

Chapter 15

New Business Models and Partnerships for Sustainable Mobility and Transport Sector



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Abstract Urban mobility is crucial to European societies in providing access to services for passengers and goods and supporting economic growth. Small and Medium (S-M) European cities are facing similar challenges to larger cities, such as congestion and pollution, and perceive similar trends, such as digitalization, the sharing economy, integrated mobility. To improve urban mobility and the related societal challenges, it requires a wide range of complementary mobility solutions and services adopting innovative user-centric, smart, multimodal, and intermodal approaches. Solving the mobility challenge requires coordinated actions from the private and public sectors. Technological advances and commercialization, funding, intelligent policies, and business model innovation are needed to improve urban mobility and create more sustainable environments in modern cities. The capacity to develop or reshape business models requires organizational know-how and tools. New business strategies enable transportation and mobility organizations to receive investments, whilst well-chosen partners will reinforce the chance of success. This chapter outlines the main results of SUITS' research into developing business models and partnerships. It provides knowledge about innovative business models in urban mobility; addresses existing and new partnership schemes; identifies evolving commercially viable business strategies; introduces the main findings of the research and recommendations.

15.1 Introduction

The situation in European cities regarding the urban environment has reached a critical level. A changing mobility paradigm that properly tackles today's challenges and accommodates current and emerging societal trends will clearly require research into

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A. Woodcock et al. (eds.), *Capacity Building in Local Authorities for Sustainable Transport Planning*, Smart Innovation, Systems and Technologies 319,
https://doi.org/10.1007/978-981-19-6962-1_15

new mobility scenarios, technological innovations, additional mobility services and solutions, as well as new partnership schemes. Over 70% of the EU's population lives in cities (including small and medium-sized cities) and accounts for approximately 85% of the Union's GDP.¹ The present mobility situation has created unsustainable conditions for living: severe congestion, poor air quality, noise emissions, and a high level of CO₂. Increasing private vehicle use has caused increased urban sprawl and commuting; however, the expansion of public transport networks has not reached the same level of development. Large European cities are well-known for their critical urban mobility situation, whilst S-M cities are left behind with respect to basic services and lack the necessary institutional capacity to manage their rapidly growing populations and the resulting mobility situation [1]. The European Commission provides measures to address mobility challenges in the S-M cities in the Member States by:

- Facilitating best-practise exchange. Dissemination of experiences and best practises (studies, web portals): Urban Mobility Portal (Eltis)²; Platform on Sustainable Urban Mobility Plans; Member States Expert Group.
- Providing platforms for collaboration: Civitas Forum³ and URBACT.⁴
- Fostering local engagement of citizens and stakeholders: European Mobility Week.
- Providing data and statistics on mobility in Europe.

Lately, new ways to invest in thriving, inclusive and liveable cities have appeared: for instance, non-motorized and electric vehicles are improving local air quality and citizen health; transit-oriented development is optimizing land use, reducing traffic congestion, and tackling urban sprawl. New mobility trends arise, and new business models appear to improve the transport sector situation and make it more sustainable. A key task of the SUITS⁵ project has been to research and identify new business models and partnerships in the mobility sector.

15.2 Urban Mobility Solutions

Automobile sales are predicted to increase from about 70 million a year in 2010 to 125 million by 2025, and more than half of these vehicles are foreseen to be purchased in cities. Some automotive analysts predict that today's 1.2 billion strong global car

¹ Urban Mobility Package—European Commission https://ec.europa.eu/transport/themes/urban/urban_mobility/ump_en.

² ELTIS—<http://www.eltis.org/>.

³ CIVITAS—<http://civitas.eu/>.

⁴ URBACT—<http://urbact.eu/urban-mobility>.

⁵ The results of SUITS research on new business schemes are presented in more details in the dedicated Guidelines “*Developing bankable projects, new business models and partnerships*” <https://www.suits-project.eu/business-models-for-transport/>.

Table 15.1 Traditional mobility schemes versus new mobility trends

Traditional mobility strategies	New mobility solutions
Individual car ownership as a main form of transport	Individual car ownership as one element of a multimodal, on-demand and shared transport offering
Limited consumer choice and poor variety of services	Larger variety of services and service providers
Government-funded public transit	Public–private partnership
Unconnected, suboptimal transportation system	On-demand, connected systems

fleet could double by 2030 [2]. The existing urban infrastructure cannot support this number of vehicles on the road. Congestion has already reached unbearable conditions and can cause such problems as wasted time, wasted fuel, and increased costs of doing business.⁶

Many innovative mobility management strategies may improve the mobility situation such as transportation diversity (travel options available to citizens) and different incentives for citizens to change their way of travelling (frequency, mode, destination, route or timing). Others provide an alternative way of travelling or more efficient land use. Some require policy reforms to develop new transportation planning practises.

Some examples of innovative ways of improving urban mobility are (but not limited to) new “multimodal” services that facilitate everyday journeys combining walking, cars, buses, bikes, and trains, etc. as well as shared transportation services, Mobility as a Service, and Urban Vehicle Access Regulations (see Table 15.1).

A shift towards new urban business strategies can provide such benefits as major savings in public budgets including health, environment, or energy by providing safer transport, less congestion, and a higher rate of employment.⁷ In this case, the technological development plays an important role.

15.2.1 *Mobility as a Service*

The objectives of MaaS are to put users at the core of mobility services, offering them personalized mobility solutions based on their individual needs and enabling easy access to the most appropriate transport mode or service. MaaS has three dimensions that should take place when planning innovation activities and developing new business models:

⁶ Urban mobility at a tipping point—McKinsey & Company. <https://www.mckinsey.com/business-functions/sustainability-and-resource-productivity/our-insights/urban-mobility-at-a-tipping-point>.

⁷ Eurostat figure. European Commission webpage on mobility facts and figures: http://ec.europa.eu/transport/strategies/facts-and-figures/transportmatters/index_en.htm.

1. *The technological dimension*: data sharing, interoperability, standardization as well as connectivity and built-in sensors of smart devices supporting MaaS.
2. *The behavioural impact*: how do travel and logistics patterns change (e.g. for older commuters); what is the potential for modal shift?
3. *Economic and policy dimensions*, including organizational and regulatory aspects. This might involve a change of roles of different players involved.

15.2.2 *Integrated Mobility*

Integrated mobility enables connecting commuters from trip origin to their final destination using all transportation modes through the integration of barrier-free planning, design, infrastructure, technology solutions, and personalization. The concept behind integrated mobility means that passengers use more than one mode of transportation. Commuters have different trip needs and may switch modes to get to their destinations.

The benefits provided by integrated mobility are:

- *Combined mobility*. Create a seamless travel experience for the door-to-door journey by integrating public and private transport modes in one single service, guided by an intermodal journey planner.
- *One-stop-shop*. Provide easier travel by combining journey planning, mobile ticketing and fare collection in one single application and perform one single transaction for the whole trip.
- *Personalized solutions*. Every traveller has her/his own travel behaviour that differs from person to person including their travel purpose, final destination and available time. Therefore, each traveller needs the flexibility to choose and adapt her/his individual subscription package.

15.2.3 *Shared Mobility*

Shared mobility forms part of the wider “collaborative economy” or “sharing economy”, in the European agenda collaborative economy defined as “[a variety of] innovative business models where activities are facilitated by collaborative platforms that create an open marketplace for the temporary usage of goods or services often provided by private individuals”.⁸ Service providers offer their goods, assets, or skills to a variety of users via a platform provided by intermediaries. “Sharing” has also become an urban mobility reality. Shared mobility prioritizes the importance of reaching destinations, often at a smaller individual and societal cost than by using a

⁸ European Commission, 2016, Communication A European agenda for the collaborative economy <http://bit.ly/2cFpEKq>.

private vehicle. As shared mobility serves a greater proportion of local transportation needs, multivehicle households can begin reducing the number of cars they own whilst others may abandon ownership reducing future demand.

15.3 Innovative Forms of Partnership in the Mobility Sector

It is crucial to choose a suitable form of partnership that will transform innovation into successful implementation. To develop a sustainable business model of a project, a well-organized partnership can facilitate obtaining investment for the project as different partners can contribute to the project by providing different inputs to ensure financial viability to the investors.

15.3.1 Innovative Public Private Partnerships

The Innovative Public Private Partnership (IPPP) is a new form of partnership where the main actors are public and private organizations and may also include other types of organizations like civil society organizations (CSOs), non-governmental organization (NGOs), or communities. These new forms of collaboration enable identification of opportunities for the design and implementation of long-term strategies for partnership. Each actor of the IPPP has an important role in the alliance.

For instance, public organizations oversee the drawing up, financing and implementation of policies and programmes. In the IPPPs, public organizations are defined as important actors who not only have a key role of supervising, creating incentives and regulatory frameworks, but also developing new opportunities and governance mechanisms to enable sustainable long-lasting collaboration with the private sector and other forms of organization, in order to optimize outcomes, impact and sustainability.

The private sector has a significant role in an IPPP. It contributes by bringing investment and expertise in the alliance from its for-profit business orientation.

Finally, other important actors in this type of partnership such as NGOs, CSOs or communities may bring their expertise and vision of the transport and mobility sector. Establishing an IPPP requires strengthening the capacities of all the actors involved.

The IPPP may provide S-M cities' local authorities with a new mechanism of implementing projects by providing additional value such as:

- Addressing market needs and trends.
- Transferring localized institutional knowledge to public and private organizations.
- Creation of a collective awareness of the innovative solutions developed by the alliance.

- Citizens' engagement.
- Enhancement of the possibility of obtaining investment by involving NGOs, CSOs or communities in the consortium.⁹
- Communities' involvement may bring the innovative vision of urban mobility solutions.
- The CSOs or NGOs may improve social relevance and influence and build capacity for policy monitoring.

Example of the CSO involvement in the transport project:

The Rhein-Main-Verkehrsverbund (RMV) is the largest transport association in Germany. It is responsible for organizing and coordinating public transport in the Rhine-Main region. To improve its services, RMV established a passenger advisory board including members of the general public and a CSO. The advisory board organizes meetings four times a year and has already initiated concrete improvements.¹⁰

15.3.2 R&D Partnerships

R&D partnerships are strategic alliances between businesses and research organizations capable of developing a new product or service (or improving an old one) and other actors who are economically interested in the development of such innovations. The resource-based view highlights that in order to exploit existing resources and to develop a long-term competitive advantage, organizations need to obtain external knowledge [3]. An organization may benefit from R&D collaboration by coordinating a project with competent R&D partners, sharing risks, resources and expertise and building new knowledge [4].

Depending on the actors involved in the R&D partnership, this form of collaboration can include the following types:

- R&D-Public partnership.

⁹ Civil Society and Public Private Partnership. Why collaborate? Three frameworks to understand business-NGO partnerships—The World Bank <https://blogs.worldbank.org/category/tags/civil-society-and-public-private-partnership>.

¹⁰ RMV—http://www.rmv.de/de/Verschiedenes/Informationen_zum_RMV/Der_RMV/Wir_ueber_uns/Struktur_des_RMV/33022/RMV-Fahrgastbeirat.html.

- R&D-Private partnership.
- R&D-PPP.

Benefits of R&D partnerships for local authorities:

- R&D partners may help to develop new products or services, improve current ones or come up with innovative approaches to operations. R&D partnerships also enable mobility suppliers to remain on the market by monitoring market needs and trends.
- Help public or private organizations to improve their business strategies.
- Local Authorities can share research and development costs and the risks associated with the investment of time, money, and other resources.
- R&D partner may help to provide market analysis or test a prototype.
- R&D partner provides monitoring of the project results.
- The involvement of the R&D partner may provide added value in sourcing investment due to the expertise that this partner can bring.

Example of the R&D institutions involvement in the transport project:

This new form of partnership for transport research was organized in Germany's central region Frankfurt RheinMain by major transport authorities and operators, including partners from industry and consultancy, and supported by the Hessen State Government. Namely, the ZIV Institute was founded at the Darmstadt University of Technology. It enables fostering exchange between research and practise. The Institute conducts research in the sphere of Integrated Traffic and Transport Systems covering the areas of Transport Infrastructure and Traffic Management, Traffic Engineering and Traffic Control, Public Transport, etc. About 25 research associates work together in ZIV on innovative concepts aimed at the optimization of traffic and transport systems. The Institute is funded exclusively through orders for planning and consulting with a focus on application-oriented research and development. ZIV founded a scientific advisory board that has its added value when working on the projects. ZIV has conducted more than 60 projects. ZIV has collaborated in projects with the following organizations: Frankfurt Airport Authority (Fraport AG), German Rail (DB Reise & Touristik AG), Deutsche Lufthansa AG, and the Regional Public Transport Authority (RMV) since 2000.¹¹

¹¹ Institute für Verkehr. Transport Planning and Traffic Engineering. http://www.verkehr.tudarmstadt.de/vv/fg_verkehrsplanung_und_verkehrstechnik/forschung_7/profil/index.en.jsp.

15.4 Innovative Business Models

Cities operate in an environment where the mobility sector is highly competitive, and the economic environment is uncertain and rapidly changing. This means that local authorities must take complex and difficult business decisions. Transport and mobility organizations run their businesses in a digital era where new technologies enable innovative business models (BMs) that could solve current mobility problems. Many factors should be taken into consideration when starting a new business such as the mobility business environment, strategic partnerships, technological innovation, market tendencies, revenue streams. A well-developed business model will enable transport and mobility organizations to obtain funds for innovation exploitation, and a well-prepared feasibility study will prove a project's financial viability.

Some researchers in the transport and mobility sector argue that the traditional organizational structure and BMs are no longer viable [5]. Increasing challenges in the mobility sector such as market saturation, environmental issues (poor air quality etc.), congestion, and accelerated urbanization are changing customers' demand and needs, forcing transport authorities to change their BM in order to address these issues. Changing market characteristics and fast-evolving new technologies are leading local authorities to reorganize or even innovate their BM [6]. The evolution of new technologies could enable solutions to some mobility problems, and transport organizations are already implementing them when developing new services.

Technological breakthroughs permit improvements and technological advancements in many areas of transport and mobility, e.g. alternative power trains, digitalization, automotive software and hardware, connectivity and smart device technologies that are further influencing the growth of innovative BM in the transport sector.

Technology innovations and business model innovations are strongly linked to each other. A business model denotes the way in which companies can make money out of a technology. No matter how the technology is innovative and sophisticated, it will fail, if it is not possible for market players to make profits from it-[7].

Following this statement, it can be argued that emerging technological innovation of the transport industry should be accompanied by BM innovation (see Fig. 15.1).

15.4.1 *Car On-Demand*

Car on-demand is an innovative, user-focussed approach that leverages emerging mobility services, integrated transit networks and operations, real-time data, connected travellers, and cooperative Intelligent Transportation Systems to allow a more traveller-centric transportation system, providing improved mobility options to all travellers and users of the system in an efficient and safe manner.



Fig. 15.1 Urban mobility ecosystem (Source authors' elaboration)

Car on-demand offers several models:

- **Taxi e-hailing**

Recently, taxi companies have revolutionized their services by applying ICT, providing door-to-door trips, through e-hailing services.¹² E-hailing represents a process of ordering a vehicle (car, taxi or any other form of transport) by using a computer or smartphone. To hail a taxi electronically, a user should provide a taxi company his/her desired or current position, by providing an address or sending a current GPS position (see Fig. 15.2).

- **Transportation Network Companies (TNC)**

A TNC is a corporation, partnership or other types of entity that runs a transportation business using digital technology to connect TNC passengers with TNC drivers. TNC provides “real-time ridesharing”, by means of a mobile application that indicates not

¹² European Commission: Study on passenger transport by taxi, hire car with driver and ridesharing in the EU. Final report—<https://ec.europa.eu/transport/sites/transport/files/2016-09-26-pax-transport-taxi-hirecar-w-driver-ridesharing-final-report.pdf>.

Business Model Canvas of Taxi e-hailing				
<p>Key Partners</p> <ul style="list-style-type: none"> Local and regional authorities: will provide the authorisation for the business; Private taxi service providers; Automotive companies: will supply with the cars; IT companies: will design the size and the architecture of the system; Insurance companies; Tourism sector Telecommunication companies; Hotel and restaurant sectors; Airports. 	<p>Key Activities</p> <ul style="list-style-type: none"> Preliminary studies; Obtain permissions and licencing; Vehicle's acquisition (leasing); Obtain insurance for the vehicles; Fare and compensation policy planning; App system architecture design; Operation and management of the services; Marketing activities; Hiring the drivers. 	<p>Value Propositions</p> <p>Provide personalised and convenient taxi services with real time tracking system and possibility to halt the taxi and pay for it using unique mobile application.</p>	<p>Customer Relationships</p> <ul style="list-style-type: none"> Automated service: users do not interact directly with the company staff. Personal assistance. 	<p>Customer Segments</p> <ul style="list-style-type: none"> Occasional individual commuters. Hotel clients. Restaurant clients. Travellers (airport) Tourists Companies' employees
<p>Key Resources</p> <ul style="list-style-type: none"> Investment Software and Hardware GPS technology Mobile application for taxi e-hailing Human resources: <ul style="list-style-type: none"> - customer relationship staff - drivers Car fleet 	<p>Channels</p> <ul style="list-style-type: none"> Mobile App Taxi website Advertising in the airport, hotels etc. 	<p>Revenue Streams</p> <ul style="list-style-type: none"> Fares collection (company getting a percentage of every taxi journey ordered through) Advertising (on cards, in the web or mobile selling apps etc.). 	<p>Cost Structure</p> <p>Costs for System implementation</p> <ul style="list-style-type: none"> Preliminary studies and service architecture design; Vehicle insurance Software development Cars' acquisition (leasing) <p>Operational costs</p> <ul style="list-style-type: none"> Operational staff wages; Customer relationship management. Maintenance and upgrade of software; Marketing. 	

Fig. 15.2 Taxi e-hailing Business Model Canvas

only the location of the potential client but also the density of drivers nearby and the waiting time for the closest driver (see Fig. 15.3).

- **Shuttle buses**

Shuttle bus services comprise corporate, regional, and local shuttles that provide limited stops and only pick up passengers at certain points. The final destination may vary depending on the customer segmentation (airports, business centres, etc.).¹³

Shuttle bus business models may differ according to the customer segmentation:

- Tourists and business travellers that commute to/from the airport. In this case, also the type of vehicle can be adapted to this passenger segment. For instance, vehicles can include space for luggage.
- Employees that commute to their organizations. For instance, such vehicles may be provided with Wi-Fi and tables for working.

15.4.2 *Micro Mobility*

Micro mobility refers to a new category of vehicles that could become an alternative to traditional modes of transportation. Several types of micro mobility vehicles exist, such as scooters/E-scooters and small electric cars with one or two seats.

- **Electric kick scooter sharing**

Electric kick scooter sharing system is a service that makes scooters available for use for short-term rentals. The scooter sharing model is similar to car sharing or bicycle sharing systems. Scooters are normally dockless, which means that they do not have a fixed base location and can be picked up and dropped anywhere in the service area. This business model makes this type of transportation a convenient mobility option for first-/last-mile urban mobility (see Fig. 15.4).¹⁴

15.4.3 *Scooter Sharing*

Scooter sharing service provides commuters with access to scooters for short-term use. The vehicles are distributed across a network of scooter sharing spaces within a metropolitan area. Clients can access the vehicles 24/7 with a reservation and are charged by time or by mile. Scooter sharing provides different service models¹⁵:

¹³ Stamford Private Shuttle Study, Final report—http://stamfordbusandshuttle.com/documents/Stamford%20Bus%20&%20Shuttle%20Study_Final%20Report.pdf.

¹⁴ McKinsey & Company: Micromobility's 15,000-mile checkup <https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/micromobilitys-15000-mile-checkup>.

¹⁵ Global Scootersharing Market Report https://www.innoz.de/sites/default/files/howebock_global_scootersharing_market_report_2017.pdf.

Business Model Canvas of TNC				
<p>Key Partners </p> <ul style="list-style-type: none"> Local and regional authorities: provide the permission and regulate the services; Investors; Lobbyists; IT engineering companies; Drivers who provide their own cars; Data analytics; Telecommunication companies. 	<p>Key Activities </p> <ul style="list-style-type: none"> Preliminary studies; Obtain the permissions; Obtain insurance for the vehicles; Fare and compensation policy planning; App system architecture design; Operation and management of the services; Marketing activities; Hiring the drivers with vehicles. <p>Key Resources </p> <ul style="list-style-type: none"> Funds to start the business Platform architecture Software & Telematics Systems Human resources: drivers, data analysts, engineers to create the platform Mobile apps both for drivers and costumers 	<p>Value Propositions </p> <p>For drivers:</p> <ul style="list-style-type: none"> Income generation/ extra income; Self-employment; Flexible work hours; Simple and easy way to enter TNC. <p>For costumers:</p> <ul style="list-style-type: none"> Easy, accessible and user-friendly service; Highest grade of flexibility, riders can choose the closest drivers to their position; Easier and efficient way of transaction. 	<p>Customer Relationships </p> <p>The system and the relation to the users is fully automated. Normally interaction occurs only via the web-app, users have no direct contact to the company's staff.</p> <p>Channels </p> <ul style="list-style-type: none"> Social media channels Web App Webpage Word of mouth 	<p>Customer Segments </p> <ul style="list-style-type: none"> Drivers: people who want to earn extra money Riders; Travellers Random passengers
<p>Cost Structure</p> <p>Costs for system implementation:</p> <ul style="list-style-type: none"> Software development Technology development <p>Operational costs:</p> <ul style="list-style-type: none"> Marketing expenditure Permanent employees (service and support team) salaries Service maintenance 			<p>Revenue Streams </p> <ul style="list-style-type: none"> Car rides charged by km/miles via smart payment Promotional offerings and partnerships involving third parties 	

Fig. 15.3 TNC Business Model Canvas


Business Model Canvas of Electric kick scooter sharing				
<p>Key Partners</p> <ul style="list-style-type: none"> Local and regional authorities; Local transport operators; public transport services suppliers; Investors; IT engineering companies; they will design the size and the architecture of the system; Scooter manufacturing company; they will provide the operators with vehicles; Insurance company; Energy charging companies; these companies will charge the scooter batteries. Telecommunication companies. 	<p>Key Activities</p> <ul style="list-style-type: none"> Preliminary studies; Introduction of the services to the urban mobility planning; Obtain the permission and licencing for the service operation; Kick scooter fleet leasing/acquisition; Development of the software platform; Maintenance of the platform; Scooter fleet management and maintenance; Charging the e-scooters; Customer care and feedback; Marketing campaign. <p>Key Resources</p> <ul style="list-style-type: none"> Software; Scooter fleet; IT infrastructure; Human resources (service administration, marketing personnel etc.) Investments. 	<p>Value Propositions</p> <ul style="list-style-type: none"> Easy, accessible and user-friendly service; Pay as you Go approach; No restriction to stations and dedicated parking areas (pick up and drop the scooter wherever in the service area of the provider); Covering the main central areas with an elevated number of vehicles in the fleet. 	<p>Customer Relationships</p> <ul style="list-style-type: none"> The relation with the users is fully automated. Service provider supports the users on online basis. <p>Channels</p> <ul style="list-style-type: none"> The electric kick scooter sharing platform can be reached by mobile app/ desktop browsers; Website; Advertisement at the public places like metro. 	<p>Customer Segments</p> <ul style="list-style-type: none"> Occasional commuters; Tourists.
<p>Cost Structure</p> <p>Costs for System implementation:</p> <ul style="list-style-type: none"> Preliminary studies; Insurance; Scooters acquisitions or leasing; Software development; Office equipment and expenses. <p>Operational costs:</p> <ul style="list-style-type: none"> Selling, General and administrative expense; Employees wages (service and support team); Repairs and Maintenance; Marketing activities; Payment for the energy charging companies 		<p>Revenue Streams</p> <ul style="list-style-type: none"> Registration fees Rental fees (Pay as you Go) Sponsorship/Commercial (advertisement in the public places) 		

Fig. 15.4 Electric kick scooter Business Model Canvas

- Round-trip: this type of scooter sharing provides the service where the user must return the scooter to its starting point, at the end of the journey. Round-trip scooter sharing provides the service to the user that demands a long-term journey, in this case, the transport operator offer daily, or day-to-day, charges.
- Point-to-point: (station-based) station-based scooter sharing service permits the users to get a vehicle at one station and return it at different one. Station-based services are considered to be less flexible than free-floating scooter sharing, however, enables more efficient specific trips.
- One-way: (free-floating) scooter sharing enables the users to pick up and leave vehicles at any desired location, within a specified operating area (see Fig. 15.5).

15.4.4 Car Sharing

- Car sharing provides commuters with access to cars for short-term use. The vehicles are distributed across a network of car sharing spaces within a metropolitan area. Commuters can access the vehicles 24/7 with a reservation and are charged by time or per mile/kilometre. Car sharing provides some of the benefits of a personal vehicle without the costs of owning a private one.
- Car sharing provides different service models:
 - Round-trip (membership services, business or institutional fleet, non-membership (e.g. vacation)): This type of car sharing represents the system where the user must return the vehicle to its starting point, at the end of the journey. Round-trip car sharing targets users that have a long-term demand, in this case, the operator is required to offer daily, or day-to-day, charges.
 - Free-floating car sharing enables members of a car sharing programme to pick up and park vehicles at any desired location within a specified operating area (see Fig. 15.6).
 - Station-based car sharing permits the users to get a vehicle at one station and return it at a different station. Station-based services are considered to be less flexible than free-floating car sharing.
 - Peer-to-peer (fractional ownership, P2P Hybrid, P2P marketplace): Individuals provide their private vehicles for other users to rent. In some cases, the vehicles are equipped with telematics devices to provide vehicle-renters with remote access via smartcard, whilst in other systems the car-owner must physically transfer the car's keys to the vehicle-renter.

Business Model Canvas of One-way free - floating scooter sharing				
<p>Key Partners</p> <ul style="list-style-type: none"> Local authorities: public transport policy developers and contracting authority for public transport services; Local transport operators: public transport services suppliers; Investors IT engineering companies: they will develop the application architecture; Scooter providers: provides transport operators with vehicles; Insurance companies: will provide the insurance of the vehicles; Telecommunication companies; CSO. 	<p>Key Activities</p> <ul style="list-style-type: none"> Preliminary studies; Acquisition of the permission and licensing; Introduction of scooter sharing to the city plan; Scooter fleet leasing/acquisition; Scooter fleet management; Development of scooter sharing digital platform; Telematics and web app Management; Maintenance of the scooter fleet; Cleaning and refuelling of the scooter fleet; Marketing activities. 	<p>Value Propositions</p> <ul style="list-style-type: none"> Urban mobility without transport ownership; Easy, accessible and user-friendly service; Highest grade on flexibility (pick up and drop the scooter wherever user wants in the area of the provider); Pay as you go approach; No restriction to stations and dedicated parking areas; High availability of vehicles. 	<p>Customer Relationships</p> <p>The system and the relation with users are fully automated. Normally interaction occurs only via the web-app, users have no direct contact to the company's staff.</p>	<p>Customer Segments</p> <ul style="list-style-type: none"> All citizens with a need for flexible mobility within the city; Tourists.
<p>Key Resources</p> <ul style="list-style-type: none"> Investments; Scooter fleet; Helmets; Charging stations (for the electric scooters); Software and Telematics Systems; Human resources for marketing, scooter maintenance services and cleaning etc. 	<p>Channels</p> <ul style="list-style-type: none"> Web App; Webpage; Promotional materials in the public places; At the charging points. 	<p>Revenue Streams</p> <ul style="list-style-type: none"> Rental fees (Pay as you Go); Sponsorship/Commercial. 	<p>Cost Structure</p> <p>Operational costs:</p> <ul style="list-style-type: none"> General and administrative expense; Employees wages (service and support team); Repairs and Maintenance; Marketing activities; Refuelling and cleaning; Customer Bonus. 	

Fig. 15.5 One-way free scooter sharing Business Model Canvas

Business Model Canvas of Free - floating car sharing				
<p>Key Partners</p> <ul style="list-style-type: none"> Local and regional authorities: public transport policy developers and contracting authority for public transport services; Local transport operators; public transport services suppliers; Investors; Insurance companies; IT engineering companies: they will design the size and the architecture of the system; Automotive manufacturers: provides transport operators with vehicles Telecommunication companies; CSO. 	<p>Key Activities</p> <ul style="list-style-type: none"> Preliminary studies; Acquisition of the permission/licensing; Insurance acquisition; Parking permission from local authorities and Introduction of carsharing to the city plan; Car fleet leasing/acquisition; Car fleet management; Development of carsharing software; Telematics and web app Management; Cleaning and refuelling of the car fleet; Customer care and feedback; Marketing activities. 	<p>Value Propositions</p> <ul style="list-style-type: none"> Urban mobility without car ownership; Easy, accessible and user-friendly service; Highest grade on flexibility (pick up and drop the car wherever user wants in the commercial area of the provider); Charge by minute with discounts for hourly and daily use; No restriction to stations and dedicated parking areas; Covering the main central areas with an elevated number of vehicles in the fleet. 	<p>Customer Relationships</p> <p>The system and the relation to the users is fully automated. Normally interaction occurs only via the web-app, users have no direct contact to the company's staff.</p>	<p>Customer Segments</p> <ul style="list-style-type: none"> All citizens with a need for flexible mobility within the city; Tourists.
<p>Cost Structure</p> <p>Costs for System Implementation:</p> <ul style="list-style-type: none"> Preliminary studies; Office equipment and expenses; Cars acquisitions or leasing; Software development; Insurance. 	<p>Key Resources</p> <ul style="list-style-type: none"> Investments; Car fleet; Charging stations (if the vehicles are electric); Software and telematics systems; Human resources for customer support, car services and cleaning. 	<p>Channels</p> <ul style="list-style-type: none"> Web App Webpage Shops Pick-up/Drop-off anywhere Promotional materials in the cars At the charging points 	<p>Revenue Streams</p> <ul style="list-style-type: none"> Registration fees Rental fees (Pay as you Go) Sponsorship/Commercial (advertisement on the car fleet, Promotion material in the cars) 	

Fig. 15.6 Free-floating car sharing Business Model Canvas

15.4.5 *Ridesharing*

- **Carpooling**

Carpooling is a way of sharing rides in a private vehicle amongst two or more individuals. It involves the use of the driver's private vehicle to carry one or more passengers [8]. The carpooling platform/app permits quick and easy matching of carpooling users' needs, moreover it helps users to plan itineraries, set prices and pay for journeys [9].

15.4.6 *Bike Sharing*

A bike sharing system is usually a public service operated by a private company through a public tender. Bike sharing exists in multiple forms, including public, closed community, and peer-to-peer systems. Bike sharing enables users to take short point-to-point trips using a fleet of public bikes distributed throughout a community (see Fig. 15.7).¹⁶

15.4.7 *Smart Parking*

Smart parking is a vehicle parking system that generally consists of in-ground smart parking sensors or cameras. Sensors are installed to the parking spots or placed next to them to determine whether the parking space is free or not. Data is collected from parking slots in real-time and is then transmitted to a mobile app or website, which communicates the parking status to users.

Smart parking models:

- Parking Guidance and Information Systems.
- Transit-Based Information Systems.
- Parking app.

- **Parking Guidance and Information Systems**

Assists users in identifying free parking spots and helps drivers in their decision-making process. Occupancy detection of parking spaces is based on vehicle detection technology [10] (see Fig. 15.8).

¹⁶ The bike-share planning guide, Institute for Transportation and Development Policy—<https://itd.dotorg.wpengine.com/wp-content/uploads/2014/07/ITDP-Bike-Share-Planning-Guide-1.pdf>.

Business Model Canvas of Station-based bike sharing	
<p>Key Partners</p> <ul style="list-style-type: none"> Local and regional authorities; public transport policy developers and contracting authority for public transport services; support bike sharing via politics and policies Operating companies: operate the bike sharing business along the entire value chain for profit. Sponsors and investors: invest money to bike sharing system. Become advertised on bike equipment. Bicycle and component manufacturers: sell the bicycles and their components. Telecommunications operators: NFC-enabled smart payment may result in additional GSM/JMITS transactions. IT engineering companies: they will design the size and the architecture of the system. Suppliers: provide the technology and infrastructure. Insurance companies. 	<p>Key Activities</p> <ul style="list-style-type: none"> Implementation of a preliminary study, required for the definition of the system's structure, stations' location etc. Acquisition of the permission for the operation. Supply of bicycles fleet. Design and installation of bicycle kiosks. Development of the IT technology required for the operation of the system (e.g.: user interface, compatibility with credit cards, mobile device application, etc.). Marketing activities.
<p>Key Resources</p> <ul style="list-style-type: none"> Bicycles Renting kiosks Parking infrastructure Infrastructure construction personnel Software development personnel Components of electrical supply and communications system Initial capital 	<p>Value Propositions</p> <ul style="list-style-type: none"> An alternative way of commuting that avoids congestion, it's easy to park and does not require special license in order to use. An easier, in relation to walking, way of sightseeing. A way for people to exercise without investing in cycling equipment. Personal cost savings.
<p>Cost Structure</p> <p>System implementation cost</p> <ul style="list-style-type: none"> Preliminary study Bicycle supply System station design and construction/installation System software development 	<p>Key Resources</p> <ul style="list-style-type: none"> Bicycles Renting kiosks Parking infrastructure Infrastructure construction personnel Software development personnel Components of electrical supply and communications system Initial capital
<p>Customer Relationships</p> <p>The system can operate both through the employment of staff at the bike renting kiosks, or through an IT system that will give the users the ability to perform the necessary activities individually. In the first case, a personal relationship between employees and customers is achieved. In the second case, an automated interaction between the system interface and the user is achieved.</p>	<p>Customer Segments</p> <ul style="list-style-type: none"> Commuters: users that choose cycling from/to their working or education destinations, etc. Recreational/errand riders: users that wish to exercise or users that rent a bicycle in order to run errands. Tourists that want to move around and explore the city.
<p>Channels</p> <ul style="list-style-type: none"> System users can be served through bicycle renting kiosks/stations that are located in specific spots around the city's network. Advertisement in the public places. 	<p>Revenue Streams</p> <ul style="list-style-type: none"> Sponsorships from private companies Cycling equipment renting fee
<p>Operational cost</p> <ul style="list-style-type: none"> Maintenance cost Staff costs Electrical supply Bicycle redistribution cost Control and customer system cost Marketing cost System insurance fee 	<p>Revenue Streams</p> <ul style="list-style-type: none"> Sponsorships from private companies Cycling equipment renting fee

Fig. 15.7 Station-based bike sharing Business Model Canvas

Business Model Canvas of Parking guidance and information system			
<p>Key Partners</p> <ul style="list-style-type: none"> Local and regional authorities: will provide the authorisation. IT engineering companies: will design the size and the architecture of the system. Suppliers: will provide the sensors. Telecommunication companies. Private companies: owns the private parking. Investors. 	<p>Key Activities</p> <ul style="list-style-type: none"> Provide the preliminary studies. Obtain the permissions from the local authorities. Create the partnership with all the required partners. App system architecture design. Acquisition of the equipment. Operation and management of the services. Marketing activities. <p>Key Resources</p> <ul style="list-style-type: none"> Investment Software and Hardware GPS technology Human resources: <ul style="list-style-type: none"> customer relationship staff marketing personnel administration and operation personnel Equipment (sensors, readers) Office rental and equipment 	<p>Value Propositions</p> <ul style="list-style-type: none"> Solving the parking searching process problems by making it faster and more efficient by using innovative technologies. Reduction of illegal parking. Better parking management. 	<p>Customer Relationships</p> <p>An automated interaction between the system interface and the user</p> <p>Channels</p> <ul style="list-style-type: none"> Mobile App Service website Service promotion in public places <p>Customer Segments</p> <ul style="list-style-type: none"> Citizens with the need of car parking Tourists Companies' employees
<p>Cost Structure</p> <p>System implementation:</p> <ul style="list-style-type: none"> Preliminary studies and system architecture design; Office rental and office equipment; Software development; Sensor acquisition and installation. <p>Operational costs</p> <ul style="list-style-type: none"> Operational staff wages; Customer relationship management. Maintenance and upgrade of software and sensors; Marketing; Administrative costs 		<p>Revenue Streams</p> <ul style="list-style-type: none"> Fare collection for the parking Advertising (on cards, in the web or mobile selling apps etc.). 	

Fig. 15.8 Parking guidance and information system Business Model Canvas

15.4.8 *Public Transport*

This type of transit comprises buses, trains, ferries, etc., with fixed local routes and express services. It is a core service of shared urban mobility. There is a huge potential for public transport agencies to integrate with or offer shared modes to enhance the access to transport and decrease costs.

- **Bus Rapid Transit**

Bus Rapid Transit (BRT) is fast and flexible road-based public transport that combines stations, vehicles, services, bus lanes, and Intelligent Transport Systems technologies in one system [11] (see Fig. 15.9).

15.4.9 *Integrated Mobility*

Integrated mobility is a technology-enabled strategic service to ensure that travellers have the most convenient possible transportation journey.

- **Multimodal journey planning**

A multimodal journey planner is a website and/or app that requires and combines the features of a public transport system, forecasting demand and coordinating services having different transport modes and operators as its main elements (Fig. 15.10).

- **E-ticketing and Smart payment**

E-ticketing (or Electronic Ticketing, or Automated Fare Collection, or Smart Ticketing) means, in general, new technologies and integration of services that the user may use to pay by the means of app, smart card.¹⁷ The main features of e-ticketing are:

- Offer related services to users when they buy an e-ticket;
- Offer a new way for public/private transport users to pay for services;
- Improve the overall efficiency and image of the public transport network (see Fig. 15.11).

15.5 **Conclusions**

Promising urban mobility services that already exist in big cities still need to scale up to their full potential in S-M cities to fully realize the benefits of sustainable urban development. Successful implementation of investment programmes requires

¹⁷ Smart ticketing—https://ec.europa.eu/transport/sites/transport/files/themes/its/road/action_plan/doc/2013-urban-its-expert_group-guidelines-on-smart-ticketing.pdf.

Business Model Canvas of BRT				
<p>Key Partners</p> <ul style="list-style-type: none"> • Transport department: large entity with a wide range of regulatory and management responsibilities; typically reports directly to city political officials. • Transport authority: organisation with wide oversight on all public transport activities. • Local transport operators: public transport services suppliers. • Insurance companies: will provide the insurance of the vehicles. • Investors. 	<p>Key Activities</p> <ul style="list-style-type: none"> • Local authority permission and regulation • Policy-making and setting standards • Planning and design • Creation of the infrastructure • Project implementation • Procurement of the vehicles • Operational management • Procure fare equipment • Financial management • Contracting and concessions • Administration and marketing activities 	<p>Value Propositions</p> <ul style="list-style-type: none"> • Faster and time saving way of transportation due to the dedicated lanes. • More economic way of commuting in respect to other transport modes (trains, taxis) 	<p>Customer Relationships</p> <p>The system and the relation to the customers are fully automated.</p>	<p>Customer Segments</p> <ul style="list-style-type: none"> • All citizens with a need for mobility within the city • Employees • Tourists
<p>Key Resources</p> <ul style="list-style-type: none"> • Investments • Bus fleet • Software and hardware systems for fare collection • Human resources (administrative personnel, drivers, mechanics etc.) • Bus dedicated lanes and stations • The infrastructure 	<p>Channels</p> <ul style="list-style-type: none"> • Web App • Webpage • Promotional materials in the public places • Airports • Hotels 	<p>Revenue Streams</p> <ul style="list-style-type: none"> • Fare payment • Advertising on the buses 		
<p>Cost Structure</p> <p>System implementation costs:</p> <ul style="list-style-type: none"> • Acquisition of the buses, feeder vehicles, and fare collection and verification equipment (vending machines fare readers, fare verifiers, turnstiles.) • Software and hardware development • Fleet insurance <p>Operational costs:</p> <ul style="list-style-type: none"> • Fixed operating costs (salaries, drivers, mechanics, administration) • Variable operating costs (fuel, tires, lubricants, maintenance) • Station services • Payment to fare collection operator • Payment to trust fund manager • Marketing activities 				

Fig. 15.9 BRT Business Model Canvas

Business Model Canvas of Multi-Modal journey planning				
<p>Key Partners</p> <ul style="list-style-type: none"> Local and regional authorities; public transport policy developers and contracting authority for public transport services; Public transport operators; public transport services suppliers; Telecommunications operators; IT Engineering companies; they will design the size and the architecture of the system; Privat companies 	<p>Key Activities</p> <ul style="list-style-type: none"> Develop strategy to collect data and agreements to get access to real time data with regional and stakeholders such as: Authorities, Mobility Agency and Public Transport Companies Develop web and App with good UX/UI and customization, including alerts and related information to provide best possible experience. Marketing strategy, especially On-board process for users Develop strategy for VC and get funds Marketing activities. 	<p>Value Propositions</p> <ul style="list-style-type: none"> An alternative way of planning journey, that avoids congestion, taking into account, events, road works, and it will inform commuter on real time of any unexpected issue to save time and money An easier way to move taking into account personal preferences 	<p>Customer Relationships</p> <ul style="list-style-type: none"> The web/App will communicate automatically. Personal assistance especially if the Multi Modal Journey App is operated by a Public Transport Company. 	<p>Customer Segments</p> <ul style="list-style-type: none"> Commuters: users that choose to travel from/to their working or education destinations Tourists that want to move around and explore the city Cities and/or Metropolitan Authorities: entities who wish to improve and update old data information system with modern, updated and friendly interface for the user managed by 3rd party.
<p>Key Resources</p> <ul style="list-style-type: none"> Human resources: Sales, Marketing, Design and IT personnel Initial capital Cloud Contact list and relationship with Mobility Agencies and Local Authorities. Software 	<p>Channels</p> <ul style="list-style-type: none"> Web and App. The advertising in the partners transport areas, metro, tram, bus. 			
<p>Cost Structure</p> <ul style="list-style-type: none"> Marketing and sales cost such as events and trips in order to get agreement on data collection with multiple organizations System cost using Cloud services such as Amazon services or Google Cloud Analysis tools for BIG DATA, ML & AI Staff including Sales, Marketing, Design, IT Systems and software development Marketing, Sales and Design initiatives 				<p>Revenue Streams</p> <ul style="list-style-type: none"> White label App for local authorities and metropolitan agency Display advertisements on the site/App Mobility tools Geo-Marketing for Local Business Data & Cross-data generation for 3rd parties

Fig. 15.10 Multimodal journey planning Business Model Canvas

Business Model Canvas of E-ticketing system			
<p>Key Partners</p> <ul style="list-style-type: none"> Local and regional authorities; public transport policy developers and contracting authority for public transport services; they are interested to make the direct revenues and the real number of users more transparent to calculate properly the compensations schemes established inside the Public Service Contracts and to define better the size of the Public Service Obligations. Public transport operators: public transport services suppliers; they are interested to increase the level of client's satisfaction Financing institutions. They can replace small cash transactions with e-payment. Telecommunications operators. NFC-enabled e-ticketing could result in additional GSM/UMTS transactions, and the additional services generated by NFC technology. Engineering companies: they will design the size and the architecture of the system. Suppliers: vendors of integrated systems of e-ticketing components, of software solutions etc. Tourism sector. Investors 	<p>Key Activities</p> <ul style="list-style-type: none"> Public transport planning; Fare and compensation policy planning; E-ticketing system architecture design; Implementation of the e-ticketing system's components at the level of PA and public transport operator; Operation of the e-ticketing system; Selling of electronic fares; Control of e-ticket validity; Monitoring and data mining; Marketing activities 	<p>Value Propositions</p> <p>The introduction of an e-ticketing system in an urban public transport network will help the Local and Regional Public Authority to deliver following strategic objectives:</p> <ul style="list-style-type: none"> reduce its subsidy to the Public Transport Operator; increase the quality of urban transport service provided to taxpayers reduce the use of cash in the provision of urban transport services. 	<p>Customer Relationships</p> <ul style="list-style-type: none"> self-service, automated service or personal assistance regarding prepaid-value model.
<p>Key Resources</p> <p>The e-ticketing system comprises:</p> <ol style="list-style-type: none"> Distribution channels: <ul style="list-style-type: none"> online shops, mobile application third party retail network public transport operator, POS equipment, off-board ticket dispensers and ticket vending machines, Fare media, comprising of: <ul style="list-style-type: none"> printed barcodes for single tickets contactless smartcard for season and concession fares. On-board validation equipment for vehicles. Inspection equipment. Core-ticketing system in back-office 	<p>Channels</p> <ul style="list-style-type: none"> The transport operator's websites for e-ticketing. The transport operators selling points regarding smart cards. The e-ticketing system must allow passengers to receive Travel Information, plan their Journey and book their travel through a range of distribution and retail channels. Users should be able to pay for the journey by using contactless payment and pre-loaded value. 	<p>Customer Segments</p> <ol style="list-style-type: none"> Public transport users: <ul style="list-style-type: none"> Occasional users; Subscription based users; Beneficiary of special tariffs. Non-public transport users: <ul style="list-style-type: none"> Companies paying for their employees; Public authorities paying for beneficiaries of special tariffs. 	<p>Revenue Streams</p> <ul style="list-style-type: none"> Public transport fares selling; Advertising (on cards, in the web or mobile selling apps etc.).
<p>Cost Structure</p> <p>System implementation costs:</p> <ul style="list-style-type: none"> Preliminary studies and engineering design; etc.); Back office system acquisition; On board system acquisition; Vending machines and on-line distribution channels acquisition; Control system acquisition. 	<p>Operational costs:</p> <ul style="list-style-type: none"> Operational staff (vendors, controllers, maintenance teams Maintenance and upgrade of hardware; Maintenance and upgrade of software; Marketing; Customer relationship management. 		

Fig. 15.11 E-ticketing Business Model Canvas

shifts in traditional business models that bring public and private interests into alignment. New approaches to developing sound project pipelines are needed to smooth and accelerate the early-stage investment process where knowledge, capacity and interest gaps can exist. Developing new business models to accelerate and scale up investment in sustainable urban mobility will depend on answering the following key questions: what to invest in, how to pay for it, how to mobilize investment capital and how to structure implementation. To best answer these questions, key stakeholders need to develop sustainable solutions together. City decision makers, mobility service providers and investors should build a shared understanding of the challenges and opportunities of different business model choices. New mobility services can have enormous potential for economic development of S-M cities, not just through direct contributions, but also by being a catalyst for innovation in domains beyond transportation, such as technology, communication, procurement. Even if the use of new mobility services is still limited to small and medium urban areas, the concepts that are at the core of new mobility services will serve as an inspiration to improve transportation policy in general and public transit in particular creating new business models and partnerships. New mobility services are an innovative solution for the entire transportation sector and S-M cities in particular.

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