Chapter 15
New Business Models and Partnerships for Sustainable Mobility and Transport Sector

Iana Dulskaia and Francesco Bellini

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

I. Dulskaia (✉) · F. Bellini
Eurokleis S.r.l., Rome, Italy
e-mail: iana.dulskaia@eurokleis.com

F. Bellini
e-mail: francesco.bellini@eurokleis.com

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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 Forum[3] 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 SUITS[5] 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.

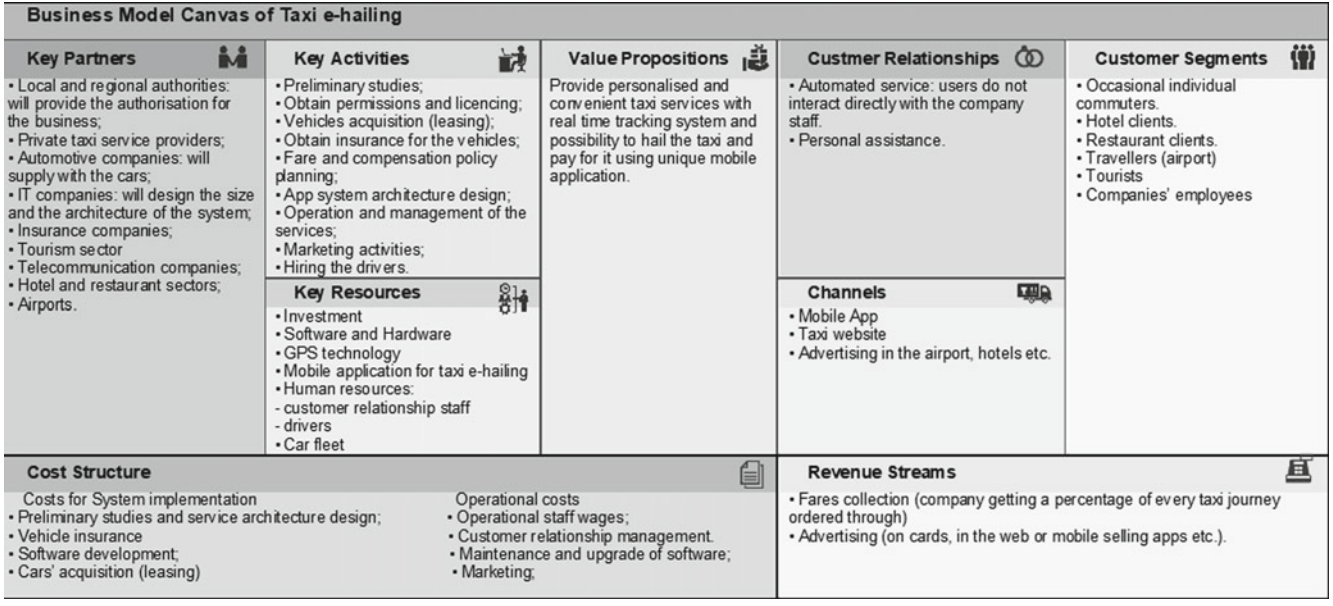

Fig. 15.2 Taxi e-hailing Business Model Canvas

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 models[15]:

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[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.

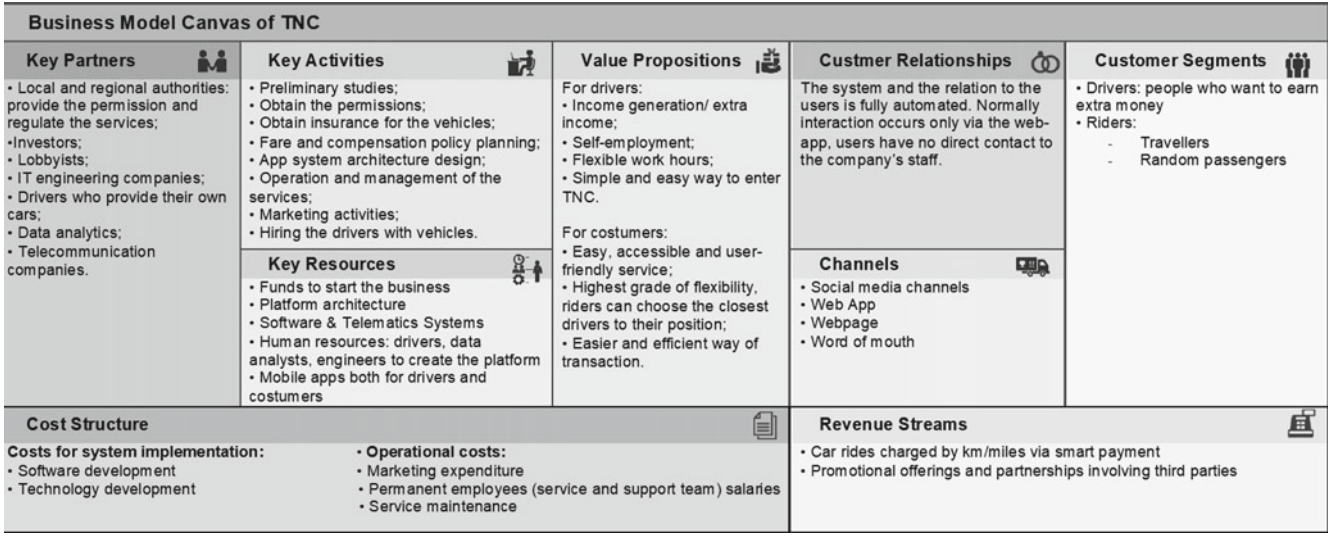

Fig. 15.3 TNC Business Model Canvas

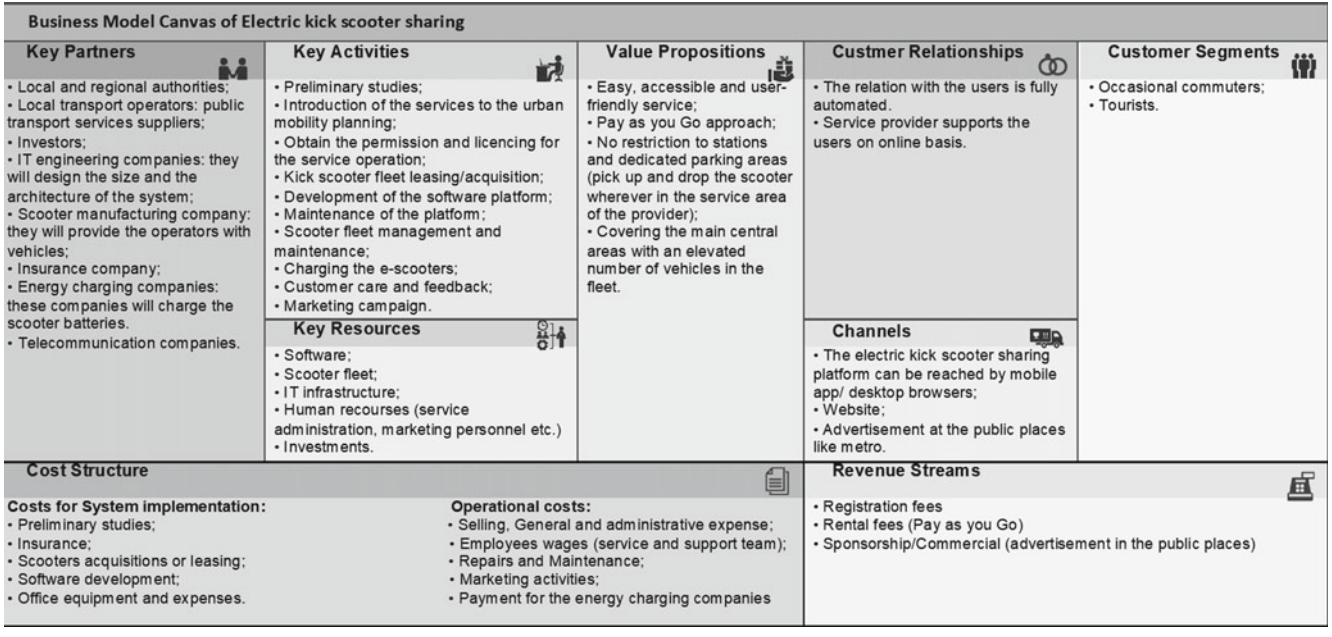

Fig. 15.4 Electric kick scooter Business Model Canvas

- 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.

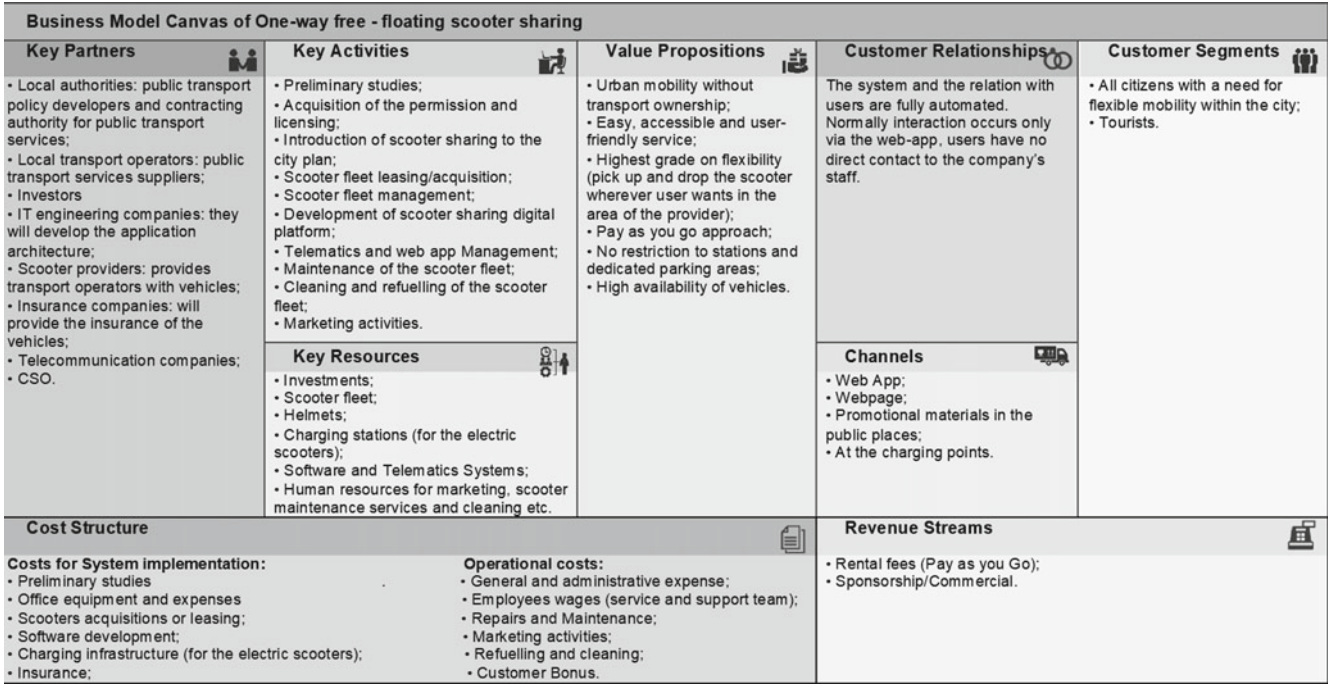

Fig. 15.5 One-way free scooter sharing Business Model Canvas

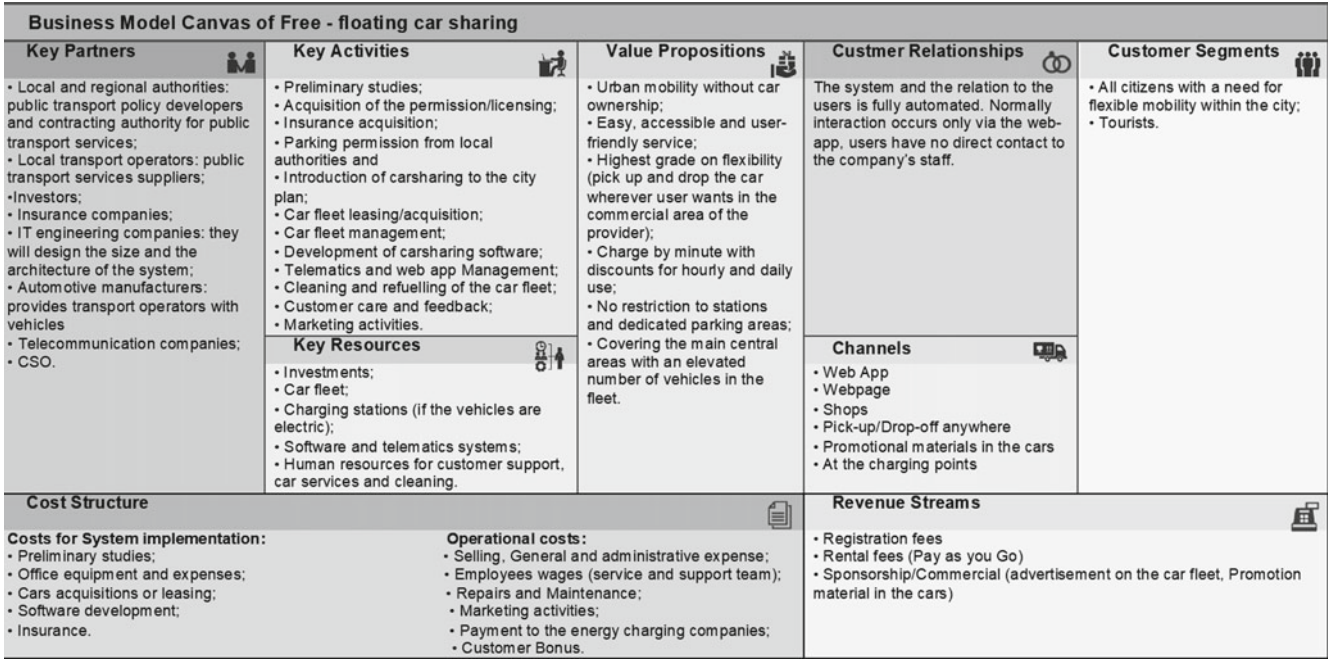

Fig. 15.6 Free-floating car sharing Business Model Canvas

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://itdpdotorg.wpengine.com/wp-content/uploads/2014/07/ITDP-Bike-Share-Planning-Guide-1.pdf.

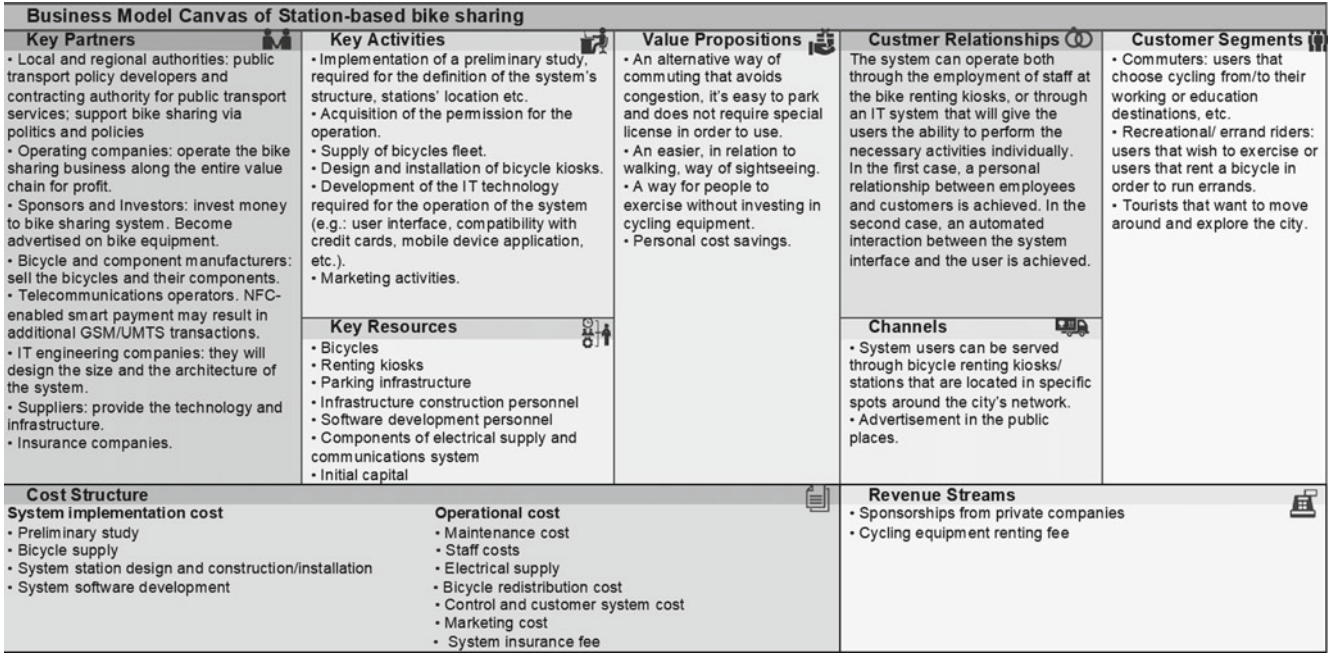

Fig. 15.7 Station-based bike sharing Business Model Canvas

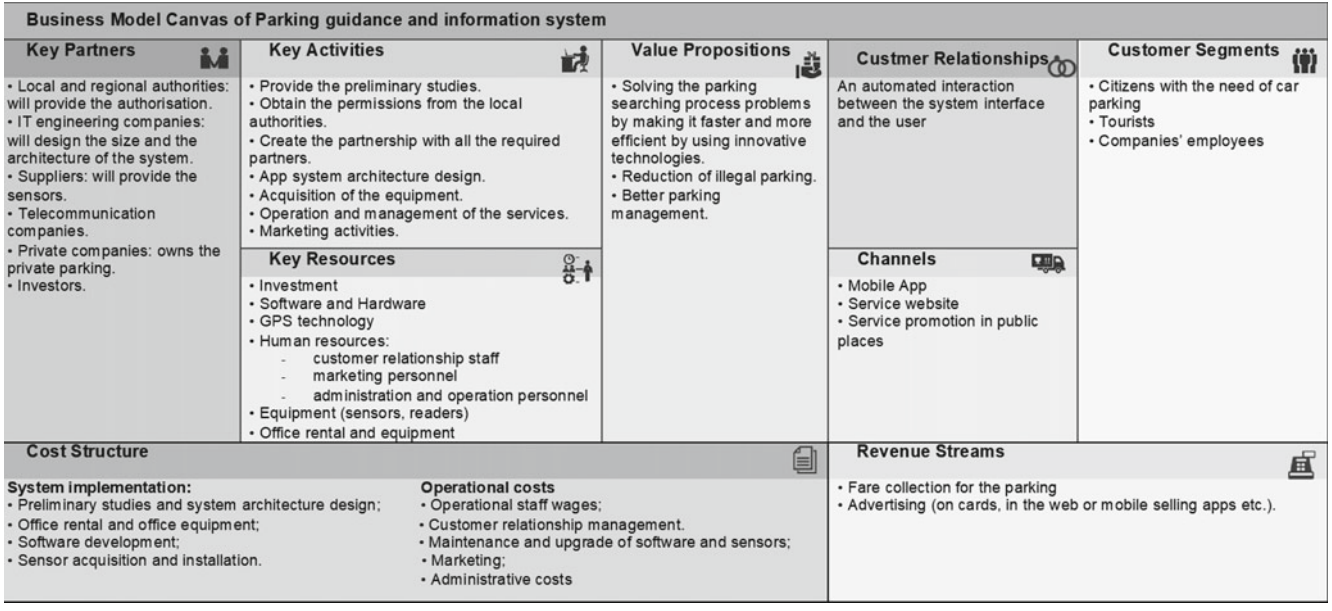

Fig. 15.8 Parking guidance and information system Business Model Canvas

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.

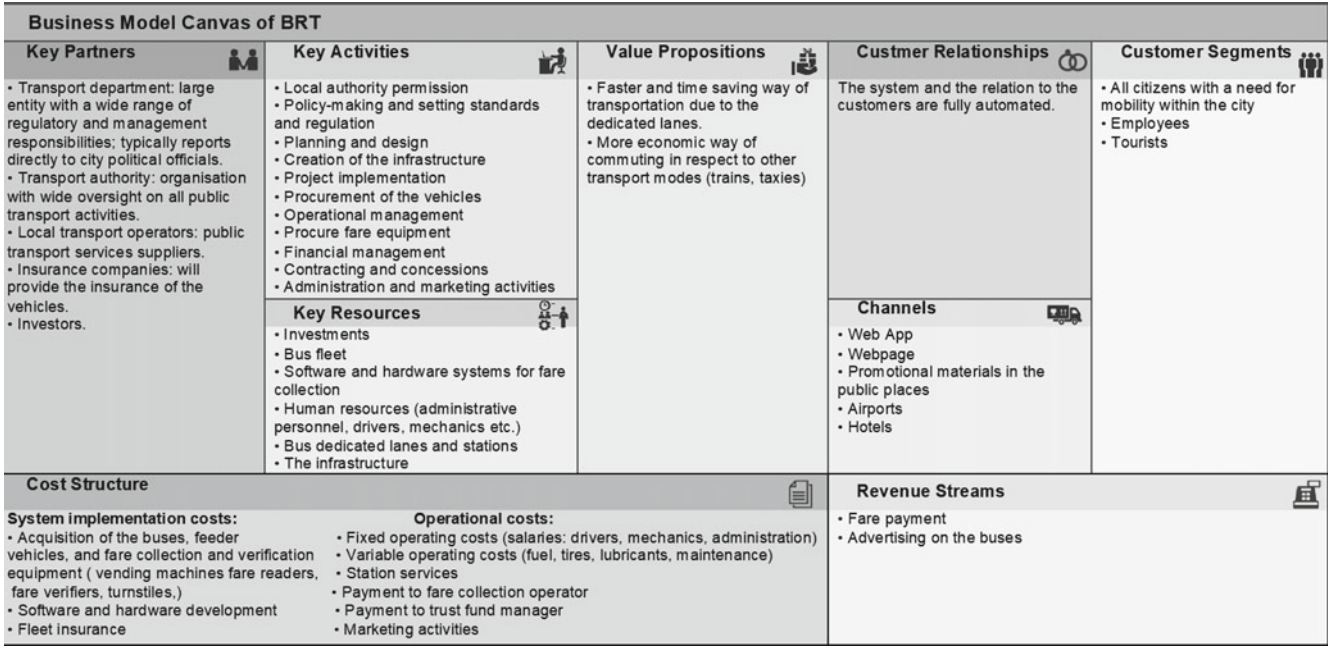

Fig. 15.9 BRT Business Model Canvas

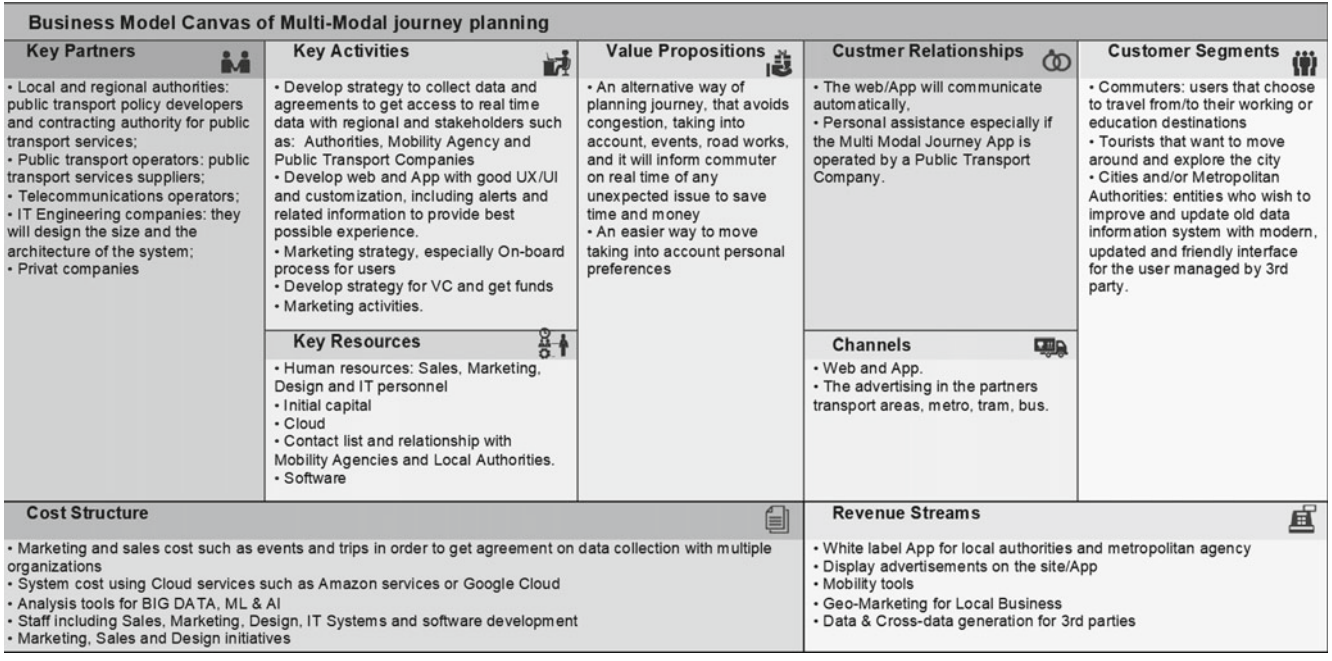

Fig. 15.10 Multimodal journey planning Business Model Canvas

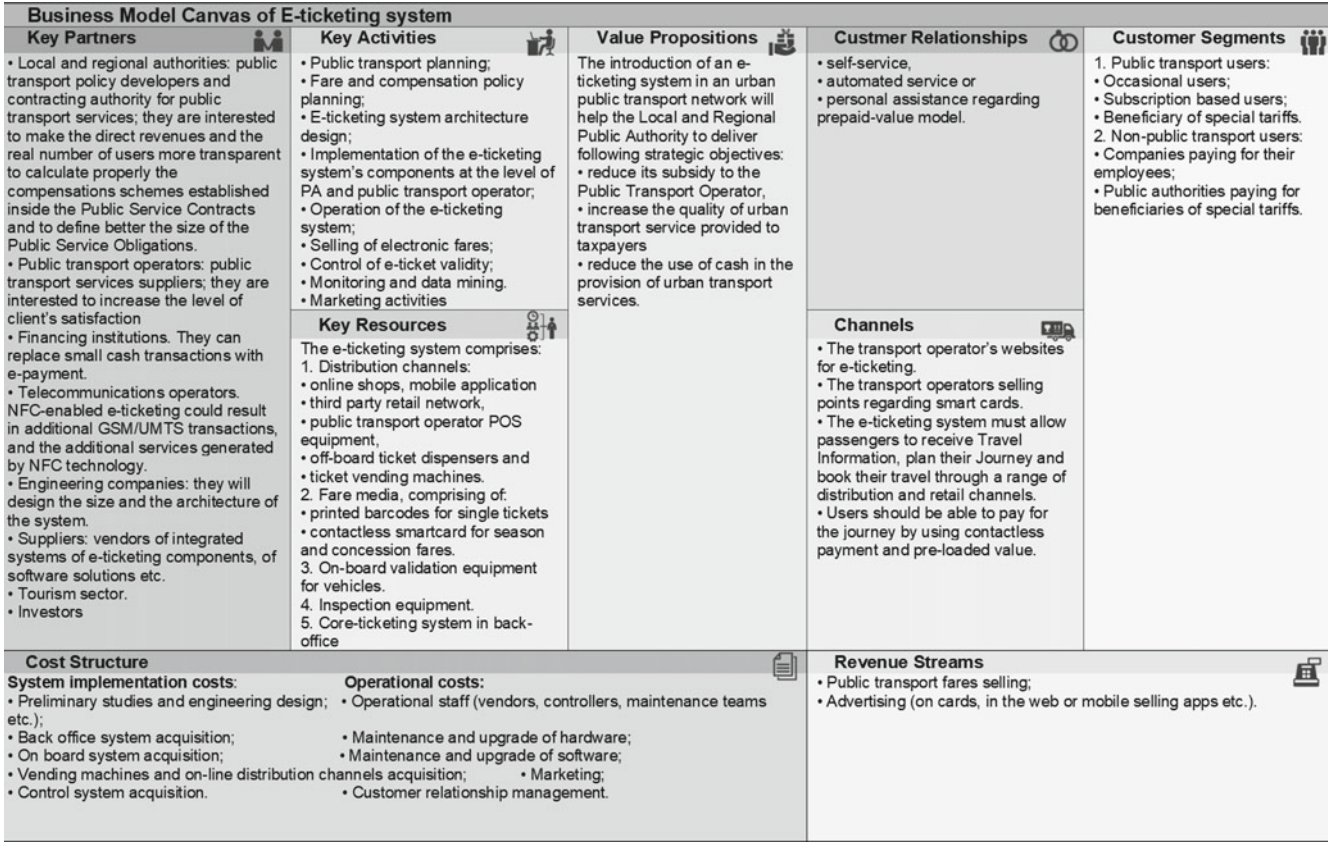

Fig. 15.11 E-ticketing Business Model Canvas

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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