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D7.1 Business models and exploitation strategies report v1

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Table of Contents

List of Tables

List of Figures

Acronyms

Acronym	Meaning
B2C	Business to Consumer
BEI	Baseline Emissions Inventory
BER	City of Berlin
BMC	Business Model Canvas
BP	Best Practices
CCTV	Closed-circuit television
CMC	City Model Canvas
CoM	Covenant of Mayors
FLO	City of Florence
FMA	Florence Metropolitan Area
FUA	Functional Urban Area
FUN	City of Funchal
GDPR	General Data Protection Regulations
HORECA	Hotel, Restaurant and Catering sector
KER	Key Exploitable Result
KPI	Key Performance Indicator
ULOs	Urban Logistics Operators
MAD	City of Madrid
MCDM	Multicriteria Decision Making
MECH	City of Mechelen
PPP	Public-Private Partnerships

PRA	City of Prague
RIG	City of Riga
SECAP	Sustainable Energy and Climate Plan
SSCR	Smart City Control Room
SULP	Sustainable Urban Logistics Plan
SUMP	Sustainable Urban Mobility Plan
UDC	Urban Distribution Centre
UFD	Urban Freight Distribution
UC	Use Case
UVARs	Urban Vehicle Access Regulations

Executive Summary

This deliverable provides the methodology and findings for the development of the business models for each of the Key Exploitable Results (KERs) that will be tested in the Living Labs and Follower Cities. The deliverable encompasses Task 7.1 Market Analysis and Monitoring, Task 7.2 Business Models, and Task 7.3 Detailed Individual Exploitation Strategies.

Firstly, a brief introduction to the deliverable will be outlined, including the ethical considerations and the progress conducted so far.

This will be followed by an explanation of the methodology that will be used for the development of the business models, including a market analysis with a PESTEL analysis, and a definition of the Business Model Canvas and the Cities Mission Canvas.

Subsequently, each of the services to be piloted will be briefly defined, and an initial analysis of their commercial exploitability will be considered. Those which have commercial potential will be analysed under the framework of a Business Model Canvas. It is worth noting that at this initial stage of the project, the services deemed as potentially exploitable will be analysed individually and not in combination, given the existing limited information about the services, although this is likely to change once the Living Lab pilots have been held and obtain detailed findings.

The services which are assessed as exploitable will then be considered within the specific context of the Madrid, Florence, and Berlin Living Labs, applying a City Mission Canvas for each of them. The different partners involved in each of the Living Labs will also be listed and considered in further detail, including a definition of their role.

Lastly, the conclusion will detail the initial findings at this stage, subject to change as the deliverable and the pilots evolve. Key takeaways include that, initially, eleven KERs are potentially exploitable, and that the Use Cases that seem to have most potential are those that test various KERs in combination.

After the pilots conclude and more detailed Business Model Canvases and City Mission Canvases are elaborated, exploitation plans will follow and will be included in the next deliverable submission.

The present version will have a two-step update at M36 (D7.4 Business models and exploitation strategies report v2 due in April 2026), and at M42 (D7.6 Business models and exploitation strategies report v3 due in October 2026).Introduction

1.1 Deliverable description and links with other activities

The present deliverable gathers the initial results from tasks 7.1 and 7.2, collecting the outcomes of the first 18 months of the project. These outcomes mainly focused on:

- the preliminary version of the market analysis

- the identification and definition of the Key Exploitable Results and use cases
- a first version of the Business Model Canvases for each exploitable service
- a first version of the City Mission Canvases for each Living Lab

The deliverable will be updated in M36 and M42, based on the progresses achieved throughout the project lifespan.

Besides including the content from tasks 7.1 and 7.2, this deliverable is connected and includes content from the following tasks:

- Task 2.4: Technical, operational and policy-based requirements definition
- Task 2.5: Use case refinement and usage scenarios definition
- Task 7.1: Market analysis and monitoring

1.2 Reference documents

For the development of this deliverable, the following documents were taken into consideration:

- Grant Agreement (GA), Reference number: 101103812, to ensure that the agreed activities and outputs are delivered in this deliverable
- D2.3 – Technical and legal requirements, KPIs and use cases, especially the parts considering the KERs and Living Labs' use cases

2 Gender, Ethics and Data

2.1 Gender related issues

As a general remark, the definition of KERs and development of Business Model Canvases and City Mission Canvases has not considered gender-related issues at this stage, although there is a specific indicator in the City Mission Canvas that considers the social impact and addresses this topic.

Gender considerations will be taken into account when developing future, more in-depth versions of the City Mission Canvases once the pilots have been implemented. A gender perspective will be used to assess various aspects of the pilots, including the demographic uptake and the implications some of these services may have on gender-related issues, such as safety or accessibility.

2.2 Ethics related issues

No people external to the UNCHAIN project consortium have participated in the activities reported in this document, so ethics-related issues are not applicable.

2.3 Data related issues

Data-related issues (FAIR and GDPR compliance) are not relevant for this deliverable as data and information included in this report are derived from previously submitted public UNCHAIN Deliverables, institutional websites, public documents, as well as contributions from the project's partners, , coming from their own sources or public sources.

3 Methodology

3.1 The market analysis

The business modelling process is supported by the market analysis and monitoring conducted in task 7.1 of the project (M1-M42), led by the WP7 leader, SPES Consulting.

Market analysis involves the assessment and understanding of the business context in which a product, service, or project is situated. This analysis provides key information that aids in making informed decisions regarding business strategies, marketing, and product and/or service development.

In the context of the UNCHAIN project, market analysis focuses, primarily, on understanding the dynamics of the logistics sectors in the countries involved, and services solutions in the logistic chain, so to provide partners with a description of future business opportunities to ensure the replication of the deployed solutions in other places (districts or cities) and beyond the horizon project. Since the services developed by the project also impact the broader mobility system in the areas where they are implemented, the market analysis will also consider the market sector related to similar digital services that support the wider mobility sector.

The methodology implemented is based on the integrated deployment of different analysis techniques, organized according to a three-level analysis:

1. **MACRO-LEVEL analysis**: *PESTEL* analysis will be carried out to study mainly the macro-environment in which pilot projects are being implemented in UNCHAIN. More specifically the analysis will focus on the national frameworks in Spain, Italy, and Germany, while also delving into regional specifics within the Community of Madrid,

Tuscany Region, and Region of Berlin-Brandeburg. Relevant unique local conditions will be also considered.

2. **PARTNER LEVEL analysis:** *Porter Five Forces* will be applied to study the competitiveness of the partners related to the selected interventions.
3. **INTERVENTION LEVEL analysis:**
   - A market *SWOT* analysis will be conducted for groups of similar intervention in each pilot city.
   - The *Value Creation Ecosystem* will be developed for each of the interventions
   - *Co-benefits and external costs analysis* will be conducted to assess social costs and benefits related to the services developed.

Each one of the above-mentioned models will be briefly explained below.

A **PESTEL analysis** is a strategic framework commonly used to evaluate the business macro environment in which a firm operates. By it, is possible to assess the political, economic, social, technological, environmental, and legal factors impacting logistics sector - mainly at a macro level l - , both directly and indirectly as part of a broader mobility sector

Combined, the six PESTEL factors can have a profound impact on risks and opportunities for firms.

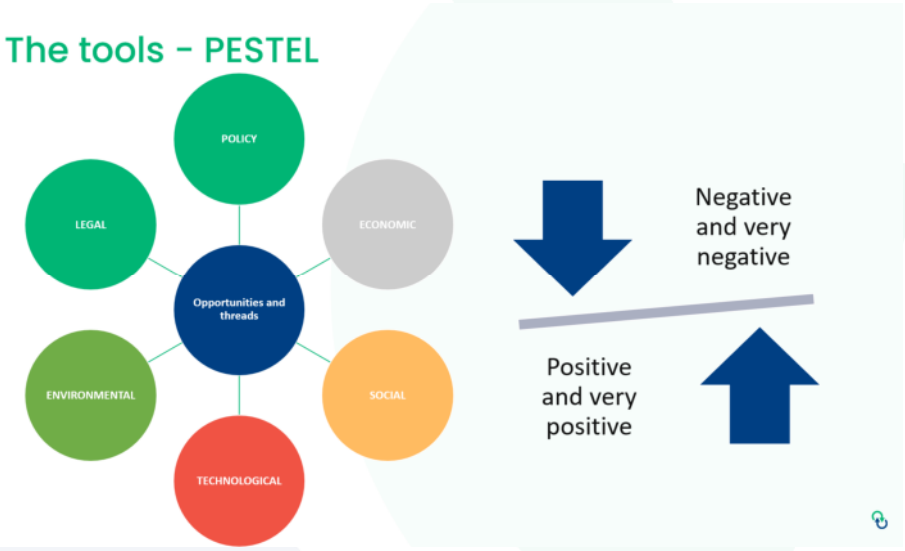

Figure 1 – PESTEL analysis

As mentioned before, using **Porter's Five Forces** (Michel Porter, 1980) the task will study the competitiveness of the partners related to the selected interventions. The Porter's Five Forces

Model is an important tool used in strategic analysis to analyse the competitiveness in an industry[1]. It includes the following five forces:

1. intensity of rivalry,
2. threat of potential new entrants,
3. bargaining power of buyers,
4. bargaining power of suppliers, and
5. threat of substitute goods and/or services.

In our competitive forces model, we'll include a sixth force, the power of complementary goods and/or services providers. The model helps a company understand the risks in the industry it is operating in and decide how it wants to execute its strategies in response to competition.

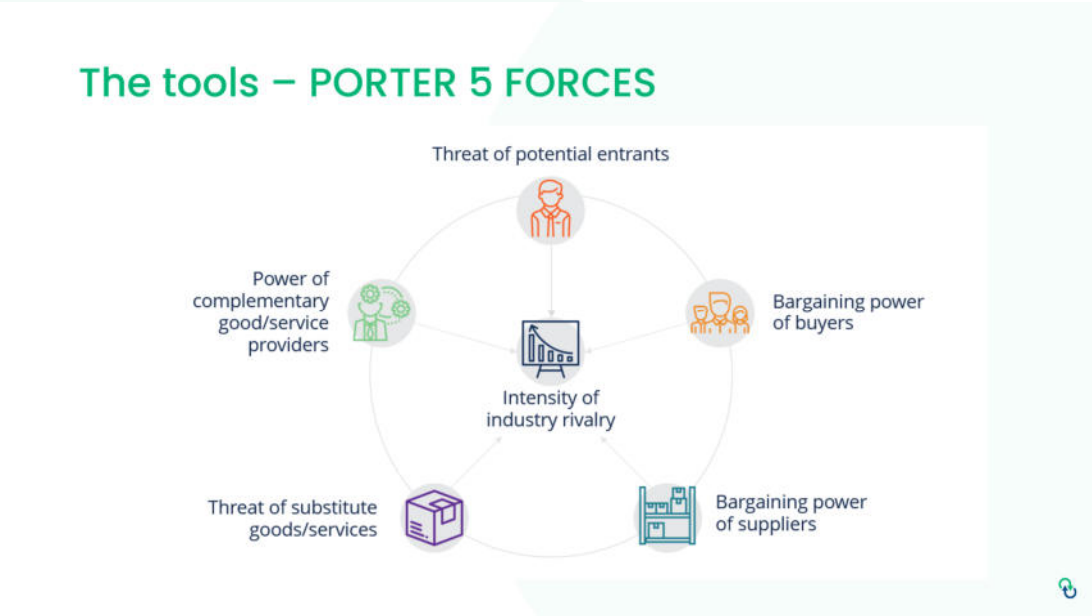

Figure 2 – PORTER 5 FORCES scheme

Then a market **SWOT analysis** will be conducted for groups of similar KERs in each pilot city. SWOT Analysis is a well-known and useful technique for understanding Strengths (S) and Weaknesses (W), and for identifying both the Opportunities (O) and the Threats (T) of a process.

[1] Michael Porter (2004) "The Competitive Strategy: Techniques for Analyzing Industries and Competitors". M. Porter, J.E. Heppelmann, M.Iansiti, K.R. Lakhani "About Digital Innovation", Harvard Business Review

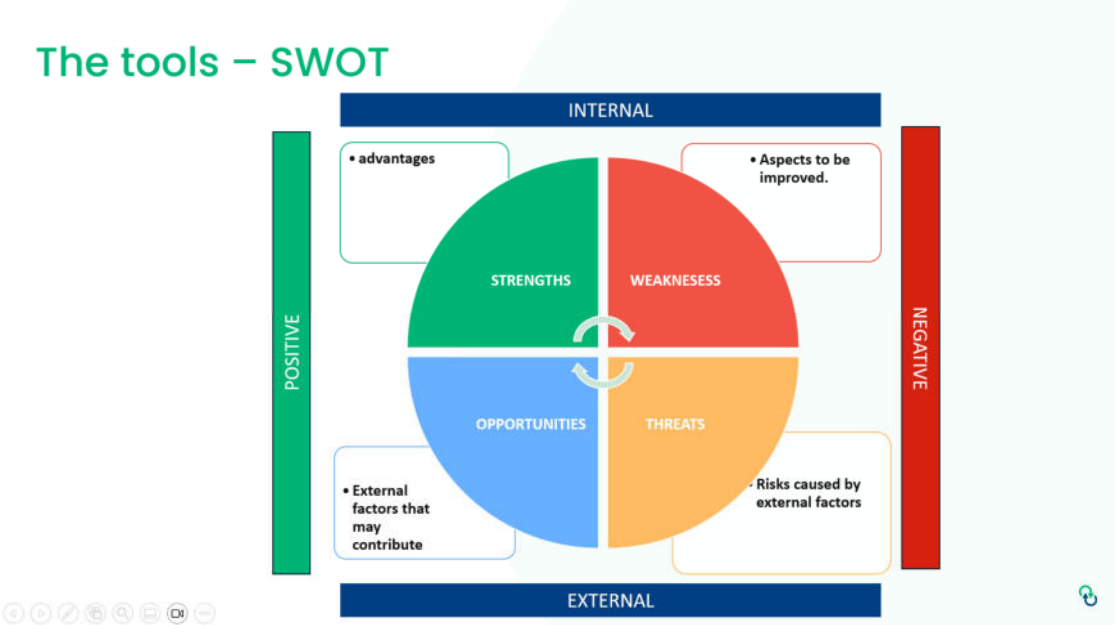

Figure 3 – SWOT analysis scheme

The sectoral analysis will be closed by developing the **Value Creation Ecosystem** of each of the interventions, with the aim of identifying the actors that are necessary to create and deliver value to citizens. Value Creation Ecosystem (VCE) model (Alle, 2000) is a standardised way of capturing and communicating the value flows between actors across the range of pilot interventions initiated by the project (see Figure 4).

Structurally, the VCE combines two important long-established tools: the value chain concept and a stakeholder map. By combining these tools into a VCE, the value exchanges between all key stakeholders become explicit, including ones amongst actors who are not in direct contact with the focal entity but are, nonetheless, important[2]. The result of a common dependency is a chain, which can be interpreted as a network of organizations, where those involved upstream and downstream by linkages to different processes and activities that produce value and deliver it to the last consumer. There is a value increase throughout the value chain, which allows that each actor can capture some of the value being created. Therefore, drawing the VCE for both single services and bundled services in each city is a key activity for answering the following questions: What activities are needed to create value for the ultimate beneficiaries? Who are these ultimate beneficiaries? What actors or stakeholders are necessary to develop these activities? What values are captured?[3].

[2] Vinaixa Jordi, Vanrespaille Winnie, Muslemani Hasan (2022): The Value Creation Ecosystem (VCE): A Novel Business Model Design Tool to Capture Multi-Stakeholder Value Exchanges, Journal of Business Ecosystems 10.4018/JBE.309124.

[3] Pardo-Bosch Francesc, Cervera Carles, Ysa, Tamyko (2019): Key aspects of building retrofitting: Strategizing sustainable cities, Journal of environmental management, DO: 10.1016/j.jenvman.2019.07.018

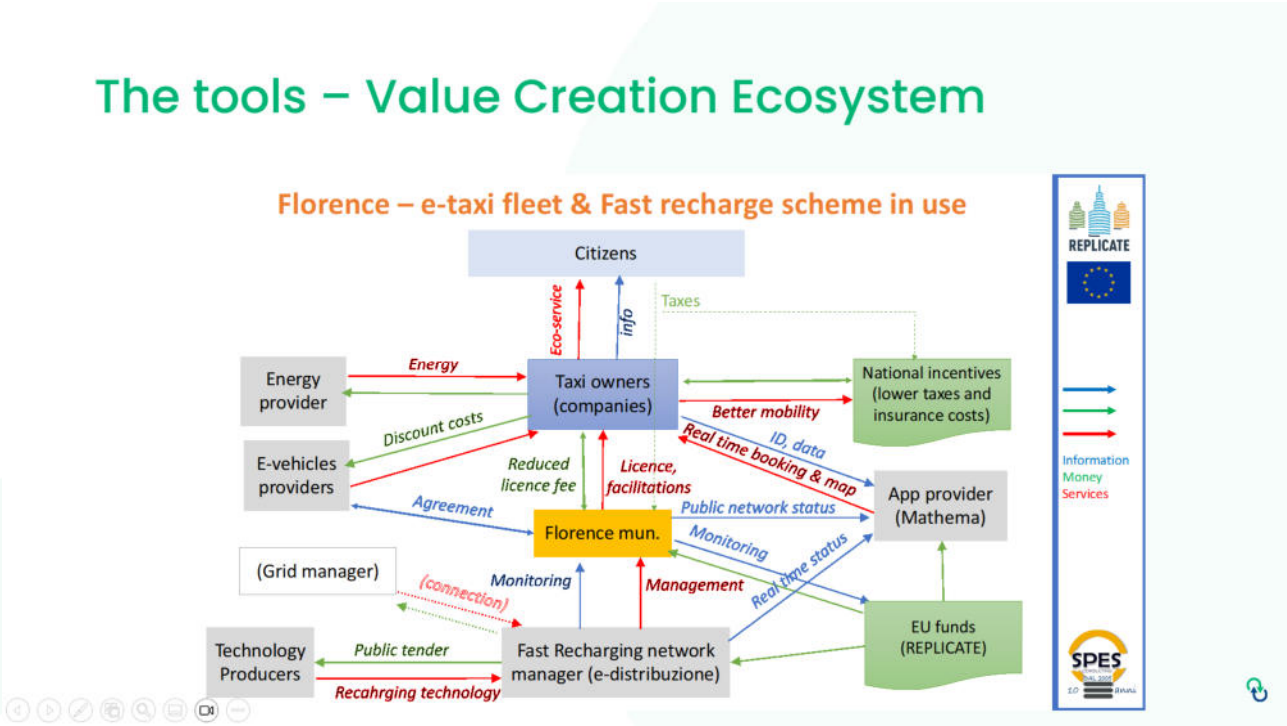

Figure 4 – Example of a value creation ecosystem diagram (Source: H2020 SCC1 project "Replicate")

None of the interventions in UNCHAIN are achieved through simple dyadic relationships between e.g., a purchaser and supplier, but are all complex networks of value flows between a range of actors.

The intention is that the final validated generic VCE models could be used as a template for replication in other Municipalities as well as stimulating further discussion about financing mechanisms.

Co-benefits and external costs advanced analysis considers the side effects that a certain activity impose a cost upon society (time costs of delays, health costs caused by air pollution, productivity losses due to lives lost in traffic accidents, abatement costs due to climate impacts of transport, etc.).

The internalisation of these costs means making such effects part of the decision-making process.

The cost/effectiveness and cost/benefits methodologies, in use for big infrastructural projects, in the simplified versions could also be implemented at urban level to have a comprehensive view of the impacts and prioritise the interventions.

Those models previously illustrated are self-standing but also interdependent[4]: for example, when discussing the influences on the five competitive forces, conventional strategy literature highlights the need to consider factors outside the industry

[4] Tony Grundy – "Rethinking and reinventing Michael Porter's five forces model" Strat. Change 15: 213–229 (2006) DOI: 10.1002/jsc.764

The important feature to note is that any product development/implementation is part of a system: the following figure captures, in an 'onion' model format, the key domains that need to be thought through, within the overall "*competitive climate*", beginning with:

- PESTEL factors
- growth drivers
- Porter's five competitive forces
- competitive position.

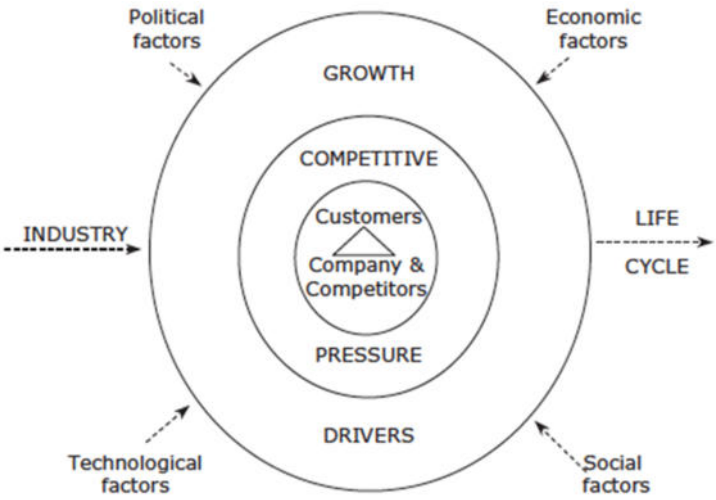

Figure 5 - The 'competitive climate' (Source: Grundy, 2006)

These layers of the onion are highly interdependent, which might be a very useful phenomenon to learn about and to apply.

As a final, options will be proposed for services to bundle together. More specifically, the SWOT analysis will be used to test different combinations of bundled tools. This will evaluate the extent to which these combinations can address customer demands and improve satisfaction, recognizing that these bundles seek to deliver complementary, synergistic, or cross-selling benefits, and target diverse customer segments based on their specific needs and preferences.

3.2 The business model canvas

Two different business model canvases (included below) will be filled by the end of the project.

- the classic **Business Model Canvas (BMC):** this canvas will allow to define a business model for each commercially exploitable KER developed in UNCHAIN. It is worth noting that at this initial stage of the project, the services deemed as potentially exploitable will be analysed individually and not in combination, given the existing limited information about the services, although this is likely to change once the Living Lab pilots have been held and obtain detailed findings. Therefore, at this stage there will be one Business Model Canvas per each individual exploitable KER.

- the **Cities Mission Canvas (CMC)**: The City Model Canvas is an adapted version of the Business Model Canvas tailored for public service development. It serves as a structured approach for local authorities to outline their strategies for generating and providing value in a financially, environmentally, and socially responsible manner through smart services.

A business model outlines the operations of an organisation, such as networks, business activities, governance, and solutions, with the intention of accomplishing several objectives and adding value. It outlines the organization's plan for generating or capturing value, whether that be through more conventional means like income or brand awareness or through public value creation like accessibility to public transportation or public space safety. A business model, among other things, aids in:

- Highlighting the organization's primary goal
- Disclosing the connections between private and public actors
- Highlighting the part that partners and third parties play in creating value
- Displays the organization's tangible and intangible assets
- Identifies expenses and sources of income

The nine pillars of the Business Model Canvas – value proposition, key activities, key resources, key partners, customer segments, customer relationships, channels, costs, and revenues – were designed by Osterwalder and Pigneur (Timeus et al., 2020). It was established with an emphasis on private enterprises, to illustrate how they generate economic value.

The following is a description of the nine pillars:

- **Value proposition:** This pillar outlines the advantages provided or specific goals targeted for. Which value is produced for particular client groups? Which particular demands are met?
- **Key activities:** Several tasks must be completed to meet the organization's goals.
- **Key resources:** The organisation will need a few assets, which might be human, intellectual, or physical, to carry out these tasks.

- **Key partners:** Outside parties needed to complete the tasks or grant access to essential resources.
- **Customer segment:** Particular user groups are the target audience for the advantages outlined.
- **Customer relationships:** The nature and degree of the relationship between the company and its client groups.
- **Channels:** Digital or physical channels that are utilised to inform and reach customers about the initiatives. These could be focused interventions or large-scale efforts.
- **Cost structure:** This shows the various fixed and variable expenses related to carrying out the essential tasks and gaining access to the essential resources.
- **Revenue streams:** The revenue pillar lists the various ways in which the company brings in money.

To fill in the canvas, an iterative approach will be followed. A first version of the classic Business Model Canvas has been filled in based on the results of the market analysis (Task 7.1) and results of Tasks 2.4 and 2.5.

Subsequently, future findings will be assessed by EIT-UMF and reflected in updated versions of Deliverable 7.1, which will be presented to the key stakeholders of each Living Lab until the definitive version of the business model is achieved.

Therefore, in each updated version of the deliverable, business models will be updated based on the project's progress and on the results of workshops.

The process to fill in the Cities Mission Canvas (CMC) will be the same and will include one CMC per pilot city.

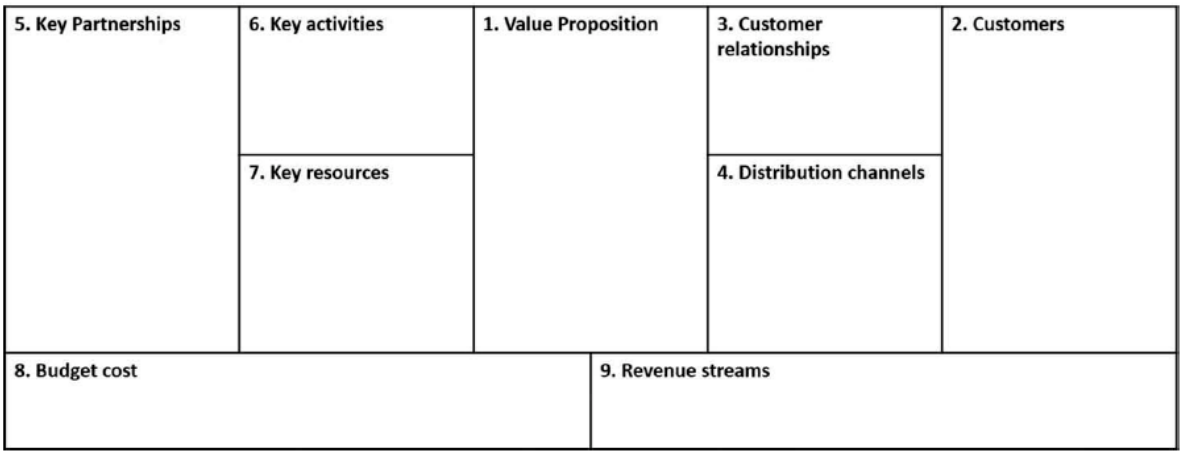

Figure 6 – Business Model Canvas (Timeus et al., 2020)

<table>
<tr><td colspan="5">1. Mission statement What is the ultimate goal that the city seeks to achieve?</td></tr>
<tr><td rowspan="2">6. Key Partnerships

Who can help the city deliver the proposed value to the beneficiaries? Who can access key resources that the city council does not have?</td><td>7. Key activities

What must the city council do to create and deliver the proposed value?</td><td rowspan="2">2. Value Proposition

What specific benefits are created and what specific problems does the proposed service solve or alleviate?</td><td>4. Buy-in & support

Whose buy-in is needed in order to deploy the service (legal, policy, procurement, etc.)?</td><td rowspan="2">3. Beneficiaries

Who will directly benefit from the proposed services?</td></tr>
<tr><td>8. Key infrastructure and resources & key regulatory framework

What key resources does the city council have to create and deliver the value? What infrastructure does it need? What is the key regulatory framework required?</td><td>5. Deployment

How will the city solve the problems of the Value proposition specifically?</td></tr>
<tr><td colspan="2">9. Budget cost structure

What costs will the creation and delivery of the proposed services entail?</td><td colspan="3">10. Revenue streams

What sources of revenue for the city do the proposed services provide? What other sources of revenue does the city have?</td></tr>
<tr><td colspan="2">11. Environmental costs

What negative environmental impacts can the proposed services cause?</td><td colspan="3">12. Environmental benefits

What environmental benefits will the proposed services deliver?</td></tr>
<tr><td colspan="2">13. Social risks

What are some of the potential social risks that the proposed service entails? Who is most vulnerable as a result?</td><td colspan="3">14. Social benefits

What social benefits will the proposed services bring about? For whom will these benefits materialize?</td></tr>
</table>

Figure 7 – City Mission Canvas (Timeus et al., 2020)

3.3 Detailed individual exploitation strategies

The UNCHAIN solutions will be implemented according to a detailed exploitation plan – that will be outlined in a later version of this deliverable – for utilising the project's results to meet the needs of specific market segments and the Consortium in the 2-5 years after the project concludes.

The main goal of T7.3 (M24-M42) is, more specifically, to create a shared and effective approach to utilizing the outcomes of the project (both individually and collectively) to guarantee their adoption by the appropriate parties throughout and beyond the project's duration, as will be outlined in the established business models.

The development of the Exploitation Plan will be carried out considering the approach/methodology defined by the META group and their Horizon Results Booster[5].The methodology applied will employ a beneficial collaborative approach, involving all consortium members collaborating closely to pinpoint and delineate the project's exploitable outcomes.

[5] https://www.meta-group.com/impact-story/common-support-service-for-dissemination-exploitation-and-valorisation-of-research-results/

More specifically, the methodology will unfold in five stages. Initially, a KER repository will be established, reflecting new value propositions and commercialization strategies derived from the living labs. Next, feedback will be solicited from project end users regarding their interest in KERs and their specific requirements. This step helps identify interdependencies among partners post-project, which is crucial for managing intellectual property rights and creating straightforward business dependency diagrams for external stakeholders. The third stage involves detailing each KER, highlighting contributions from partners, innovations introduced, and funding sources. The fourth stage focuses on creating a KER priority map to assess commercialization risks and potential mitigation strategies. Finally, a collaborative exploitation strategy will be drafted for KERs involving multiple partners.

Along with the common strategy for utilizing the UNCHAIN results, individual exploitation plans for the project partners will be developed, based on the preliminary versions reported in section 4.4 of this deliverable. . A first version of the individual exploitation strategy will be incorporated into D7.4 (M36), while the final version will be part of the subsequent version of the deliverable (D7.6), due at month 42.

The individual exploitation strategy will first focus on the developers. Regarding the logistics operators, the individual exploitation plans will be mainly aimed at analysing how the UNCHAIN solutions implementation will support them in improving their service quality, operational efficiency, and sustainability practices.

As for the cities, the potential to replicate and exploit the project solutions will be analysed in the SULPs draft that will be developed in WP8.

4 Outcomes of the first 18 months of the project

This section provides an overview of the outcomes and advancement of the project related to business models and exploitation strategies analysis until M18.

4.1 First results of the market analysis

In task 7.1, a PESTEL analysis is being carried out to identify and assess the main trends and factors influencing the logistics and mobility sector, primarily focusing on examining the national macroeconomic context in Spain, Italy, and Germany, as well as the regional context in the Community of Madrid, the Tuscany Region, and the Region of Berlin-Brandeburg. Additionally, the analysis considers relevant aspects at the local level in the living labs.

More detailed and comprehensive information will be provided in the first version of deliverable D7.2, "Markets Analysis and Monitoring Report v1", scheduled for submission in M26 of the project (June 2025)[6].

Hereafter, some initial considerations are reported. Although there are obviously circumstances that are specific to each of the examined countries, common recent and ongoing dynamics[7] affecting logistics and mobility sector can be observed across the European countries.

As for the **Political factors**, first the political stability is crucial for a smooth running of the logistics sector. The uncertainty and disorder in politics, coupled with global tensions and conflicts (including the war in Ukraine and Red Sea crisis) can disrupt the smooth transportation of goods across borders, leading to delays in logistics and higher operational costs.

Along this, elections often bring changes in government policies, regulations, and priorities and administrations (last political elections held in Spain in 2023, in Italy in 2022. In Germany, the next federal elections are scheduled in 2025). The introduction of new government policies can impact trade agreements, infrastructure projects, fuel taxes, and environmental regulations. These changes may not always be negative, but they do demand that companies possess the flexibility to develop a strategic plan to adjust to these new circumstances.

The sustainable practices in logistics transport, operations and warehousing are shaped by environmental laws and guidelines adopted at European (European Green Deal, European Climate Law) and national level.

The Increasing financial resources allocated to mobility and transport infrastructures by the National Governments (thanks also to the funds allocated through the Next Generation EU program) and the incentives plans for switching to environmentally friendly vehicles, technology integration, and automation rules can impact how strategies are put into action by logistics firms.

Moving to the **economic area**, a significant challenge arises from the overall rise in transportation costs for goods, as well as expenses related to warehousing and storage activities. This increase is driven by higher fuel and energy prices, along with rising costs of materials and components, coupled with an increase in interest rates, resulting in higher financial expenses[8].

Switching to the **social dimension,** different factors can be observed:

[6] The second release of the Deliverable (D7.5, due at M42) will include a PESTEL analysis for the follower cities as well.

[7] Analysis updated to August 2024.

[8] The latest European Commission's forecasts for the EU economy[8] foresee that, after the contraction in economic activity in 2023, inflation rates will continue to decline, and the EU economy is expected to grow gradually in 2024.These developments are largely driven by an expansion in private consumption, supported by wage growth and job opportunities. (https://economy-finance.ec.europa.eu/economic-forecast-and-surveys/economic-forecasts/spring-2024-economic-forecast-gradual-expansion-amid-high-geopolitical-risks_en?prefLang=it).

- A major challenge is represented by a global shortage of truck drivers: it is increasingly clear that the logistics sector must be able to attract workers with adequate salaries and fair working conditions.
- The high rates of inflation can result in a drop in purchasing power.
- The new consumer spending patterns and the increase of online shopping impact on the demand for new warehousing space and services.
- There is a growing attention to climate change mitigation actions. While there may be initial expenses associated with introducing environmentally friendly projects, they have the potential to result in substantial financial benefits and appeal to environmentally aware customers.

As for the **technological factors** the planning aspect of logistics often requires extensive design efforts that can be streamlined by digitalization, artificial intelligence, and sophisticated design tools. According to the Digital Economy and Society Index (DESI)[9], currently, the percentage of enterprises operating in the transport and storage sector with high and very high digital intensity index[10] are as follow: Spain 22,20%, Italy 21,70%, Germany 27%. Surely, there are significant differences between SME logistics operators and multinational logistics operators in terms of the technology they use. SMEs are lagging behind these larger companies; however, digitalization can greatly influence their processes and overall efficiency. l. On the other hand, sociological challenges are emerging in the logistics sector as technological innovations like autonomous vehicles and AI reshape the employment environment.

Stepping into the **environmental field**, it is important to acknowledge the increasing impacts of climate change in all European countries. These effects can disrupt the logistics sector, causing inconvenience, delays, and interruptions in transportation and delivery operations. They can also harm warehouses and storage facilities, leading to extra expenses. Planning ahead for these impacts is not only cost-efficient but can also provide significant co-benefits for ecosystems, health, and the economy[11].

It's clear that the future of logistics is driven by environmental and bio-based technologies, also given the increasingly stringent environmental regulations and goals set at European and National level[12], in terms of mitigation and adaptation to climate change, the need to improve the air quality in urban areas, and the ever-increasing attention towards sustainability issues by consumers and citizens. The increasing costs of raw materials and energy, along with their limited availability, add to the strain.

[9] The Digital Economy and Society Index (DESI) 2022, European Commission

[10] The indicator measures the use of different technologies by enterprise and is useful to describe the extent to which EU enterprises are digitalised https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Digial_Intensity_Index_(DII)&curid=120437&oldid=614292#:~:text=The%20digital%20intensity%20index%20(DII,a%20score%20of%201%20point.

[11] European Climate Law.

[12] Even at the local level, many cities have set a goal to reach climate neutrality before 2050. Examples include Florence and Madrid, which are part of the "100 climate-neutral and smart cities by 2030" Mission, and Berlin, aiming to achieve climate neutrality by 2045 at the latest.

Finally, as for the **legal area**, some common factors can be analysed:

- Logistics companies need to adjust to the regulations set by cities for Low Emission Zones (LEZ), Low Traffic Zones (LTZ), truck routes, and delivery schedules. Sometimes, they may need to renew a portion of their fleet to be able to reach the central areas of cities.
- More and more Spanish, Italian, and German cities are implementing the 30 km/hour speed limit[13] in their urban streets. More specifically, the Spanish Traffic Regulations, approved on November 10, 2020, set the speed limit at 30 km/h for one-way urban roads. This law, effective since May 11, 2021, impacts over 60% of the streets nationwide. Madrid began enforcing the 30 km/h speed limit at the end of 2018, primarily to reduce pollution in the city centre. Since May 2021, driving at 30 km/h is mandatory on 90% of Madrid's streets. In Italy a growing number of cities and municipalities (currently, around 60) are adopting this measure in urban areas. In Florence, there are currently 14 active 30 km/h speed zones covering about a third of the entire inhabited centre and about a fifth of the total municipal territory. Additionally, five more 30 km/h speed zones are being established, which will increase the area, keeping it around the 45% of the inhabited centre area. In Germany around 400 cities and municipalities have now joined the initiative. In Berlin, there are deviations from the maximum speed limit of 50 km/h in built-up areas on many roads. Since the beginning of April 2018, the Senate Department for Mobility, Transport, Climate Protection and the Environment has imposed a 30 km/h speed limit on several of Berlin's main roads that are particularly polluted by nitrogen dioxide, as well as near sensitive locations such as daycare centres, schools, hospitals, and hazardous areas. Additionally, the speed limit on many streets is 30 km/h only at night[14][15].
- This measure has produced the desired, such as lower speeds, high levels of compliance with speed limits, as well as significantly fewer traffic accidents, particularly serious accidents and accidents involving pedestrians and cyclists. All these effects have of course a positive impact on the daily logistics operations.
- The presence of different stakeholders and authorities, such as national statistical offices, shipping companies, and logistics firms, along with the emergence of unconventional data sources, plays a crucial role in collecting and sharing freight transport data, making the process complex and time-consuming.

[13] The Spanish Traffic Regulations, approved on November 10, 2020, set the speed limit at 30 km/h for one-way urban roads. This law, effective since May 11, 2021, impacts over 60% of the streets nationwide. In Italy a growing number of cities and municipalities (currently, around 60) are adopting this measure in urban areas. In Germany around 400 cities and municipalities have now joined the initiative.

[14] Because the air quality has improved, the 30 km/h sections on 34 main roads in Berlin that were introduced years ago for environmental reasons have to be lifted again for legal reasons, as announced by the Transportation Senator in February 2024. However, this should only apply where road safety permits. For example, the 30 km/h speed limit could remain in place at schools, daycare centres or care facilities.

[15] "Introduction of 30 km/h as general speed limit in European cities. What effects can be documented?" TØI Report 2009/2024. Institute of Transport Economics, Norwegian Centre for Transport Research.

- Companies in the transportation and logistics industry gather extensive information on their business activities and clients. Customers' data can be obtained, stored, or processed carefully following the GDPR instructions. Many consumers lack confidence in businesses handling their personal data responsibly. Frequently, individuals seek to retrieve their data, sparking a current discussion on whether firms should retain such information indefinitely.

The following table summarizes the factors that influence logistics in the various areas under analysis. In the second column, the symbols +, -, and = indicate the type of impact (positive, negative, neutral). One symbol represents less impact, whereas three symbols represent a higher level of impact.

Table 1 – PESTEL analysis of the logistics sector: influencing factors and their impacts

POLITICAL	
European, national, municipal and regional elections	=
Geopolitical uncertainty	-
Incentives for the purchase of electric vehicles	+
"Climate" legislation	+
ECONOMIC	
Slowdown of major economies	-
Inflation	-
Increasing prices for transportation of goods and warehousing and storage activities	-
High interest rates	-
SOCIAL	

Loss of purchasing power	-
Lack of qualified talent in the logistics market	-
Lack of drivers	-
Significant growth in online commerce	+
People are not ready to use services based entirely on web platforms	-
Older population, more resistant to changes	-
Growing attention to climate change mitigation actions.	+
TECHNOLOGICAL	
Cybersecurity	+
Robotisation, digitalization	+
Automation of processes and equipment	+
ENVIRONMENTAL	
Increasing requirements for greenhouse gas emission abatement	+
Urban air pollution to be tackled	+
Climate change and Extreme weather events	-

LEGAL	
Access to restricted road network	-
"30 km/h zones" implementation	+
Privacy restrictions for data sharing	-

4.2 Key exploitable results

This section includes a description of the key exploitable results (KERs) that will be developed in the framework of UNCHAIN. It lists the partners responsible for the exploitation of each KER and identifies those KERs with a commercial exploitable potential. Commercial exploitability refers to the possibility for the service to be exploited in different urban contexts and potentially being purchased by local authorities and/or logistics operators. All the KER services that have been identified as commercially exploitable have been considered under the framework of a Business Model Canvas.

4.2.1 Definition of services and identification of key exploitable results

The table below presents the services developed in UNCHAIN and the partner responsible for their development. A more detailed description of each KER is presented below.

Table 2 – List of exploitable services

UNCHAIN Service	Name of the Service	Owner
KER1	Data-driven urban logistics cooperation framework	ETRA
KER2	SUMPs and SULPs guidance tool	VMZ
KER3	Freight-efficient land use strategy	IBV
KER4	UCC location and integrated planning KIT	VMZ
KER5	On-street loading zones planning tool	ETRA
KER6	Active UVARs and city regulations tools	MUNI
	Multi-criteria Decision Making Framework for UVARs	ULANC
KER7	Knowledge powerhouse for urban logistics	EIT-UMF
KER8	Dynamic curb side management	ETRA
KER9	Dynamic management of pick-up/drop-off points	MUNI
KER10	IT Pop-Up delivery points management tool	ETRA
KER11	Logistics operator monitoring system and incentives tool	MUNI

	Multi-criteria Decision Making Framework for ULOs	ULANC
KER12	Congestion forecasting and safe route planning	VMZ
KER13	Advanced Management IT Cockpit of Shared Facilities	ETRA

KER1 – Data-driven urban logistics cooperation framework

This KER defines the data space through which all the partners share the data and in which all the other KERs are allocated. All services must apply a data-driven urban logistics cooperation framework, developed under Work Package 3. The purpose for this is to share, access, and consume interoperable data.

KER2 – CLICK ACT (SUMPs and SULPs guidance tool)

CLICK ACT, powered by VMZ, is a web tool that will help cities regularly monitor and assess the measures implemented within SULPs and SUMPs through a data-driven platform to anticipate the results of the measures and policies implemented by the cities in each context and guide the development, implementation, and update of their Sustainable Urban Mobility Plans (SUMP) and Sustainable Urban Logistics Plans (SULP). Data input will be graphically processed and evaluated in real-time through the CLICK ACT web interface. Cities will be able to customise and organise the generated visualisations in their own dashboards. The tool will offer different templates and examples of monitoring charts, as well as multiple visualization types.

CLICK ACT will include considerations for public and stakeholder participation in infrastructure planning when mandatory or existing and will comply with national laws on the preservation of historical monuments. The tool will have both public and private sections, with the public section providing general information and the private section containing restricted monitoring data that will support local authorities drawing conclusions on how to readjust the measures and policies to further increase the impact and improve the implementation of their SUMP/SULP to achieve their sustainability and climate-neutrality targets.

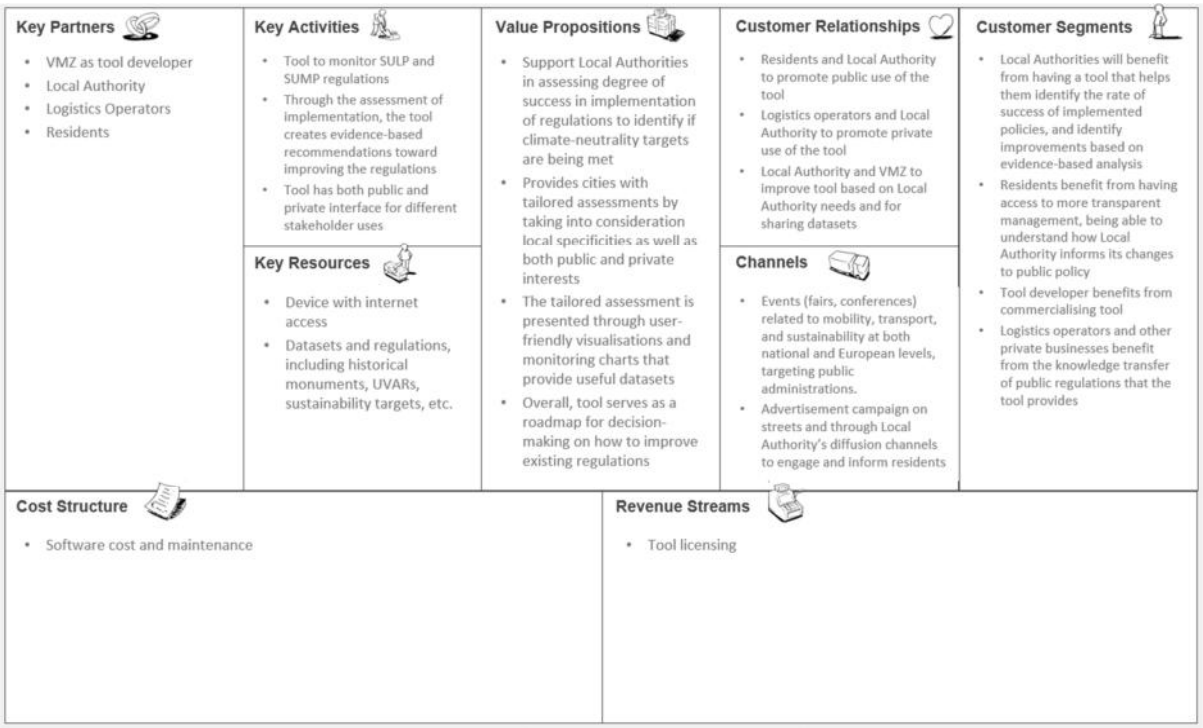

Figure 8 – KER2 Business Model Canvas

KER2, as a monitoring tool that serves to provide guidance on the effectiveness of implemented public regulations, is initially highly commercial tool, given the low number of resources, partners, and costs involved, and the high level of return in terms of guidance for several key partners, including the local authority, residents, and private businesses.

KER3 – Freight efficient land use handbook

User-friendly handbook, designed by IBV, intends to assist urban planners in comprehending city freight dynamics and effectively incorporating freight into land-use planning. It will provide strategic recommendations for land-use allocation to improve urban freight distribution efficiency and suggest logistics solutions for various city areas, balancing both public and private interests. The handbook will enable the mapping of interest areas based on delivery requests and include a collection of best practices from different cities.

Targeting professionals in the logistics sector, the handbook will draw on existing urban distribution models to define zones, characterizing EU cities according to logistics operations. Between four and six urban zones will be delineated, and the handbook will adopt a mixed-use approach for consolidation points. It will also classify delivery strategies into three groups: radial, perimeter, and itinerary.

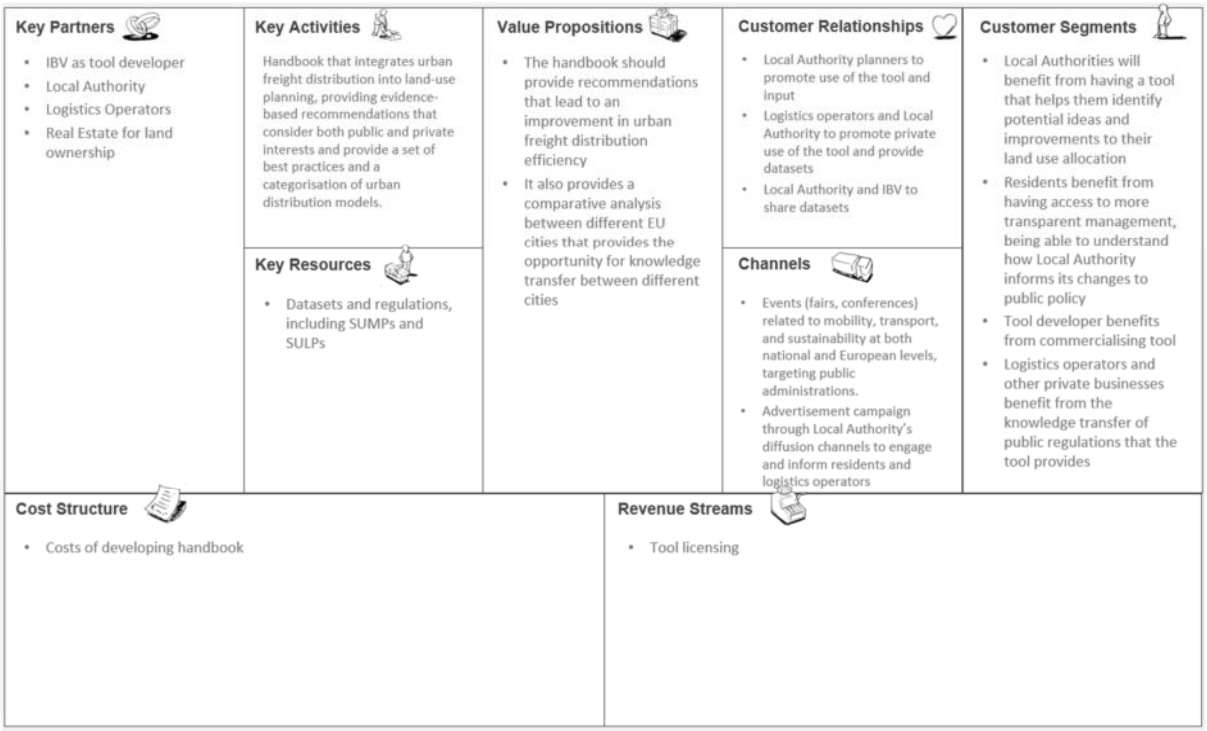

Figure 9 – KER3 Business Model Canvas

KER3, in a similar way to KER2, is a highly commercial service as it does not involve high costs nor resources, given that it is a handbook, but it provides local authorities and public and private stakeholders with valuable recommendations that act as a roadmap toward greener and more efficient urban freight distribution.

KER4 – CLICK LOG: UCC location and integrated planning kit

CLICK LOG, a web tool designed by VMZ, will assist urban planners in identifying suitable locations for Urban Consolidation Centres (UCCs) and micro-depots within a specified planning area. Planners will be able to create personalized plans by setting preferences and deciding on dependent inputs. CLICK LOG will allow users to input planning-relevant data and offers an option for automated data retrieval from public sources like OpenStreetMaps. Users will be able to create various scenarios and receive recommendations on the number and potential locations of UCCs and micro-depots.

CLICK LOG will also allow to evaluate strategic land in relation to the complete supply chain. Using multi-criteria and multi-stakeholder decision-making methodologies, CLICK LOG will be able to perform analysis of macro-level data related to traffic levels, population density, land use planning, price, together with data from logistics operators (such as number of parcels shipped, and routes followed to determine optimal locations).

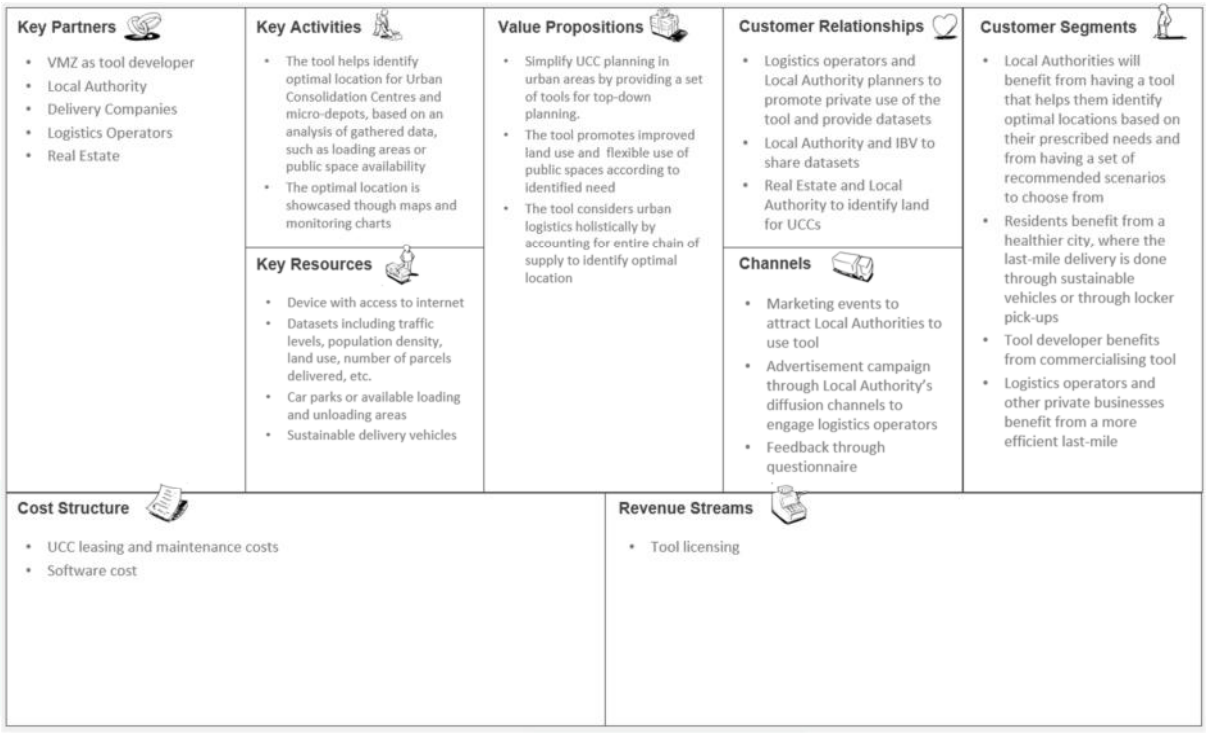

Figure 10 – KER4 Business Model Canvas

KER4 has exploitable potential because is proposes values to the entire chain of supply of urban deliveries, from origin to destination. It should reduce costs for all stakeholders involved and provide a better allocation of public space that would benefit residents' wellbeing.

KER5 – On-street loading zones planning tool

KER5, developed by ETRA, will offer local authorities a method to define new zones for on-street loading and unloading. It will present a map of the city, displaying accessibility index values based on the proximity and availability of loading zones, which will allow to identify the optimal location of loading bays. Through a simple system of colours and scores, the tool helps to decide the location of the next loading and unloading zone.

KER5 will incorporate several key functional and data requirements, including user authentication and profile features, allowing users to register and authenticate their accounts securely. The tool's architecture will be designed to ensure scalability and high performance, accommodating an increasing number of users and data. To enhance usability, the app should feature a user-friendly interface for adjusting user preferences, making it easy for users to customize their experience.

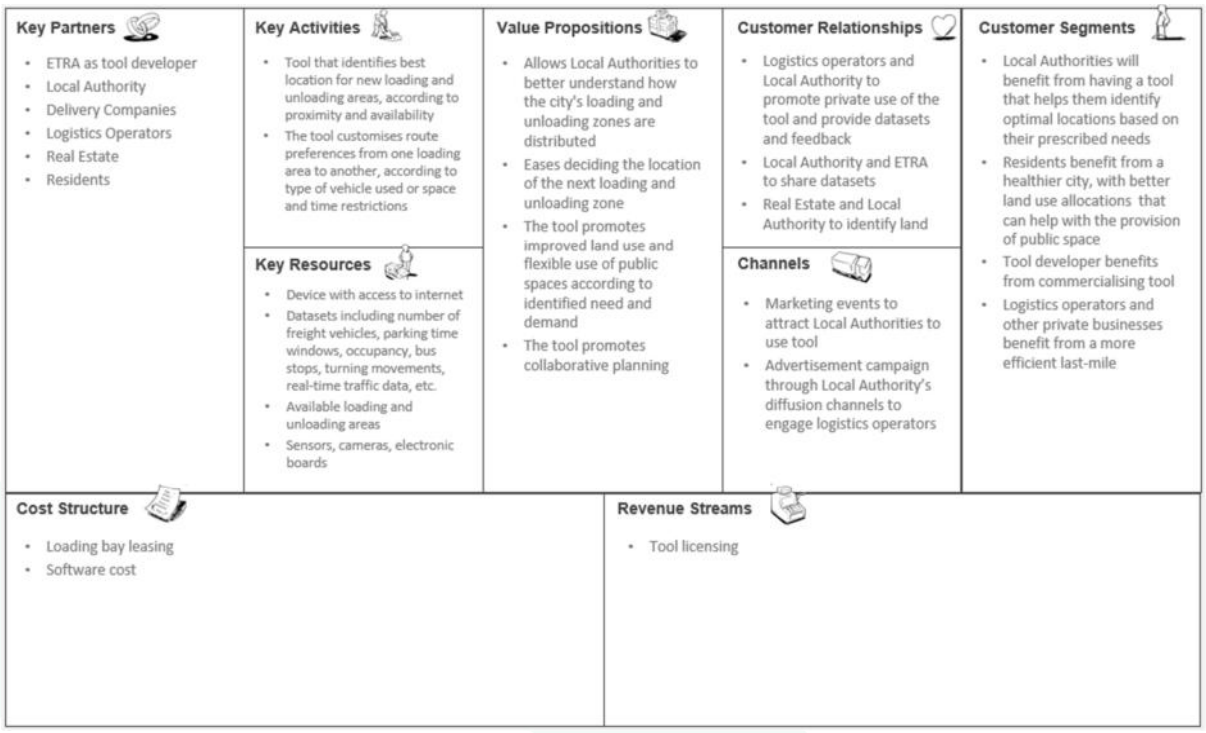

Figure 11 – KER5 Business Model Canvas

KER5 is has exploitability potential because the improved allocation of on-street space for loading and unloading areas will have efficiency benefits for logistics operators and delivery companies, whilst also promote a safer and greener environment, with a fairer allocation of land uses.

KER6 – Active UVARs and city regulations tools

KER6 consists of two tools. The tool, developed by Municipia, will offer a communication channel between local authorities and logistic operators, to facilitate the verification and authorisation of existing Urban Vehicle Access Regulations (UVARs). Public authority operators will use the system to improve transit and parking rules based on data analysis, including alternative delivery times, street closures, or maximum vehicle size and weight, while logistics operators will log in to acquire necessary permits and enter cargo information, such as details about transporting special goods like medicines or food.

The tool will also implement an alert system that will update logistics providers about changes in restrictions and regulations but also real-time updates on rules and incidents, which will be incorporated into the system to assist delivery operators. The tool will also include features for monitoring and enforcing the illegal use of transit and parking permits. The tool will also enhance route planning, since it will provide logistics operators with optimized routes, available pick-up/drop-off points, and real-time tracking of estimated arrival times. The tool will be available and accessed via authenticated, role-based front ends on web or app platforms and it will accommodate various professional groups beyond logistics operators,

such as plumbers and other professionals, by providing clear regulations specific to each city, town, or district. Finally, the tool also provides recommendations, for instance, suggested street closures, alternative delivery times or size and weight restrictions. These recommendations are particularly useful to improve the efficiency of delivery journeys.

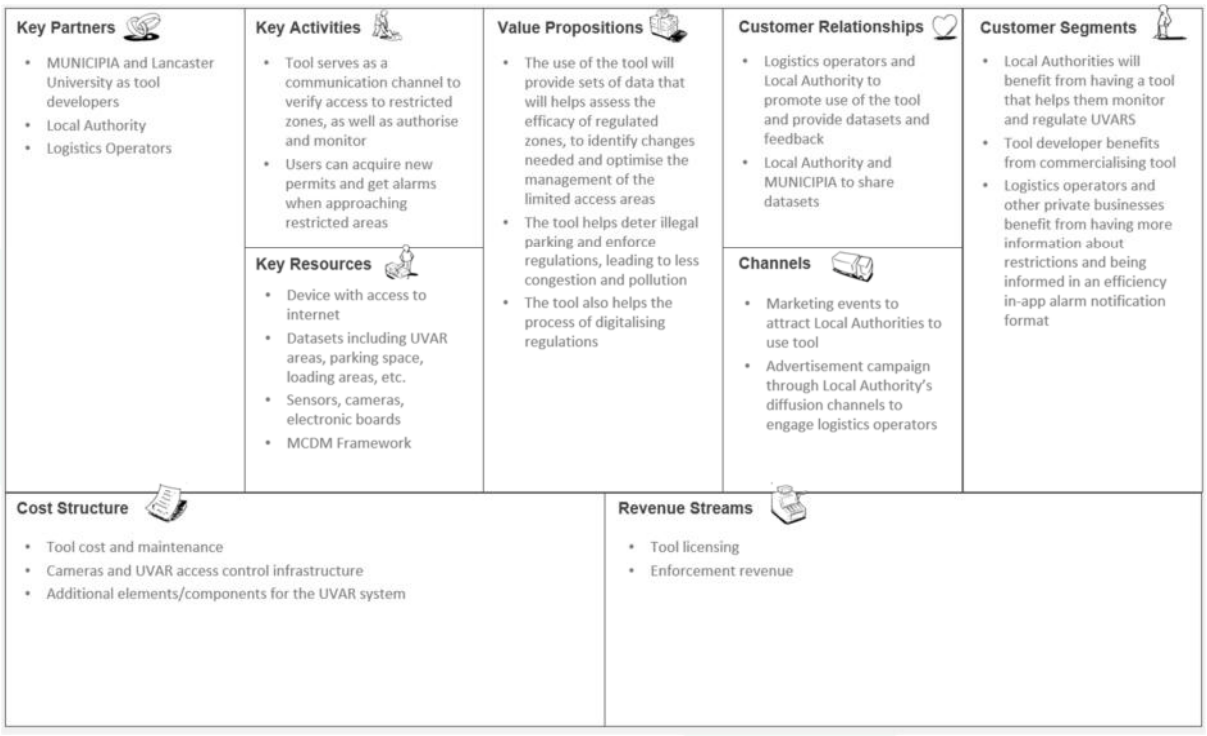

Figure 12 – KER6 Business Model Canvas

This KER is particularly exploitable because it proposes a considerable amount of value for both local authorities and logistics providers. It not only serves as a monitoring tool to identify the effectiveness of regulated areas, but it also serves to digitalise administrative tasks such as giving permits or verifying them.

KER 6 also includes a MCDM Framework for UVARs developed by ULANC.A self-standing, strategic tool that allows local authorities to assess the impact from the introduction of alternative UVARs on their logistics and mobility system. This is also a particularly exploitable feature for policy makers in developing and assessing their SUMPs and SULPs, as well as for consultants that are involved in supporting local authorities to develop or assess their SUMPs and SULPs.

KER7 – Knowledge Powerhouse for urban logistics (EITUMF)

The Knowledge Powerhouse for urban logistics, developed by EIT-UMF, will consolidate the research and innovation findings in the field of urban logistics and it will facilitate capacity building, knowledge sharing, and the exchange of good practices.

The service will include a dedicated section with related EU-funded projects, identifying replicable best practices and solutions. Additionally, it will incorporate recorded workshops focused on capacity-building activities to ease the transferability of the tools and measures developed in UNCHAIN. To assist non-UNCHAIN cities in selecting the most suitable service or tool for their needs, an "initiative selector" will be included. The tool will also feature various sections to collect urban logistics news and findings from the project, such as diagnosis, KPIs, methods, and practices.

The tool will be embedded into the project's website to ensure seamless access and integration. This will make it readily available to users and stakeholders, providing a centralized platform for accessing relevant information and resources. Finally, to enhance connectivity and resource sharing, the tool will explore options to link with the CIVITAS website and the Cities Mission platform. This will help in creating a more comprehensive network of resources and support for urban logistics initiatives.

It is noted that this service is not identified as commercially exploitable given that it is more of a knowledge-sharing resource rather than a material exploitable service, and therefore a Business Model Canvas will not be developed for it.

KER8 – Dynamic curb side management

The tool, developed by ETRA, will allow a dynamic management implementation of curbside parking spaces, providing transport operators with more parking slots for delivery vehicles, adapting the use of parking spaces as needed. The tool will be composed of an electronic informative display that will be installed on-street to show the current usage of the parking zone (physical hardware component) and of a software that will dynamically display schedules and usage patterns based on different time periods. The tool will integrate real-time monitoring features and big data analytics to better understand the curbside usage.

Operators will be able to check the status of curbside parking and change the curbside zone state as required. This operational flexibility allows for real-time adjustments based on the current demand and conditions. Additionally, the tool will allow for changes in curbside use based on a calendar, facilitating planned adjustments to accommodate different schedules and peak times.

This service will consist of a physical device installed nearby the parking slot that will provide the time up to and the use of each one. Although due to administrative limitations, the use will have to be defined some time in advance to the starting of the real moment, the definition of the uses will be based on previous analysis of the vehicles and parking needs of the area. In addition to the informative physical device, a QR code will be included in it and the users will be encouraged to notify in the app the real use of the parking. This action will not be mandatory, but it will be suggested to allow us the analysis of the tool. These features

collectively aim to improve the management of urban curbside spaces, enhancing the efficiency and effectiveness of delivery operations.

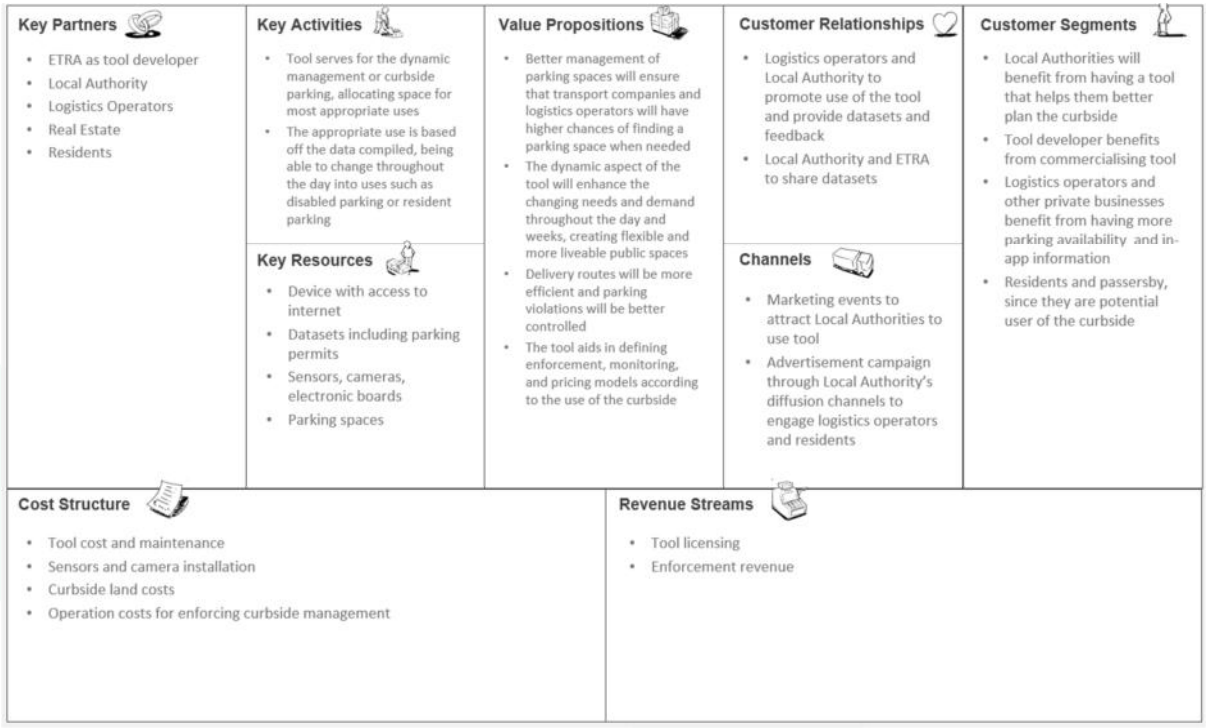

Figure 13 – KER8 Business Model Canvas

KER8 has exploitability potential because it addresses the specific needs of different stakeholders, being able to provide various customer segments. Whilst logistics operators benefit from more access to parking spaces, residents also benefit from more parking space when needed, and disabled residents are prioritised. The fact that the tool is dynamic accounts for the fact that cities have different needs according to the context, providing a form of flexibility that would also support local authorities in improving their urban planning.

KER9 – Dynamic management of pickup/drop-off points

This tool, developed by MUNICIPIA, will allow to digitalize loading and unloading bays for urban goods distribution, enabling real-time monitoring of their occupancy status, and regulating their use to prevent potential misuse. The tool supports dynamic urban space management of these bays, integrating services and equipment (e.g. sensors) to automate check-in/check-out procedures and prevent unauthorized parking, which can slow down logistical operations. The tool will provide information on the volume to be picked up, allowing adjustments to vehicles and times accordingly.

The tool will be able to produce raw data on the number of logistics operators and businesses using the service, allowing to identify rate of success and areas of demand. It will integrate seamlessly with logistics operators' networks, enhancing efficiency and communication. Local

authorities will have access to a web backend to configure the management of pick-up/drop-off points and view the status of these bays. The system will offer authenticated, role-based front-end access via web or app.

For logistics operators, the tool will provide means to check available logistics parking areas, search by address or maps, and make reservations for pick-up/drop-off points. Once logged in, they can select slots, view availability, book them, and receive notifications confirming their bookings through multiple channels, such as in-app notifications and email. The tool will also support check-in/check-out of pick-up/drop-off points, registering actions and changing point status automatically through sensors when necessary. The tool will support creating new reports and indicators, providing comprehensive data insights for effective decision-making.

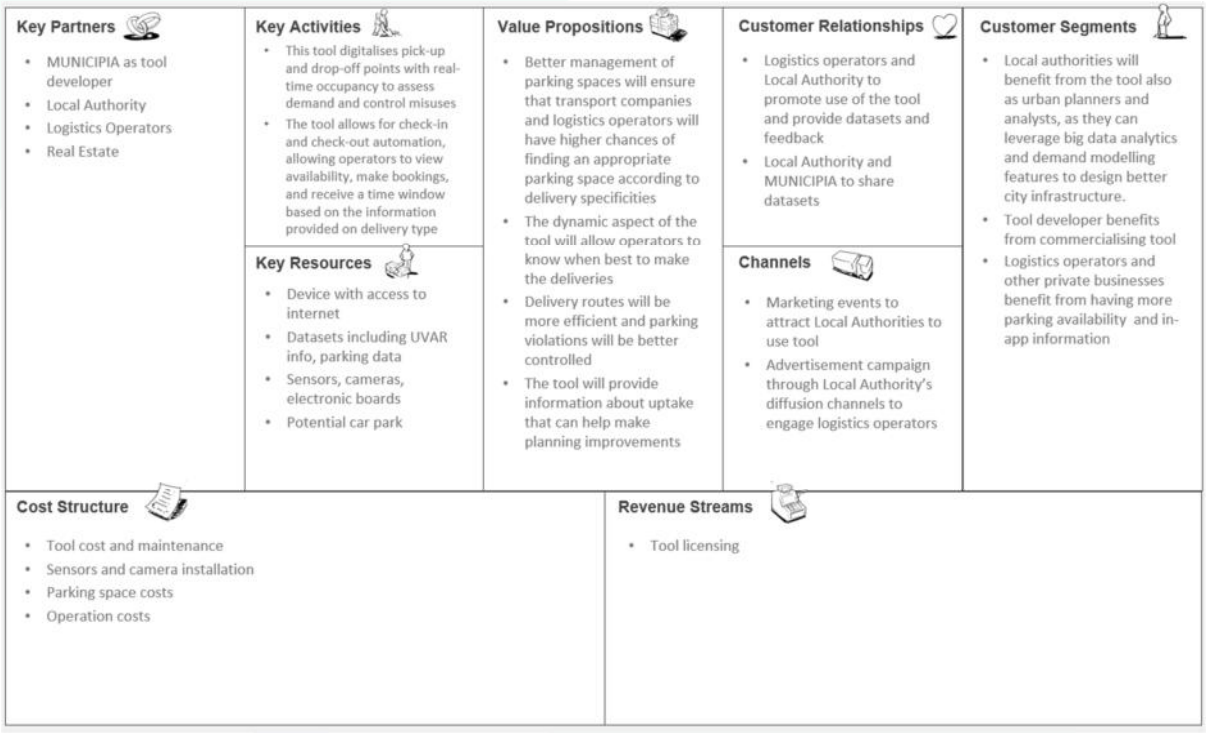

Figure 14 – KER9 Business Model Canvas

KER9 has a key exploitable aspect which is that it can be integrated with existing logistics operators' networks, making it relatively easy to implement. It will provide real-time data of occupancy, allowing operators to make informed decisions before starting delivery route. KER9 can also be integrated with other services that function through a multimodal car park, allowing for a range of services to be used collaboratively.

KER10 – IT Pop-Up delivery points management tool

The IT management tool, developed by ETRA, will allow local authorities and parking and UDCs/UCCs managers to set up geofences and reallocate public/private spaces as pop-up delivery spaces. Therefore, the tool aims to assist in identifying pop-up delivery point zones that need to be reallocated based on calendar events and predefined zones.

The tool aims to enhance the management and use of pop-up delivery points by offering real-time information. This functionality will ensure that logistics operators and other users can access up-to-date details on the availability and status of pop-up delivery points, enabling more efficient and informed decision-making.

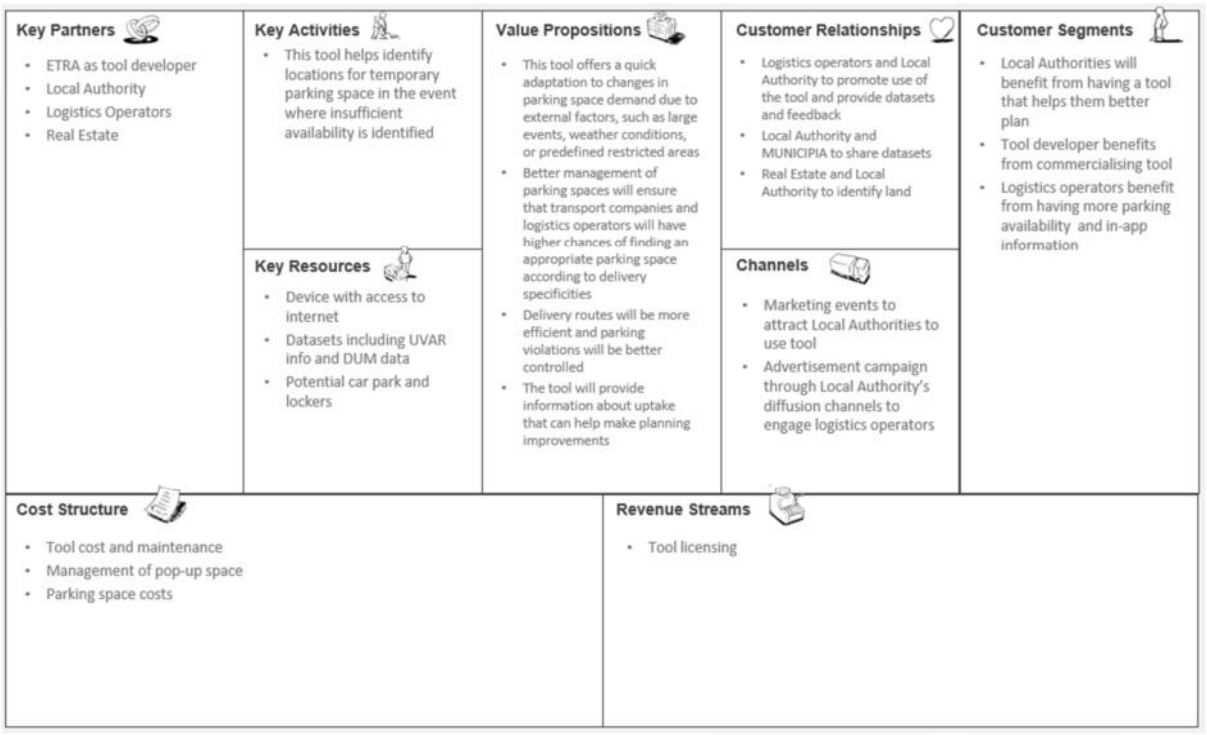

Figure 15 – KER10 Business Model Canvas

In a similar way to KER9, KER10 has the exploitable aspect that it can be combined with other services to provide a more holistic monitoring service for both local authorities and logistics operators. Specifically, KER10 accounts for the fact that urban contexts often have to adapt to unexpected events, providing a quick and reliable solution to keep urban freight processes in place despite eventualities.

KER11 – Logistics operator monitoring system and incentives tool

This KER includes two tools. The tool, developed by Municipia will provide an urban logistics monitoring and rewarding management platform to enable public authorities to manage a 'reward based' policy by defining restricted zones and regulations and by awarding or penalising logistics operators on the basis of different factors to address the 'polluter pays'

principle (i.e. vehicle emissions and dimension, duration of the stay in L/U bay, time window used, compliance with the itinerary allowed in the permit, etc.). The platform will also support public authorities in evaluating the performance of logistics operators in complying with regulations, rules, and guidelines.

The tool will enable cities to create sustainability recognitions and offer policy incentives, which will vary based on the size of deliveries. This functionality will be crucial for promoting environmentally friendly practices and optimising urban logistics. Logistics operators, once logged in, will have access to a reward dashboard where they can view behaviour information, reward criteria, and acquired rewards.

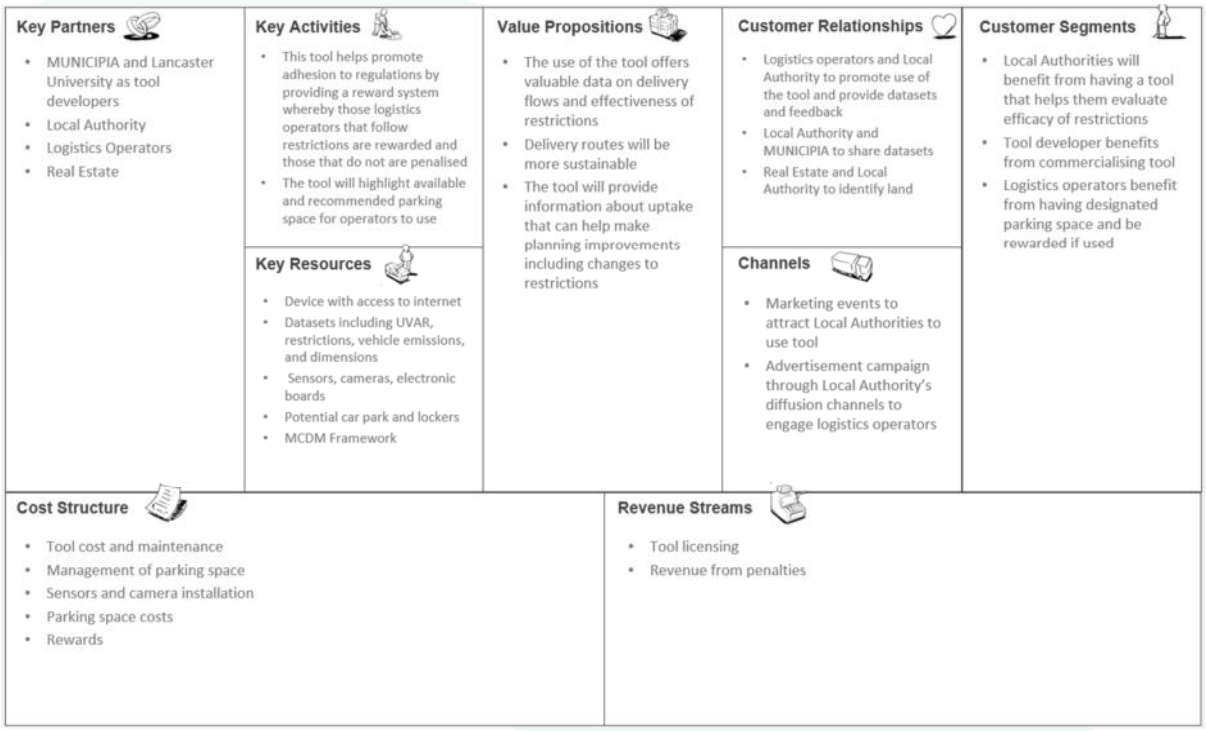

Figure 16 – KER11 Business Model Canvas

KER11, given that it directs logistics companies to designated car parks, can be exploited together with services such as KER10 and KER9. The specific characteristic of the reward system can strongly incentivise logistics operators to implement more sustainable delivery choices.

KER 11 also includes the MCDM Framework for ULOs developed by ULANC.A self-standing, strategic tool that allows local authorities to assess the adherence to regulations of ULOs. This is also a particularly exploitable feature for policymakers to develop incentive/disincentives schemes and obtain useful information for assessing ULOs.

KER12 – Cargo Connect: Congestion forecasting and safe route planning

The tool, developed by VMZ, is a routing service with a focus on operational efficiency and safety. This service will include route planning and optimization between delivery points, allowing cargo bike riders or delivery vehicle drivers to input the start, end, and potentially via points of a delivery route along with relevant information. The application generates optimised routes between these points, considering factors such as road conditions and congestion, as specified in collaboration with partner cities. With route optimization and real-time tracking capabilities, cargo bike riders or vehicle drivers can navigate the city efficiently, avoiding traffic and congested areas.

The tool will include advanced predictive models to forecast traffic behaviour under given circumstances (weather, month, day, road works or other external conditioning factors) and feed logistic operators routing tools with enriched information to optimise their delivery and pick-up routes. Moreover, the service will rely on static and dynamic information to compose safe freight routes and will inform the logistic operator of the streets to be avoided due to their proximity to vulnerable areas (e.g. school) or due to random incidents (e.g. accidents, abnormally high flow of people, etc.) advising the operator to use alternative routes with lower risk.

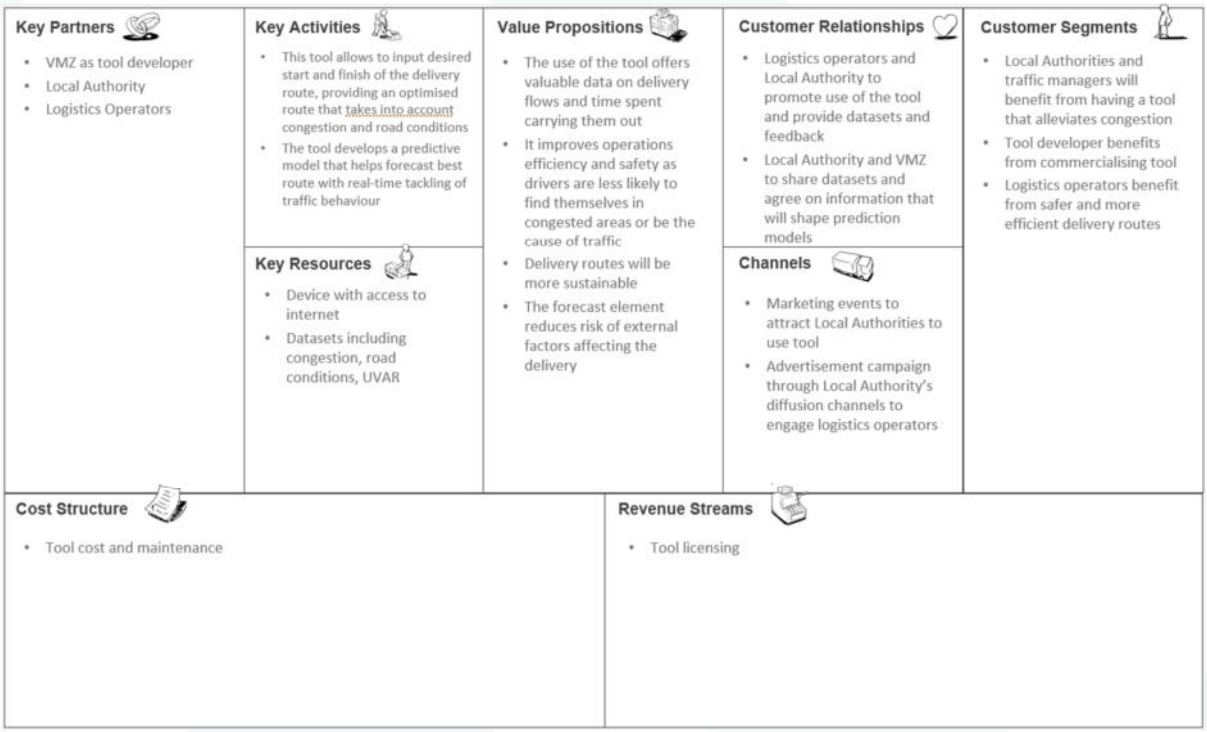

Figure 17 – KER12 Business Model Canvas

KER12's main differential and exploitable aspect is that is provides a safer route option for transport companies and logistics operators, which overall promotes healthier urban environments for everyone. As it is only a virtual tool, it is relatively easy to implement and can be used together with logistics' operators existing networks. The forecast element is highly valuable in terms of the reduction in congestion that it would promote.

KER13 – Advanced Management IT Cockpit of Shared Facilities

The tool, developed by ETRA, will support in the management of shared facilities by monitoring and providing control over parking spaces using cameras to identify parked vehicles. It will include a reservation system to monitor and address misuse of designated parking zones. Operators will have the capability to check the status of parking lots in real-time, allowing for efficient and informed management. Additionally, the tool will define zones for each parking lot, providing better organization and streamlined operations.

Operationally, the system will maintain a whitelist of car plates to verify vehicle access permissions for parking lots. This feature will ensure that only authorised vehicles can park and will also enable the addition and removal of car plates from the whitelist, providing flexibility and control over parking access. Furthermore, the tool will integrate logistics information into city data dashboards, facilitating better data sharing and city planning. Interoperability with existing systems will be ensured, allowing for seamless integration and operation within current frameworks.

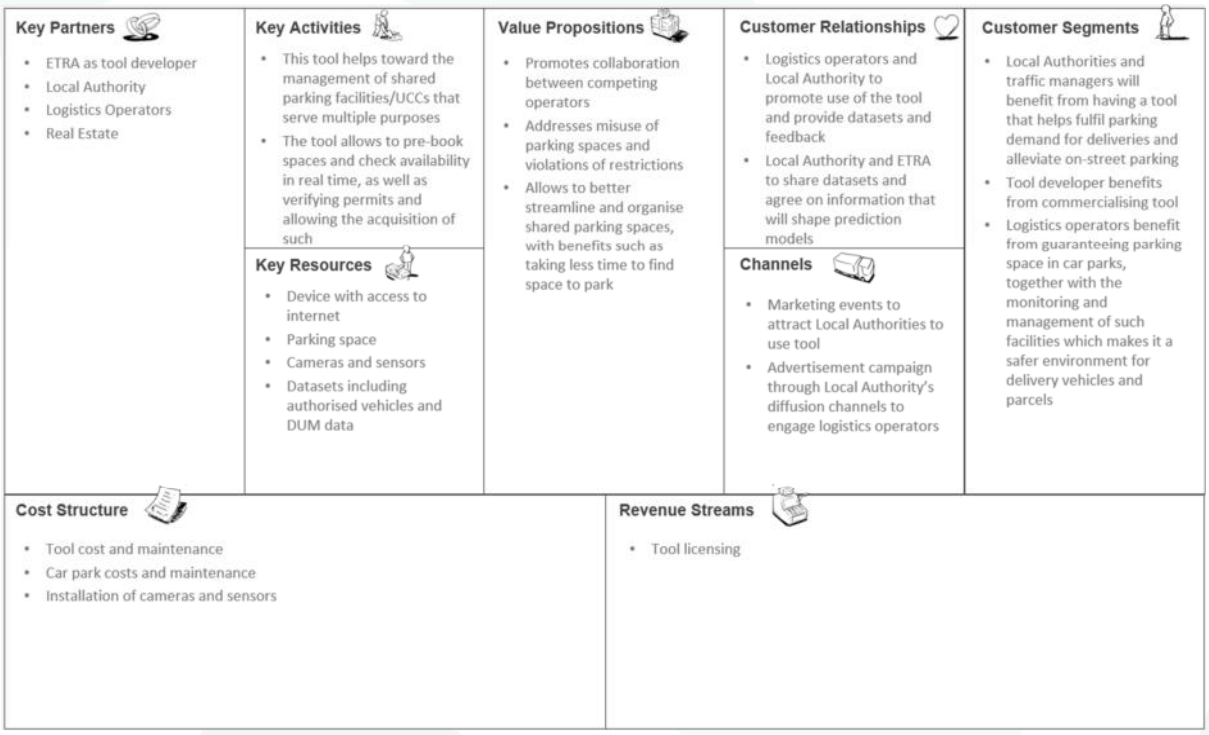

Figure 18 – KER13 Business Model Canvas

In this initial assessment, KER13 seems to be one of the most exploitable services as it encompasses several functionalities that other KERs have, creating a rounder service that has added value. The service helps to monitor and support delivery processes of all types, promoting streamlined processes that reduce stress on street parking and enhance collaboration between competing businesses.

4.3 First definition of use cases and first city model canvas

This section includes the definition of the different use cases of UNCHAIN where the different KERs will be tested. Each of the business model in each of the three use cases is compiled in a Mission Cities Canvas, in which the main components for the solutions tested are shown.

Table 3 – List of KERs and the Use Cases where they will be piloted

List of KERs & Use Cases				
KER nº	**Name of the KER**	**Living Lab**		
		Madrid	**Florence**	**Berlin**
KER1	Data-driven urban logistics cooperation framework			
KER2	SUMPs and SULPs guidance tool			
KER3	Freight-efficient land use strategy			
KER4	UCC location and integrated planning KIT	Use Case 1	Use Case 1	Use Case 3
KER5	On-street loading zones planning tool		Use Case 1	
KER6	Active UVARs and city regulations tools		Use Case 3	Use Case 1
KER7	Knowledge powerhouse for urban logistics			
KER8	Dynamic curb side management	Use Case 3	Use Case 1	
KER9	Dynamic management of pick-up/drop-off points		Use Case 1	
KER10	IT Pop-Up delivery points management tool	Use Case 1		
KER11	Logistics operator monitoring system and incentives tool		Use Case 3	
KER12	Congestion forecasting and safe route planning	Use Case 2	Use Case 2	Use Case 2
KER13	Advanced Management IT Cockpit of Shared Facilities	Use Case 1	Use Case 1	

It is noted that highlighted KERs that do not have a Use Case written on them are cases where the service will be tested but not piloted.

4.3.1 Madrid Living Lab

Madrid Use Case 1: Promotion and optimisation of shared transport facilities

This use case looks to test the **CLICK_LOG (KER4) tool** for urban planners to support them in identifying the best location for urban consolidation centres (UCCs). The tool will be tested by

Madrid's City Council together with the local transport company EMT, and VMZ. KPIs that will measure the impact of this tool include the number of UCCs, platforms, hubs, and lockers, as well as the number of loading/unloading areas, and the amount of public space designated to urban logistics. The location will focus on the city's centre.

This use case will also test the **IT Pop Up Delivery Management (KER10)** and the **IT management of shared facilities (KER13)**. In this case, DHL and EMT in partnership will test both KERs to identify and deploy pop-up delivery points and manage shared logistics facilities. For the pilot to work, a DHL customer, delivery person, and logistics planner are needed, together with the parking manager of EMT's car park in Avenida Portugal. Involving such stakeholders allows for the required resources – such as data sets and user profiles – to be provided, which makes the testing of KERs more achievable. KPIs that will be taken into consideration to measure impact include customer satisfaction, time spent finding parking space and loading and unloading areas, distance travelled by commercial vehicles, parking occupancy, and the carbon footprint of deliveries.

Madrid Use Case 2: Efficient and safe urban logistics

This second Madrid use case looks to test **congestion forecasting and safe route planning (KER12)** around Madrid's metropolitan area. This forecasting allows to plan safe routing for delivery services, obtaining real-time updates and developing predictive models. The test is set to be carried out by Madrid City Council, VMZ, and DHL, and the KPIs measured to test the impact include the distance travelled by commercial vehicles, loading and unloading times, the time spent per delivery, and the carbon footprint of deliveries. This is a tool designed by logistics planners to optimise routes, allowing to choose the route start and finish.

Madrid Use Case 3: Dynamic and efficient curbside management

The final Madrid use case will test **dynamic curb side management (KER 8)**. Different uses will be deployed for parking spaces, including space for logistics operations, as well as for residents with special needs, such as disabled people. Both residents and logistics companies will test space availability using pre-installed sensors and electronic boards. Impact will be measured by considering parking time windows for logistics companies, parking space availability, number of soft violations (i.e. parking on double lanes), percentage of freight vehicles in movement, and traffic and noise pollution indicators. The location is set to be in Paseo del Marqués de Zafra.

Mission Statement: To promote and increase logistics microhubs, including intermodal parking spaces

Key Partnerships

Transport companies: EMT

Local Authority: Ayuntamiento de Madrid

Logistics operators: DHL

Service Providers: VMZ, ETRA, IBV

Real estate

Key Activities

Consolidation of car park and curbside management and route optimisation, together with the allocation of additional parking facilities if necessary

Key Infrastructure and resources & key regulatory framework

- SUMP and LEZ implementation
- Madrid 360 strategy
- DUM
- Climate City Contract
- Cameras and sensors
- Datasets
- Car park and lockers
- Device with internet access

Value Proposition

Improved management of urban freight distribution processes, allowing for more sustainable and efficient last-mile deliveries

Identification of optimal location for UCCs and intermodal parking spaces

Useful assessment of implementation of SUMP and LEZs through real-time forecasts and predictive models that can allow to update regulations accordingly

Promotion of flexible uses so facilities can be adapted in case of external factors, such as large events

Buy-in & Support

Transport companies and logistics operators need to be incentivised to use facilities and to work cooperatively

Deployment

Cooperation agreements between competing companies need to be reached

Logistics microhubs need to be set up in LEZ fringes, with a smart booking system for loading bays and lockers

Local authorities can monitor vehicle permits and allocate or remove new vehicles to list

Beneficiaries

Logistics operators will be able to carry-out last mile delivery in a more efficient and sustainable way

Residents will see a decrease in congestion and pollution

Local Authority will be able to assess changes needed and monitor the implementation of regulations

Budget cost structure

- Car park rental and maintenance
- Personnel costs
- Lockers
- Delivery vehicles

Revenue streams

- Logistics operators booking car and locker spaces

Environmental costs

None

Environmental benefits

- Greener last mile logistics
- Less noise pollution

Social risks

- Lack of acceptance and trust
- Low uptake

Social Benefits

- Less congestion
- More safety for drivers and residents
- Possibility of allocating curbside parking spaces for alternative social uses, such as disabled parking
- Less illegal parking

Figure 19 – Madrid City Mission Canvas

Summary:

The main distinguishable aspect of the Madrid Living Lab is that it has identified a shared facility location where several KERs can be implemented simultaneously, which would allow to achieve a more holistic solution for urban logistics that encompasses several challenges and develops shared solutions. The use of EMT-owned cark parks and DUM data demonstrate how public facilities can be used collaboratively by competing transport providers to achieve more efficient last-mile logistics. However, it is important to note that this facility has been an option thanks to the involvement of Madrid's main transport operator EMT, together with big-player DHL. Other Living Labs such as Berlin have found it more difficult to find an adequate location to test the KERs due to not having a logistics and transport provider as part of the cluster.

Furthermore, the Madrid car park is also considered to be an optimal share facility to test the KERs given that it achieves to reduce urban pollution, it does not detriment urban aesthetics, it increases safety, allows to use urban public spaces for other civic uses, and it reduces pressure on urban congestion and on the issue of over-density in the city centre. It will also help providers and transport companies to comply with the newly installed low-emission zone regulations by placing these shared facilities around the perimeter of the UVAR zone.

4.3.2 Florence Living Lab

Florence Use Case 1: Services for urban planning and space management

Florence's Use Case 1 combines the most KERs out of all use cases, including KER4, KER5, KER8, KER9, and KER13. In terms of KER4, it will test the **CLICK-LOG (KER4) tool** for urban planners to support them in identifying the best location for urban consolidation centres (UCCs) within regulated city centre areas. The tool will be tested by Florence City Council planners together with VMZ. KPIs that measure the impact of this tool include the number of UCCs, platforms, hubs, and lockers, as well as the number of loading/unloading areas, and the amount of public space designated to urban logistics.

KER5 will test a planning tool for on-street loading zones together with **KER8, which studied curb side management**, both services developed by ETRA. Different uses are to be deployed for parking spaces, including space for logistics deliveries, as well as for residents with special needs, such as disabled people. Logistics planners will test and monitor space availability using pre-installed sensors and electronic boards. Impact was measured by considering parking time windows for logistics companies, percentage of freight vehicles in movement, carbon footprint, and parking occupancy. The pilot is due to take place in the surroundings of Sant'Ambrogio car park.

KER9 will test the management of pick-up/drop-off points in car parks, a service developed by MUNICIPIA. The tool also allows to pre-book car park spaces, and to combine the transhipment in car parks with different types of last-mile delivery vehicles, such as cargo bikes. Logistics company UPS, together with Florence's City Council are needed to test the tool and provide feedback, likely to be in the Sant'Ambrogio underground car park. Impacts to be

measured include car park occupancy, customer satisfaction, distance travelled by delivery vehicle, time spent parking and finding loading and unloading areas, and the carbon footprint.

This use case also tests the **IT management of shared facilities (KER13)**, another service developed by ETRA. In this case, Florence City Council will book parking spaces for logistics operators to access the area at a given time window. Access to the area is controlled through cameras and sensors, which are the only required resources . This tool will be tested by UPS in the Sant'Ambrogio market area. The impacts will be measured through customer satisfaction levels, distance travelled by delivery vehicle, time spent finding parking space, time spent in loading and unloading areas, and the carbon footprint, as well as parking spaces occupancy.

Florence Use Case 2: Services for efficient and safe operations

Use Case 2 in Florence will solely test **KER12, which is a congestion forecasting and routing service** with a focus on operational efficiency and safety. This service is due to be piloted in Florence's city centre, being tested by UPS technicians and drivers. The KPIs established to measure this service's impacts are distance travelled by delivery vehicle, loading and unloading time, time spent per delivery, car park occupancy, and the carbon footprint of deliveries. Different datasets are required for the pilot to work, including UVAR information and loading and unloading status data.

Florence Use Case 3: Advanced services for monitoring and communication

Florence's Use Case 3 has two usage cases, the first tests KER6 by itself and the second one tests KER11, as no feasible scenario was identified to test both simultaneously.

KER6 looks to test active UVARs and city regulations tools. Delivery operators use the tool to enter areas within Florence city centre restricted by low emission zones. The tool also provides a suggestion on the optimal route. Delivery times are recorded through the tool so performance can be assessed, and in addition, city officials receive data on accesses and permits to the low emission zone. The impacts will be measured through analysing the time spent per delivery, distance travelled by delivery vehicle, time spent finding a parking space, time spent loading and unloading, and the carbon footprint.

The self-standing MCDM framework for UVARs will be used to strategically to assess alternative UVARs to overall improve the logistics and mobility system.

KER11, on the other hand, looks to test a logistics operator monitoring system together with and incentives tool. The monitoring system is mostly to identify the location of pre-booked car parks for deliveries. In exchange, the local authority rewards logistics operators if they use the car park and share delivery data. This service tool developed by Municipia is tested in Florence's city centre by UPS and the City Council. The impacts will be measured according to

time window use for delivery, distance travelled by delivery vehicle, time spent finding parking spaces, time spent loading and unloading, and the carbon footprint.

The self-standing MCDM framework for ULOs will be used to strategically assess the performance of ULOs in adhering to city logistics and mobility regulations.

Mission Statement: To improve traffic congestion by addressing freight operations in Florence's city centre

Key Partnerships
- Logistics Operators: UPS
- Local Authority: Florence City Council
- Real Estate
- Service Providers: MUNICIPIA, ULANC, ETRA, VMZ, IBV

Key Activities
- Identification of optimal location for UCCs and their implementation together with IT services
- Identification of new loading and unloading areas, in both car parks and on the curbside, to be replicated elsewhere
- Analysis of real-time data to assess success of regulation implementation
- Management of access and control into restricted zones
-

Key Infrastructure and resources & key regulatory framework
- SUMP, SULP and LEZ implementation
- Smart City Plan
- Climate City Contract (2023)
- Green City Accord (2021)
- Cameras, UVAR infrastructure
- MCDM Framework
- Car parks
- Device with access to internet

Value Proposition
- Improved management of urban freight distribution processes, allowing for more sustainable and efficient last-mile deliveries
- Identification of optimal location for UCCs and intermodal parking spaces, as well as promotion of dynamic uses according to varying needs
- Useful assessment and monitoring of implementation of SUMP and LEZs through real-time forecasts and predictive models that can allow to update regulations accordingly
- Address the pressure on Florence City Centre as a UNESCO world heritage site

Buy-in & Support
- Transport companies and logistics operators need to be incentivised to use facilities and to work cooperatively
- Metropolitan Area needs to work together with Local Authority for measures that extend beyond Florence's fringes

Deployment
- Cooperation agreements between competing companies need to be reached
- Through the digitalisation of regulations, local authorities can monitor vehicle permits and allocate or remove new vehicles to registry, together with enforcing better management through pre-bookings, availability alarms, and check-in and check-out processes
- Delivery window times to be readjusted to release stress during peak hours through route optimisation and through a reward systems for operators who adhere

Beneficiaries
- Logistics operators will be able to carry-out last mile delivery in a more efficient and sustainable way
- Residents will see a decrease in congestion and pollution and will benefit from public money being diverted toward social uses other than logistics infrastructure improvements
- Local Authority will be able to assess changes needed and monitor the implementation of regulations
- Both residents and delivery companies will benefit from safer routes

Budget cost structure
- Car park maintenance
- Personnel costs
- Lockers and Delivery vehicles
- Cameras and sensors
- Rewards

Revenue streams
- Logistics operators booking car and locker spaces
- Penalties from companies not adhering to regulations

Environmental costs
None

Environmental benefits
- Greener last mile logistics
- Less noise pollution

Social risks
- Lack of acceptance and trust
- Low uptake
- Logistics operators might see using these apps as extra work and effort

Social Benefits
- Less congestion
- Possibility of allocating curbside parking spaces for alternative social uses, such as disabled parking
- Less illegal parking

Figure 20 – Florence City Mission Canvas

Summary:

In a similar fashion to the Madrid Living Lab, Florence makes use of centric car parking spaces to pilot several of the KERs and target as many challenges as possible through shared solutions. This is of particular importance in the case of Florence because its city centre is a designated UNESCO world heritage site and the need to address the pressure on the city centre is pertinent. Using existing car park facilities will alleviate congestion, decrease pollution, improve the centre's aesthetics, create safer environments, and allow for alternative public space uses. The choice of KERs also looks to incentivise transport and logistics operators to abide by the UVAR regulations, identifying options for them to be able to follow such restrictions. At the same time, it looks to create solutions for other mobility challenges, such as parking facilities for vulnerable residents. The strong focus on flexible and adaptative uses depending on location and time of day promotes a creative approach that may lead to multiple solutions in one.

4.3.3 Berlin Living Lab

Berlin Use Case 1: Active UVARs and city regulations

Berlin's Use Case 1 focuses solely on **KER6, which seeks to test tools for active Urban Vehicles Access Regulations**. It will be a tool to improve the communication between Local Authorities and logistics operators about traffic and parking restrictions. Delivery people get access to controlled areas and receive suggestions on the optimal route, which logistics operators then assess to review best delivery performance. That data is also shared with Local Authority planners so they can manage access to regulated areas. The MCDM framework for UVARs within this KER will also be used to strategically assess alternative UVARs to improve the overall logistics and mobility system. The KPIs measured to assess impact are time window spent delivering, distance travelled by delivery vehicle, time spent finding a parking space and loading and unloading bays, and the carbon footprint. However, it is noted that matters regarding data sharing and permits are still being defined by partners, with more detailed information provided in the next round of review.

The self-standing MCDM framework for UVARs might be used to strategically assess alternative UVARs to improve the overall logistics and mobility system.

Berlin Use Case 2: Congestion forecasting and advanced route planning

Berlin's Use Case 2 is also solely limited to piloting a single KER, which in this case is **KER12, looking to test congestion forecasting and safe route planning for cargo bikes**. Logistics operators, small businesses or municipal companies use the tool to plan routes around the city centre to deliver services or goods, obtaining real-time updates when the delivery people are in route. This tool, developed by VMZ, will be measured according to distance travelled by

delivery vehicle, loading and unloading times, time spent per delivery, and the carbon footprint.

Berlin Use Case 3: Services for urban planning and space management

The final Berlin use case is due to test **KER4, which refers to the CLICK-LOG tool**, a service for urban planners to help find the optimal location for micro depots. Impacts will be measured according to the number of micro depots, number of loading and unloading areas, and the amount of public space dedicated to urban logistics. However, it is not confirmed that these KPIs will be the ones used to measure impact nor which types of datasets will be necessary for the pilot to work.

Current discussions are being held between partners involved in Berlin's Use Case 3, wherein the possibility of including **KER5** in the pilot is being considered as an option.

Mission Statement: To establish new processes and structures for urban freight logistics, including the digitalisation of regulations

<table>
<tr>
<td rowspan="2">Key Partnerships

• Local Authority: Senate Department for Urban Mobility, Transport, Climate Action and the Environment

• Logistics operators

• Service Providers: VMZ, IBV, MUNICIPIA

• Real estate</td>
<td>Key Activities

• Identification of optimal location for micro depots
• Identification of loading zones needs
• Identification of safe and efficient planned delivery routes for cargo bikes</td>
<td rowspan="2">Value Proposition

Improved management of urban freight distribution processes, allowing for more sustainable and efficient last-mile deliveries and addressing uncontrolled freight traffic

Assessment of SUMP and SUMP to identify improvements and follow evidence-based recommendations

Promotion of knowledge transfer and comparative analyses through the dissemination of land use strategy guidebooks</td>
<td>Buy-in & Support

Residents need to be informed about initiatives to assess their support</td>
<td rowspan="2">Beneficiaries

• Logistics operators will be able to carry-out last mile delivery in a more efficient and sustainable way through route optimisation
• Residents will see a decrease in congestion and pollution
• Local Authority will be able to assess changes needed and monitor the implementation of regulations
• Private businesses may see a growth in their e-commerce</td>
</tr>
<tr>
<td>Key Infrastructure and resources & key regulatory framework

• SUMP
• SULP</td>
<td>Deployment

Optimisation of delivery routes, shared facilities management, identification of optimal micro depots location and loading zones needs, and increasing the attractiveness of cargo bikes for goods and services delivery</td>
</tr>
<tr>
<td colspan="3">Budget cost structure
• Licensing
• Handbook development</td>
<td colspan="2">Revenue streams
• Long-run cost saving on issues caused by uncontrolled freight traffic</td>
</tr>
<tr>
<td colspan="3">Environmental costs
None</td>
<td colspan="2">Environmental benefits
• Greener last mile logistics
• Less noise pollution</td>
</tr>
<tr>
<td colspan="3">Social risks
• Lack of acceptance and trust
• Low uptake</td>
<td colspan="2">Social Benefits
• Less congestion
• More safety for drivers and residents
• Possibility of allocating public space for alternative social uses
• Less illegal parking</td>
</tr>
</table>

Figure 21 – Berlin City Mission Canvas

Summary:

In a different fashion to the other Living Labs, Berlin has a more narrowed focus on optimising delivery journeys specifically. The KERs chosen to pilot, focus on improving the efficiency of these deliveries by identifying parking spaces, optimal location for micro depots, and identify regulated areas. The fact that the focus is narrower suggests that an appropriate solution may be feasible as there are less challenges to address. However, it is important to highlight that the Berlin Living Lab does not have an established location to test the services, nor does it have all necessary stakeholders involved in the cluster, which will make it harder to identify the best solutions to meet all stakeholders' needs. Nonetheless, the choice of KERs seeks to improve the communication and shared work between the local authority and logistics operators.

4.4 Partners to be analysed for exploitation

This field includes information of each partner responsible for the development and exploitation of each service.

4.4.1 ETRA

ETRA is responsible for developing and exploiting the following services:

- KER1 – Data-driven urban logistics cooperation framework (ETRA)
- KER5 – On-street loading zones planning tool (ETRA)
- KER8 – Dynamic curb side management (ETRA)
- KER10 – IT Pop-Up delivery points management tool (ETRA)
- KER13 – Advanced Management IT Cockpit of Shared Facilities (ETRA)

ETRA's customers are typically public authorities and large companies who use our large-scale real-time traffic and mobility systems and information management services to run complex infrastructures. UNCHAIN will enable ETRA to further develop its market niche composed of local governments, public transport authorities and operators. This will allow ETRA to incorporate to its portfolio of mobility services for public authorities extended functionalities and be at the vanguard of the sustainable mobility solutions and integrated management systems towards climate-neutral cities in Europe. Moreover, UNCHAIN will allow complementing the transport and urban mobility services that ETRA currently provides.

4.4.2 VMZ

VMZ is responsible for developing and exploiting the following services:

Funded by the European Union

- KER2 – CLICK Act (SUMPs and SULPs guidance tool)
- KER4 – U-CLICK: UCC location and integrated planning KIT
- KER12 – Cargo Connect - Congestion forecasting and safe route planning

UNCHAIN will make an important contribution to the VMZ in evaluating the Integrated Urban Logistics Concept (IWVK), which as a subordinate planning document concretizes the Urban Development Plan Mobility and Transport (StEP MoVe) for the short- and medium-term planning horizon of the City of Berlin. The evaluation is intended to help reconcile the increasing demands on functionality and flexibility of urban logistics with the requirements of maintaining or increasing urban environmental, surrounding and quality of life.

4.4.3 MUNICIPIA

MUNICIPIA is responsible for developing and exploiting the following services:

- KER6 – Active UVARs and city regulations tools
- KER9 – Dynamic Management of Pick-up/Drop-off Points
- KER11 – Logistics operator monitoring system and incentives tool

Engineering Group, a global IT player in the digital transformation sector is involved in UNCHAIN through Municipia. Within UNCHAIN, Municipia aims at advancing and test its smart solutions for the city logistics and will expand its market share in the EU mobility market and incorporate the knowledge, experience and technology developed within the project in its portfolio of Smart Mobility solutions for municipalities and municipal agencies. Thus, UNCHAIN is a relevant opportunity to diversify its Digital Transformation offer for cities and to strengthen the collaboration with the municipality of Florence, a partner/customer of Municipia.

4.4.4 Lancaster University

Lancaster University aims to develop and exploit the MCDM Framework for UVARs within KER6, and the MCDM Framework for ULOs in KER11. ULANC is a leading academic research institution, in the **top 150 universities in the world**, according to the QS World University Rankings 2025. It is ranked 141st among 1,503 universities across 106 countries and regions. The Centre for Transport and Logistics (CENTRAL) which works on the development of the MCDM Frameworks for UVARs and ULOs, is part of the Lancaster University Management School (LUMS) which was ranked first in the UK in terms of its Research Power and Research Environment, in the 2021 Research Excellence Framework.

The UNCHAIN project results will contribute to Lancaster University's:

- enhancement of the content of academic modules related to Logistics and Supply Chain Management
- potential to compete for National Research Funding and European Funding

- capacity to engage with key transport and logistics stakeholders, including local and national governmental organizations, logistics operators, and non-governmental organizations (NGOs)
- research and practice impact.

4.4.5 UPS

UPS will be actively involved in the testing of different following KERs and might be interested on their adoption once the project finalises.

As a company moving 3% of the world's GDP every day, UPS is at the forefront of achieving sustainable mobility that can answer to the fast-changing needs of its customers. UPS's envisages a smart logistics network with advanced technology vehicles and structures, including consumer access points that simplify the management of home deliveries to reduce emissions, powered by its fleet of alternative fuel vehicles. By participating in UNCHAIN, UPS would benefit in terms of further executing its sustainability goals, with focus in the Florence historic city centre.

4.4.6 DHL

DHL will be actively involved in the testing of different following KERs and might be interested on their adoption once the project finalises.

DHL expects from UNCHAIN project to improve the last mile delivery leg. Project outcomes will help to overcome some barriers encountered in big cities that make more complicated to execute this last part of the logistics process. DHL by its own would not be able to push some policies, urban organization, etc which will support a more efficient and optimized last mile delivery.

4.4.7 IBV

IBV is responsible to develop and exploit KER3 – Freight efficient land use handbook.

IBV will improve and adapt their methodologies to capture the voice of relevant stakeholders. These methodologies will be applied in the design, creation, and assessment of services in the Smart City environment, thus allowing us to offer better advice to public and private entities innovating in this market. UNCHAIN project will allow IBV to strengthen their reference position in the application of Citizen Science methodologies: inclusive methodologies, social innovation, co-creation, user-centred design. In general, UNCHAIN results, and the 'Land Use for Efficient Logistics Guidance', will enable IBV to provide practical solutions to Smart City ecosystem stakeholders in their influence area.

4.4.8 EIT-UMF

EITUMF is responsible to develop and exploit KER7 – Knowledge Powerhouse for urban logistics.

UNCHAIN results will inform future EITUM activities under its Innovation, Business Creation and Academy programmes. Knowledge/findings can be fed into new/existing courses/capacity building trainings. Spin-offs (transferability and scaling-up of the UNCHAIN solutions) can be promoted through entrepreneurship activities. Visibility of UNCHAIN solutions with a relevant market potential can be increased by facilitating their inclusion in the EITUM MarketPlace and in the Tomorrow Mobility event. The guidelines/recommendations for policy makers developed in UNCHAIN will be shared through the EITUM cities' network. A liaison with the NetZeroCities project will be encouraged so cities can benefit from UNCHAIN solutions in its journey towards climate neutrality.

5 Conclusions and next steps

Throughout the first eighteen months of the UNCHAIN project there have been some preliminary results that have aided in the initial development of exploitation plans and business models. These have taken into consideration the framework developed by SPES for Task 7.1. It comprised evaluating and comprehending the business environment in which a project, service, or product is situated, as well as conducting market research and monitoring. The framework used a PESTEL analysis together with a Poster Fiver Forces analysis, and a SWOT analysis.

These initial developments showcase a preliminary Business Model Canvas for all exploitable services, including a thorough definition of each service being tested, listing their main objectives together with the resources and stakeholders needed for the service to be tested in each of the three Living Labs. 11 out of 13 services have been identified as exploitable based on the value contributions to the UNCHAIN ecosystem together with key partnerships.

Secondly, an initial explanation of each of the Living Labs' Use Cases has been detailed. The Living Labs have several use cases, some of them testing a service independently and others testing the integration of several services. As a result, it was deemed that for this initial evaluation, a City Mission Canvas for each Living Lab encompassing all use cases, was the best approach given the limited results at this initial stage. As such, one City Mission Canvas has been developed for both Madrid, Florence, and Berlin, providing a more holistic and differential approach as opposed to the conventional Business Model Canvas. In general terms, those services that are being tested in conjunction seem to have more value than those being tested alone, given their likelihood of developing a holistic scenario that can address several issues at once. It is noted that the exploitability results are only preliminary and will be updated as the project develops.

In terms of next steps, there will be two more updates done to this deliverable once the second mid pilot and third mid pilot take place. After those pilots, the preliminary results mentioned above will be further developed and detailed in accordance with the outcomes of each of the use cases. The current version of Business Model Canvases and City Mission Canvases will be validated by the relevant stakeholders to indicate whether they are viable, attractive, and economically sustainable.

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