIB finds suitable to partner with a tourist MaaS operator by 2021 , the QR code scanner API can be transferred as part of the data sharing agreement. In the meantime, a Tourist MaaS Operator can gain traction and bringing revenue by re-selling the Eventpass, the citycards and redirecting users with the micromobility vouchers. The existing contracts allows these temporary solutions, they offer routing, ticketing integration and payment by invoicing.
- **Profitability → its challenging and not profitable for at least 3 years.**
  - Any investor that would like to invest on a MaaS operator start up should be interested not in the ticket reselling profit, but in the business of selling travel behavior data to corporate customers (81% of SNEL income by the 2nd semester of the 3rd year). Based on Juniper Research (2020) this master thesis estimates that by 2027, the annual market size for leisure tourism interested in mobility platform services will be more than 30 million euros in Belgium and 102 million in the whole EU-27. According to the Finnish PTA representative, even today, MaaS Global is paying their operational costs entirely with their investors' money (they were founded in 2015) which indicates that MaaS profitability is treated in a long-term basis.
- **Scalability → its scalable.**
  - According to the learning obtain from the internship in the MaaS Alliance, MaaS operators can only scale internationally when roaming will be a reality. Roaming is the ability to access mobility services wherever you are, so the app can pull and grant you access to local mobility offering. For MaaS operators, bilateral IT integrations and contractual agreements are key cash burning and time-consuming issues. The efforts for building European standardization and data sharing schemes are part of the current EU Commission data strategy agenda. Now, related to SNEL MaaS operator, scalability and reaching break-even is proposed under the assumption that there will be 91 corporate clients willing to buy tourist travel behavior reports (TBD) for the price of 1000 euros per month. It's indeed a very optimistic approach, but in the other hand, it's imperative to start looking for new revenue streams in the MaaS ecosystem, otherwise, making money in the business of switching people from ownership to usership could be impossible.

6.5 Recommendation # 2: About the learning process and recommending using the lean-startup business plan methodology:

- The best recommendation for readers and practioners who are interested in building a MaaS startup is definitely related to the constant testing and validation of the value proposition. The first prototype and MVP designed back in April 2019 is totally different from the final version. The methodology helps you to go back and forth, revise your business plan and test your hypotheses with your stakeholders. This feedback triggers changes and make you build the business model based on their point of view, needs and constraints.
- It's crucial to interview your key partners. Instead of approaching them in the traditional sales and aggressive method, is way better to understand what their needs are, what is the struggles they are having to upgrade their ticketing technology and finding together ways to unite forces and solve the passenger mainly problems. At least this is the Belgian approach, the openness of the Belgian representatives interviewed was remarkable, the way they make business is more on the basis of finding common ground, telling you straight forward what is feasible and what is not feasible for them and walk-you-thru on what should be fix to partner with them. It is highly recommendable to approach them with politeness and making them see that you are building a MaaS solution based on their feedback and you are willing to calibrate anything in your value proposition to make it the most realistic and functional as possible. Partnerships in MaaS solutions are the real key for success.

6.6 Recommendation # 3: About the future of MaaS

- Opening a Tourist MaaS operator might be too early after seeing how COVID-19 is making everything to slow down. In general, I think the MaaS concept (switching from ownership to usership) will only kick-off when we have autonomous vehicles. This is because in reality the value of combining and using different modes of transport is still too low in comparison with the value of owning a car. Is not until we have autonomous vehicles in place that MaaS can actually generate money. Take for example the current MaaS operators, they are having profitability issues because the costumers are giving away too small commissions. They also have scalability issues because there is no standards in the agreements and in the integrations to create a roaming ecosystem. Today, the main shareholders that invest in MaaS operators are actually automotive companies, who fear that autonomous vehicles will drop their customer relationships since caring about the brand of the vehicle will no longer have a value, if you don't drive it or own it. When you see technology giants like Google investing in autonomous vehicles you can see that they are not interested in mobility services, they are just interested in advertising and data. What they want to do is to own the platform of vehicles to install screens and push tailored advertising to those MaaS costumers inside. At the end, creating a Tourist MaaS operator to compete with Google Maps is unrealistic, but getting travel behavior data and consumption patterns are the real cash-machine behind MaaS solutions.

REFERENCES

Amazon Web Services (2020) Amazon Lightsail Pricing. Retrieved online on 10/05/2020 via: https://aws.amazon.com/lightsail/pricing/?opdp1=pricing

Ancienne Belgique (2020) Agenda. Retrieved online on 3/01/2020 via: https://www.abconcerts.be/en/agenda/events/?

Blank, S (2012) Tools for Business Model Generation [Entire Talk].Stanford E-corner. Stanford University. Retrieved online on 3/01/2020 via: https://ecorner.stanford.edu/videos/tools-for-business-model-generation-entire-talk/

Blank, S. (2013) Why the Lean Start-Up Changes Everything. Retrieved online on 8/02/2020 via: https://hbr.org/2013/05/why-the-lean-start-up-changes-everything

BISA– Brussels Institute for Statistics and Analysis. (2018) Mini-Bru: Brussels-Capital Region in figures 2018. IRIS Editions – D/2018/6374/274. Brussels, Belgium.

Brussels Times (2020) STIB wants 2,000 testers for new mobility app. Retrieved online on 3/01/2020 via: https://www.brusselstimes.com/brussels-2/98165/stib-wants-2000-testers-for-new-mobility-app/

Brussels Tram Museum (2020) Prices and reservations. Retrieved online on 5/01/2020 via: https://trammuseum.brussels/brussels-tourist-tramway/tarifs-et-reservations/

Bruxelles Mobilite (2016) L'autocar en pleine mutation. Retrieved online on 3/01/2020 via : file:///C:/Users/Erick%20Ovares/Downloads/ESPMOB_Brochure_Autocar_FR_DEF_WEB%20(1).pdf

BSCA – Brussels South Charleroi Airport (2019) Increase in passenger numbers: More than 800,000 travellers have come through Brussels South Charleroi Airport. Retrieved online on 3/01/2020 via : https://www.brussels-charleroi-airport.com/en/news/charleroi/increase-passenger-numbers-more-800000-travellers-have-come-through-brussels-south

BZA – Brussels Zaventem Airport (2019) Brussels Airport in numbers. Retrieved online on 4/01/2020 via : https://brusselsairportinnumbers.brusselsairport.be/en#we-love-numbers

BZA – Brussels Zaventem Airport (2019) Brussels Airport Traffic December 2018. Retrieved online on 3/01/2020 via : https://media.brusselsairport.be/bruweb/default/0001/21/d45c19d7482b6ff72ec3d7edde2d6892ea27294b.pdf

Coworker.com (2020) TRIBES. Pricing. Brussels. Retrieved online on 19/04/2020 via : https://www.coworker.com/belgium/brussels/tribes-brussels-central-station#amenities

D&D Group (2020) Set Up And Grow Your Activity Under The Belgian Law. Retrieved online on 10/05/2020 via : http://dndgroup.eu/services/

Detemmerman, S.; Descamps, C.; Oubihi, G. (2019) Annual report of the Brussels tourism observatory 2018.Retrived from the official website of Visit.brussels.be. Brussels, Belgium.

Ecolane (2019) What is MaaS? mobility as a service explained. Retrieved online on 3/01/2020 via: https://www.ecolane.com/blog/what-is-maas

EIC - European Innovation Council (EIC) Business Acceleration Services (2020) EIC ePitching with Investors on mobility: speed up your investment. Retrieved online on 20/05/2020 via : https://ec.europa.eu/easme/en/eic-epitching-investors-mobility-speed-your-investment

European Cities Marketing (2019) Leading European city tourism destinations in 2018, by number of bednights. European Cities Marketing. Retrieved online on 6/01/2020 via : https://www.statista.com/statistics/314340/leading-european-city-tourism-destinations-by-number-of-bednights/

European Commission's Directorate-General for Mobility and Transport (2012) "Intermodal Passenger Transport in Europe Passenger Intermodality From A To Z the european forum on intermodal passenger travel". Linkforum.eu

Fang, J.; Zhao, Z.; Wenb, C.; Wanga, R. (2017) Design and performance attributes driving mobile travel application engagement. International Journal of Information Management. 0268-4012/ 2017 Elsevier Ltd.

Forest National (2020) Calendrier. Retrieved online on 7/01/2020 via: http://www.forest-national.be/fr/calendrier

Foxe, K. (2016) Passengers bring 2 or 3 electronic devices on flights. Retrieved online on 8/01/2020 via: https://www.lonelyplanet.com/articles/survey-air-passengers-bring-two-to-three-electronic-devices-on-flights

Google Travel Study(2018) How smartphones influence the entire travel journey in the U.S. and abroad. Retrieved online on 3/01/2020 via: https://www.thinkwithgoogle.com/consumer-insights/consumer-travel-smartphone-usage/

Google Maps (2020) Pricing for Maps, Routes, and Places. Retrieved online on 7/01/2020 via: https://cloud.google.com/maps-platform/pricing

Hensher, D.A., 2018. Tackling road congestion – what might it look like in the future under a collaborative and connected mobility model? Transp. Policy 66, A1–A8.

Hietanen, S. (2014) 'Mobility as a Service' – the new transport model? Eurotransport. ITS Transp. Manage. Suppl. 12 (2), 2–4.

International Association of Public Transport – UITP (2019) Report "Mobility as a Service". April 2019. Brussels, Belgium

Intelligent Transport (2019) - Berlin launches the world's largest MaaS solution. Retrieved online on 3/01/2020 via: https://www.intelligenttransport.com/transport-news/88799/berlin-launches-the-worlds-largest-maas-solution/

TRAFFI (2020) Job Posting: Backend engineer. Retrieved online on 8/04/2020 via: https://drive.google.com/file/d/1NAsitUHSXmK-ekXt2Wg6YmlsJKH3gYcn/view?usp=sharing

JCDecaux (2016) JCDecaux developer: Usage of the API key. . Retrieved online on 3/01/2020 via: https://developer.jcdecaux.com/#/opendata/vls?page=getstarted

Juniper Research (2020) MaaS ~ The future of city transport 2027: White Paper. Coordinated by Nick Maynard. Juniper Research Ltd, Hampshire, United Kingdom

Kamargianni, M., and M. Matyas (2017) The Business Ecosystem of Mobility as a Service. 96th Transportation Research Board (TRB) Annual Meeting, Washington DC, 8-12 January 2017.

Kamargianni, M., Matyas, M., Li, W., Schäfer, A., (2015) Feasibility Study for "Mobility as a Service" concept in London. FS-MaaS Final Deliverable.

Kamargianni, M., Polydoropoulou, A., (2013)Hybrid choice model to investigate effects of teenagers' attitudes toward walking and cycling on mode choice behavior. Transp. Res. Rec. J. Transp. Res. Board 2382, 151–161.

Klein, N., Smart, M., 2017. Millennials and car ownership: less money, fewer cars. Transp. Policy 53, 20–29.

KVS - Koninklijke Vlaamse Schouwburg (2020) Programme. Retrieved online on 4/01/2020 via: https://www.kvs.be/en/agenda?locationselect=ownvenues#anchorFilters

Matyas, M. and Kamargianni, M. (2018) Exploring Individual Preferences for Mobility as a Service Plans: A Mixed Methods Approach. MaaSLab Working Paper Series Paper No.18-02.

MacHale, D. (2018) Travelers now prefer travel apps to web for search and booking. Retrieved online on 3/01/2020 via: https://www.phocuswire.com/Travelers-now-prefer-travel-apps-to-web-for-search-and-booking

Matyas, M. and Kamargianni, M. (2018) Exploring Individual Preferences for Mobility as a Service Plans: A Mixed Methods Approach. MaaSLab Working Paper Series Paper No.

Matyas, M (2018) Mobility as a Service and Tourism: Insights from the MaaS4EU Horizon 2020

MaaS Alliance (2019) What is MaaS? Retrieved online on 3/01/2020 via : https://maas-alliance.eu/homepage/what-is-maas/

MaaS Global (2020) MaaS Transport Service Provider Booking API. Retrieved online on 3/01/2020 via: https://github.com/maasglobal/maas-tsp-api/blob/master/specs/Booking.md

MaaS Global (2020) Job Posting: Android developer. Retrieved online on 8/04/2020 via: https://apply.workable.com/maas-global/j/33B876EEAC/

MaaS Global (2020) Job Posting: DevOps Engineer. Retrieved online on 8/04/2020 via: https://apply.workable.com/maas-global/j/677A040E0F/

MaaS Global (2020) Job Posting: IOS Developer. Retrieved online on 8/04/2020 via: https://apply.workable.com/maas-global/j/B0F1A395F1/

MOOVEL (2020) Job Posting: Algorithms Back-end Engineer. Retrieved online on 8/04/2020 via: https://drive.google.com/file/d/1PDrryKcoAsRLQhxRFMdVUvhAnW06yeUO/view?usp=sharing

MOOVIT (2020) Job Posting: Senior Algorithms Engineer Retrieved online on 8/04/2020 via: https://drive.google.com/file/d/1CcbA_tTpGYB8hoNTSX6JieguUhvqyPQu/view?usp=sharing

Mulley, C., Kronsell, A., 2018. Workshop 7 report: The "uberisation" of public transport and mobility as a service (MaaS): implications for future mainstream public transport. Res. Transp. Econ in press.

NMBS - Nationale Maatschappij der Belgische Spoorwegen (2020) Mobility Service Provider. Retrieved online on 3/01/2020 via : https://www.belgiantrain.be/nl/support/faq/faq-developers/faq-developers-data

NMBS - Nationale Maatschappij der Belgische Spoorwegen (2020) Developers - use our data - data. Retrieved online on 3/01/2020 via : https://www.belgiantrain.be/nl/3rd-party-services/mobility-service-providers/msp

NMBS - Nationale Maatschappij der Belgische Spoorwegen (2020) (Re) discover Belgium. Retrieved online on 6/01/2020 via : https://www.belgiantrain.be/nl/travel-ideas/inspiration/discover-belgium

NMBS - Nationale Maatschappij der Belgische Spoorwegen (2020) Weekend ticket. Retrieved online on 7/01/2020 via : https://www.belgiantrain.be/nl/tickets-and-railcards/weekend-ticket

NMBS - Nationale Maatschappij der Belgische Spoorwegen (2020) Rail Pass. Retrieved online on 4/01/2020 via : https://www.belgiantrain.be/nl/tickets-and-railcards/railpass

NMBS - Nationale Maatschappij der Belgische Spoorwegen (2020) JUMP CARD: Unlock Brussels with the all-in-one ticket. Retrieved online on 3/01/2020 via : https://www.belgianrail.be/en/travel-tickets/passes-cards/jump.aspx

OECD (2016), "Seamless transport to enhance the visitor experience", in OECD Tourism Trends and Policies 2016, OECD Publishing, Paris.

Osterwalder A., Pigneur Y. (2010), Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers, Alexander Osterwalder & Yves Pigneur.

Osterwalder, A. (2012) Tools for Business Model Generation [Entire Talk].Stanford E-corner. Stanford University. Retrieved online on 6/01/2020 via: https://ecorner.stanford.edu/videos/tools-for-business-model-generation-entire-talk/

Paypal (2020) Fees for Selling and Accepting Payments. Retrieved online on 5/05/2020 via:

Polydoropoulou, A; Pagonia, I. Tsirimpaa, A; Roumboutsosa, A. (2019) Prototype business models for Mobility-as-a-Service. Transportation Research Part A. Article in Press. Elsevier.

Price & Popijn (2019) Brussels region regulates free circulation electric scooters. CEW & Partners Advocats. Retrieved online on 3/01/2020 via: https://cew-law.be/brussels-region-regulates-free-circulation-electric-scooters/

Project. MaaS Lab. Energy Institute, University College London

Ries, E. (2011). The lean startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses. New York: Crown Business, 2011.

Romanyuk, J. (2018) Mobility As A Service-Hype Or The Future Of Transportation?. Master's Thesis. Aalto University School of Business, Helsinki, Finland.

Roumboutsos, A., Kapros, S., Vanelslander, T., 2014. Green city logistics: systems of innovation to assess the potential of E-vehicles. Res. Transp. Bus. Manage. 11,

STIB - Société des transports intercommunaux de Bruxelles (2020) Open Data Portal. Retrieved online on 3/01/2020 via : https://opendata.stib-mivb.be/store/home

STIB - Société des transports intercommunaux de Bruxelles (2020) The different holders for our transport tickets. Retrieved online on 3/01/2020 via : https://www.stib-mivb.be/article.html?_guid=30af0085-2483-3410-5394-a71daf08acd1&l=en

STIB - Société des transports intercommunaux de Bruxelles (2020) Single fares & multiple journeys Retrieved online on 7/01/2020 via : https://www.stib-mivb.be/article.html?_guid=d0707200-2683-3410-479e-b21a51d668f0&l=en

Summerfield, J (2020) Mobile Website vs. Mobile App: Which is Best for Your Organization? Retrieved online on 5/01/2020 via: https://www.hswsolutions.com/services/mobile-web-development/mobile-website-vs-apps/

Solanki, J. (2020) How to Choose the Right Mobile App Database for Your Application. Retrieved online on 5/05/2020 via: https://www.simform.com/mobile-app-developers-database-selection/

Tokarski, A.; Tokarski, M. Wójcik, J. (2017) The possibility of using the business model canvas in the establishment of an operator' s business plan. Torun Business Review 16(4) 2017 17-31

TripAdvisor (2020). Villo : Review Highlights. Retrieved online on 5/01/2020 via: https://www.tripadvisor.co.za/Attraction_Review-g188644-d8059504-Reviews-Villo-Brussels.html#REVIEWS

Transport Systems Catapult (2016) Exploring the opportunity for Mobility as a Service in the UK. Transport Systems Catapult, UK.

Utriainen, R., Pöllänen, M., 2018. Review on mobility as a service in scientific publications. Res. Transp. Bus. Manage in press

UXdesignersalaries.com (2020) Global average UX Designer salaries by country. Retrieved online on 8/04/2020 via: https://uxdesignersalaries.com/

Villo!- Brussels City bike sharing (2020) Our Subscription Plans. Retrieved online on 8/01/2020 via: https://www.villo.be/offers/groups/list#578570

Visitbrussels.be(2019) Brussel card pricing. Region de Brussels Capitale. Retrieved online on 3/01/2020 via : https://ticketing.visitbrussels.be/en/bc

Visit.brussels (2018) Annual report of the Brussels tourism observatory 2018. Retrieved online on 6/01/2020 via : https://visit.brussels/site/binaries/content/assets/pdf/barometres/rapport-annuel-2018---en-final.pdf

Wind (2020) Job Posting: Full-Stack Web Developer. Retrieved online on 8/04/2020 via: https://jobs.lever.co/wind/d63d65db-f691-4d0d-b60c-e82621bb1dfd

Wardman, M. (2014), "Valuing Convenience in Public Transport: Roundtable Summary and Conclusions", International Transport Forum Discussion Papers, No. 2014/02, OECD Publishing, Paris, http://dx.doi.org/10.1787/5jz40rk8h2f0-en.

Woolthuis, R.K., Lankhuizen, M., Gilsing, V., 2005. A system failure framework for innovation policy design. Technovation 25, 609–619

WTTC - World Travel & Tourism Council (2018) Total contribution of travel and tourism to GDP in Belgium from 2012 to 2028*. Travel & Tourism Economic Impact 2018 Belgium. Retrieved online on 6/01/2020 via : https://www.statista.com/statistics/810260/travel-tourism-total-gdp-contribution-belgium/

WTTC - World Travel & Tourism Council (2018) Contribution of travel and tourism to GDP in Belgium in 2017, by type. Travel & Tourism Economic Impact 2018 Belgium. Retrieved online on 4/01/2020 via : https://www.statista.com/statistics/810260/travel-tourism-total-gdp-contribution-belgium/

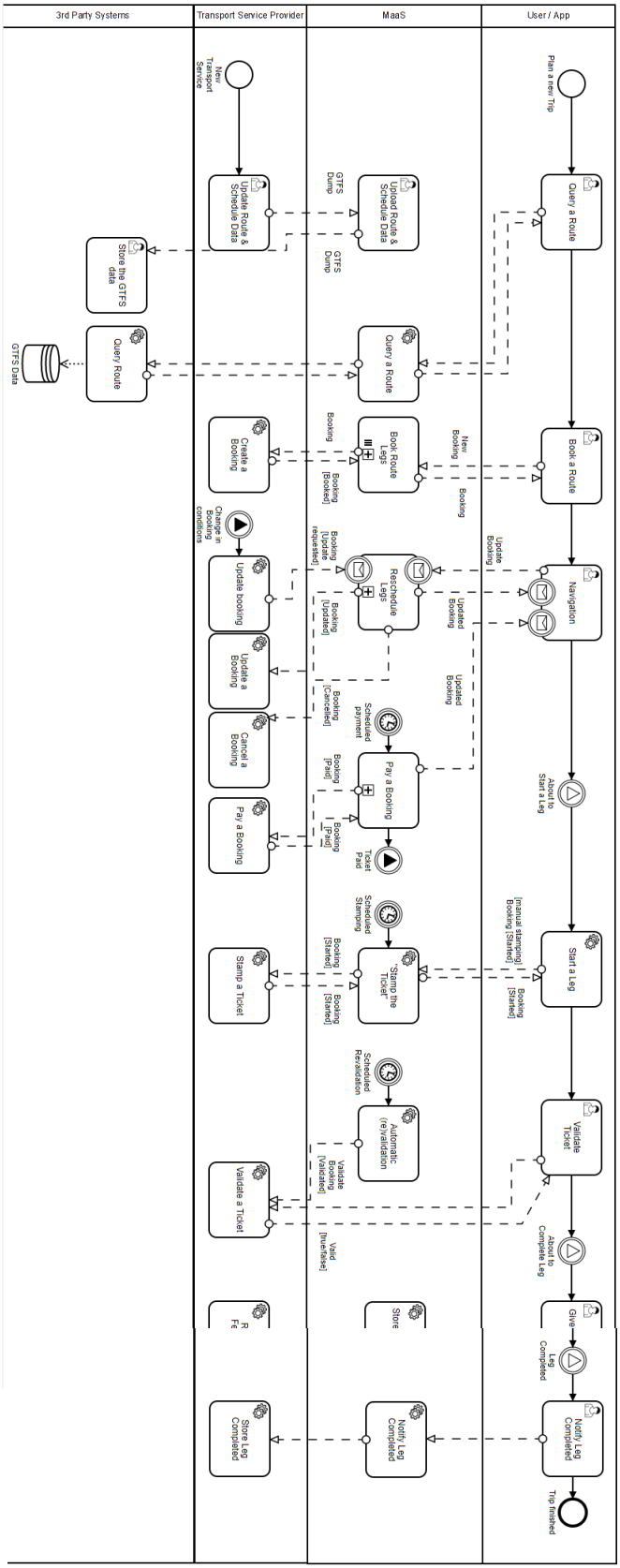
WTTC- World Travel & Tourism Council (2018) Contribution of travel and tourism to employment in Belgium in 2017, by type. Travel & Tourism Economic Impact 2018 Belgium. Retrieved online on 3/01/2020 via : https://www.statista.com/statistics/810260/travel-tourism-total-gdp-contribution-belgium/

WTTC - World Travel & Tourism Council (2018) Domestic tourism expenditure in Belgium from 2012 to 2028*. Travel & Tourism Economic Impact 2018 Belgium. Retrieved online on 8/01/2020 via : https://www.statista.com/statistics/810260/travel-tourism-total-gdp-contribution-belgium/

APPENDIX

APPENDIX 1 :

How a Booking API works between MaaS Provider & MSP (MaaS Global, 2020)



APPENDIX 2

The three designed BMC for Budapest, Greater Manchester and Luxembourg cities (Polydoropoulou et al, 2019)

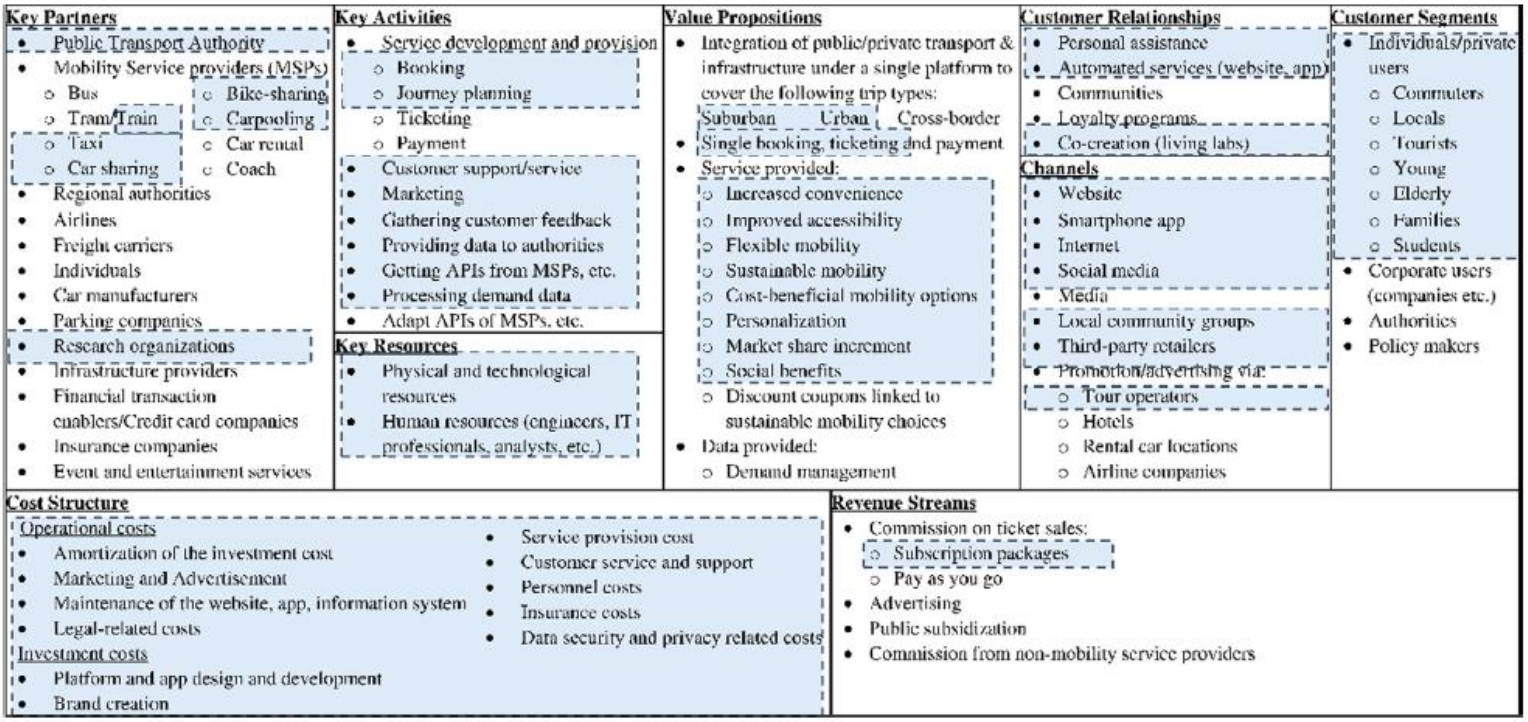


Fig. 5. Business model canvas for MaaS in Budapest.

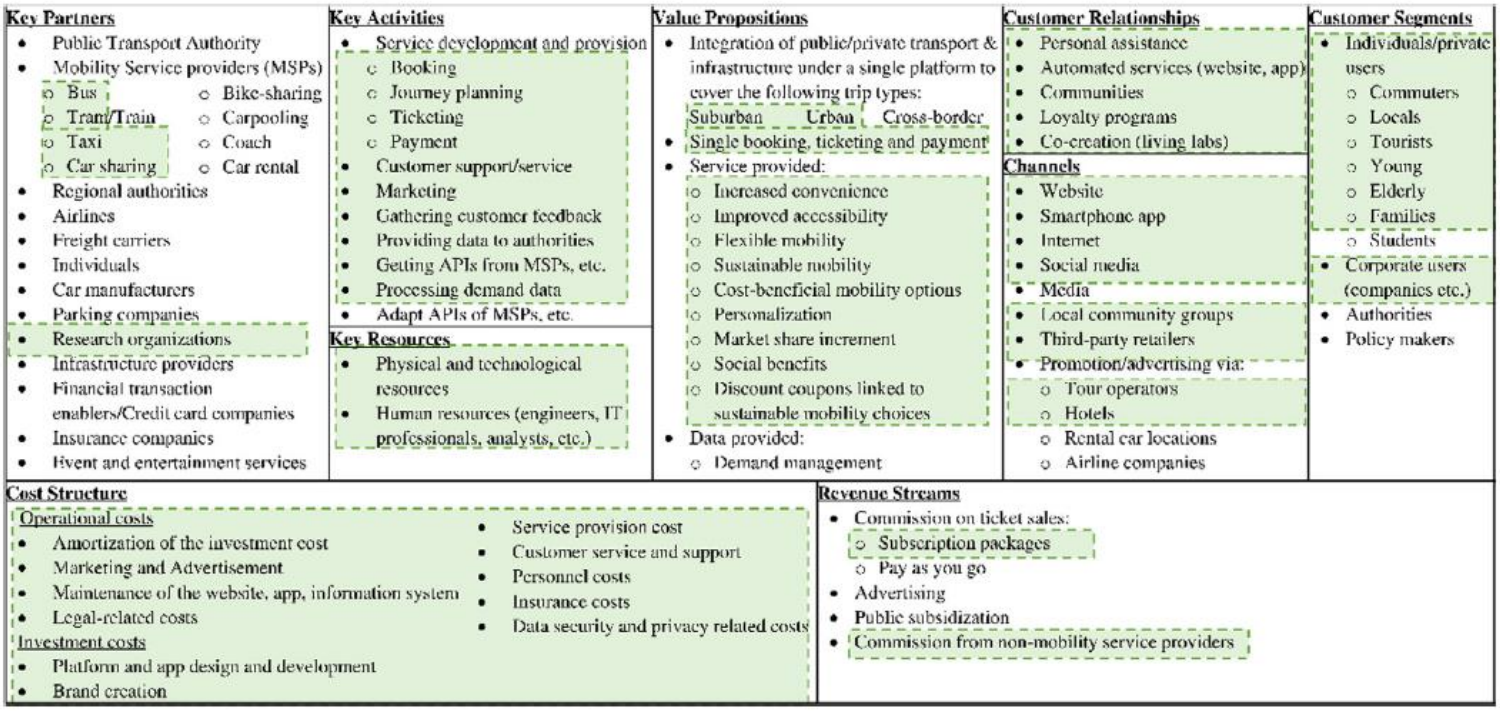


Fig. 6. Business model canvas for MaaS in Greater Manchester.

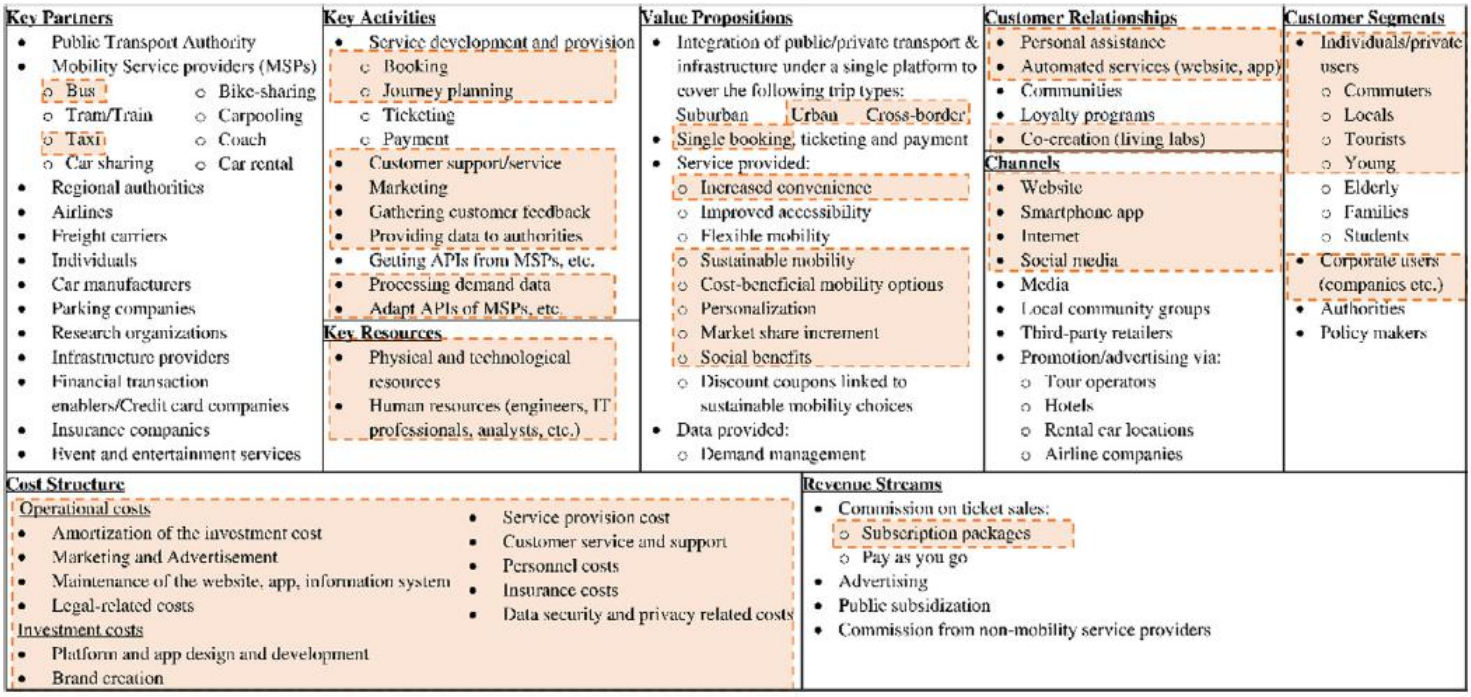


Fig. 7. Business model canvas for MaaS in Luxembourg.

APPENDIX 3

3rd Pilot survey (Google Forms)

Mobility Survey to belgians & international tourists

This survey is exclusively for master thesis and academic purposes. Your responses are confidential and highly valuable. Let's start !
*Required

1. 1. What is your main arrival (or departure) station in Brussels? *

   Mark only one oval.

   - ◯ International Brussels Airport Zaventem Train Station (BRU)
   - ◯ International Airport Brussels South Charleroi (CRL)
   - ◯ Brussels Zuid Train Station
   - ◯ Brussels Gare du Nord Bus Station
   - ◯ Brussels Gare Zuid Bus Station
   - ◯ Brussels Central
   - ◯ Brussels Noord
   - ◯ Other: _____

2. 2. What is your age range? *

   Mark only one oval.

   - ◯ Younger than 18 years old
   - ◯ 18 - 24 years old
   - ◯ 25 - 34 years old
   - ◯ 35 -44 years old
   - ◯ 45- 54
   - ◯ 55 - 64
   - ◯ Older than 65 years old

3. 3. Have you visited Brussels as a tourist? *

   Mark only one oval.

   - ◯ Yes
   - ◯ No

4. 4. What is your nationality? *

Mark only one oval.

- ◯ Belgium
- ◯ France
- ◯ United Kingdom
- ◯ Spain
- ◯ Nederlands
- ◯ Germany
- ◯ USA - Canada
- ◯ Other country of EU
- ◯ A country from Latin America
- ◯ A country from Africa
- ◯ A country from Middle East
- ◯ A country from Asia

5. 5. Normally, what modes of transport you use to get to your attractions when you are in a new city like Brussels? *

Tick all that apply.

- ☐ Walking
- ☐ Bike
- ☐ Public transport (Metro, Bus, Train or Tram)
- ☐ Electric kick scooter
- ☐ Car solutions (UBER, car rental, car sharing)
- ☐ Taxi
- ☐ A friend car

Other: ☐ _____

6. 6. Normally, what issues you experience when you use PUBLIC TRANSPORT as tourist in a new city (Ex:Brussels)?

Tick all that apply.

- ☐ Unclear local information (stop location, routing, availability, safety, weather)
- ☐ Unclear ticketing information and complex booking
- ☐ Language difficulties
- ☐ Prices are too expensive
- ☐ Too crowd public transport and no comfort
- ☐ Delays
- ☐ Other issues
- ☐ No issues

7. 7. Normally, what issues you experience when you go WALKING as tourist in a new city (Ex: Brussels)?

Tick all that apply.

- ☐ Difficulties of getting directions to my destination
- ☐ Language difficulties
- ☐ Long distances and Long travel time
- ☐ Unclear connection with local public transport
- ☐ Exhausting and tiring
- ☐ Other issues
- ☐ No issues

8. 8. Normally, what issues you experience when you use BIKE or KICK SCOOTER as tourist in a new city (Ex:Brussels)?

Tick all that apply.

- [ ] I don't use bike or kick scooter as a tourist
- [ ] Unclear and complex booking information
- [ ] Difficulties of getting directions to go to my destination
- [ ] Language difficulties
- [ ] Dangerous or crowded road traffic
- [ ] Availability of bikes or scooters nearby
- [ ] No issues

9. 9. As a tourist, what ISSUES you experience when you SEARCH FOR INFORMATION to arrive to your attractions?

Tick all that apply.

- [ ] Information is in another language
- [ ] Local information is not clear (signs, routes, transport details, suggestions)
- [ ] Information is not updated, and website/app is not user friendly
- [ ] Information is not accessible without internet
- [ ] Pricing and ticketing information is not clear
- [ ] Other issues
- [ ] No issues

10. 10. How do you prefer to buy your tickets when your use public transport in a new city?

Tick all that apply.

- [ ] At the station
- [ ] Via website
- [ ] Via the app
- [ ] At the vending machine

Other: [ ] _____

11. 11. As a tourist, are you willing to pay for public transport single tickets in an online platform ?

Mark only one oval.

- ◯ Yes
- ◯ No

12. 12. What are the main ISSUES you don't like when you book ONLINE transport tickets?

Tick all that apply.

- [ ] When I have to install too many apps for every single transport operator
- [ ] When requests my ID data (storage of credit card and personal information)
- [ ] When ticket prices are too expensive
- [ ] When ticket pricing is unclear
- [ ] When I don't receive payment confirmation
- [ ] When I have to pay a security deposit
- [ ] When the booking process takes too long and is not user-friendly
- [ ] I have no problem to pay tickets online
- [ ] I prefer to pay my tickets on the counter or vending machines

13. 13. Which mobility apps you use to arrive to your destination in the most efficient way?

Tick all that apply.

- [ ] Whim
- [ ] Google Maps
- [ ] Skipr
- [ ] Citymapper
- [ ] The bus or train apps of the city I am visiting

Other: [ ] _____

Please watch carefully the following APP video

[redacted]

[redacted] http://youtube.com/watch?v=i1O3gP2T9qg

14. 14. Imagine if this APP exists, would you be willing to use this app for your future trip planning in a new city?

Mark only one oval.

- ◯ For sure yes
- ◯ Probably yes
- ◯ Maybe, I need more information
- ◯ Probably no
- ◯ Definitely no
- ◯ I do not understand the concept

15. 15. What characteristics you liked the most from this app?

Tick all that apply.

- [ ] Easy to search route from origin to destination
- [ ] Easy to choose the most cost-effective of mode of transport journey planning
- [ ] Possibility to book and pay my ticket inside thie app without installing additional apps
- [ ] Easy navigate through the map and navigation
- [ ] Real time information with delays and weather conditions.
- [ ] I dont like or I dont think I would use such an app

Other: [ ] _____

16. Thanks for your feedback! Leave your email if want to know more about us!

_____