DESTINATIONS

Measure Evaluation Results

LPA 5.1 - D4 Service: The Smart Distribution System

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Executive Summary

The Sustainable Urban Logistics Plan (SULP) of Las Palmas de Gran Canaria (measure LPA 5.2) identified the strengths and weaknesses of urban freight in the city. Amongst the weaknesses, the SULP identified a poor degree of digitisation among the local freight companies and a lack of information about last mile deliveries.

The D4Service solution (https://www.d4service.com/Home/QueEsD4Service.aspx) was the initial step to overcome these problems, by providing a smart distribution system to small local businesses in order to make urban delivery processes more efficient. It is a mobile App which organises delivery routes automatically and allows real-time communication with customers.

Amongst others, the main advantage of the D4Service for local freight companies is that it allows businesses to organise the distribution process beforehand and react in real time to changes that might occur during the day. Moreover, it does not require new infrastructure and optimises existing resources, making management and delivery costs cheaper.

After carrying out a pilot test which lasted between 2017 and 2018, the D4Service was improved and modified according to stakeholders' and the Municipality's requirements. The service has been fully operational since Summer 2019.

The results of this measure were evaluated through operational data provided by the company in charge of the App. Its acceptance level was evaluated as the number of customers that were using the app for their deliveries, which was 1,732, more than expected at the beginning. Moreover, the main goal of delivery companies was to deliver more parcels, and reduce the fuel consumption per kilometre. In this sense, companies using the D4Service App had an 8.6% average increase in the number of parcels delivered, and a reduction of 4.7% in fuel consumption. In conclusion, the D4Service App developed in this measure allowed deliveries to be optimised and thus, it contributed to a reduction in fuel consumption.

One of the main barriers related to the measure implementation was the fact that urban logistics is a competitive sector and the stakeholders involved were usually reluctant to share data. The data used in this document was provided by Inelcan, the developer of the app.

Concerning the lessons learnt with this measure, the most important is that local stakeholders (in this case logistic stakeholders) should be involved from the very early design stages of the app, in order to be able to include the features that are useful and necessary.

A Description

This measure was developed as a result of the Action Plan from the Sustainable Urban Logistics Plan (SULP) of Las Palmas de Gran Canaria (measure LPA 5.2). This SULP identified the weaknesses of the urban freight system in the city, and one of them was the poor degree of digitisation within the local freight companies.

In this measure, Inelcan designed a Transport Management Software (D4Service) to improve urban freight management in the city of Las Palmas. D4Service contributes at the last stage of the supply chain (distribution) and helps local freight companies to have more effective management over their freight flows and increased efficiency throughout the distribution network.

The D4Service helps improve the management by providing a smart distribution system to small local delivery companies in order to make urban delivery routes more efficient. It consists of a mobile App which organises delivery routes automatically and allows real time communication with customers.

Before the app was launched to the general public, Inelcan carried out a pilot test in order to improve and modify the app according to the stakeholders' and the Municipality's requirements.

A1 Objectives and outputs

City policy level objectives

- Increase private transport effectiveness (by reducing traffic congestion and solving traffic problems)

Measure specific objectives

- Decrease number of freight vehicles in the inner city
- Optimising distribution within the urban area

Outputs

- Creation of a new ITS tool for freight management available for freight operators
- Pilot test for the new ITS tool before it was launched to the general public

Supporting activities

In order to share knowledge to design and develop the solution for urban freight, and to better fine-tune the app, collaboration was established between Inelcan (the start-up that developed the app) and with the research environment of Gran Canaria (University of Las Palmas de Gran Canaria).

A2 Inter-relationship with other measures

This measure is related to measure LPA 5.2 - *Urban Freight Solutions into SUMP* as the D4Service is an output of the Sustainable Urban Logistics Plan (SULP) that was drafted in that measure.

A3 Target groups and/or affected part of the city or region

This measure was targeted at freight transport companies which operate in Gran Canaria but can be used in order parts of the world.

A4 Stakeholders: CIVITAS project partners and other important actors

Stakeholder name	Activities description
Cluster Canario de Transporte y Logística	Cluster that brings together the leading companies in transport and logistics in the Canary Islands
FET - Federación de empresarios de transportes	The FET is the most representative business organisation of land transport in the Canary Islands. The FET is composed of industry associations that include companies of regular passenger transport, school transport, tourist transport, freight transport, machinery and construction, medical transport, taxis, rent a car and limousines

Table 1: Stakeholder involvement

B Measure implementation

B1 Situation before CIVITAS

Prior to DESTINATIONS, the growth in the amount of freight circulating within Las Palmas de Gran Canaria has increased congestion in recent years. This has had significant impacts on the urban centre and on the image of tourism by those that visit Las Palmas, due to the high levels of environmental pollutants and noise. Under such circumstances, there was a need to increase the efficiency of urban goods distribution and therefore reduce congestion, noise, and pollution.

B2 Innovative aspects

The D4Service provides the most optimal routes for carriers. The system manages the planning and routing for hundreds of shipments at once either by consolidating or pooling. The system can also manage multimodal transportation.

The new solution also allows the real-time exchange of shipment information between carrier, distributor, and customer thanks to its track & trace feature. Moreover, this allows regular and

competent sharing of shipment information across organisations through web-based access, increasing visibility, accuracy of tracking and monitoring, and efficient management & reporting.

B3 Research and technology development

The technology development part of this measure was the creation of the D4Service app itself. The research stage was the pilot test which was carried out in order to test the app before it was officially launched, to check it had all the features that local urban freight distribution stakeholders needed.

B4 Actual implementation of the measure

The development of the D4Service App started with the definition of the requirements for the mobile application by Inelcan, and in cooperation with the University of Las Palmas de Gran Canaria. With these inputs, Inelcan developed the App, with the objective of helping logistics companies to define more efficient delivery routes and thus reducing externalities in the city.

After this, a pilot test was carried out between 2017 and 2018, with the launch of the first prototype of the App. As a result of the pilot test, the D4Service was improved and modified according to the stakeholders' and the Municipality's requirements.
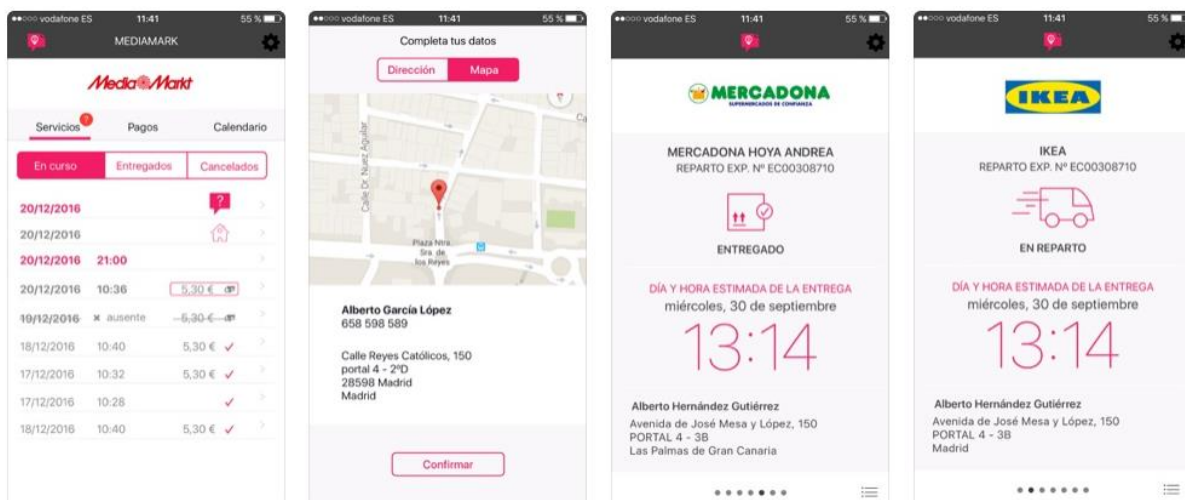

Figure 1: The mobile app D4Service (source: Inelcan)

The service has been fully operational since Summer 2019, with 1,732 customers using the app for their deliveries. This service can increase the number of parcels delivered while reducing the fuel consumption per kilometre.

In January 2021, the D4Service App was being used by more than 1,700 logistics companies, mainly in the Canary Islands and Las Palmas de Gran Canaria.

C Impact evaluation

C1 Evaluation approach

Expected impacts and indicators

Impact category	Impact indicator	Unit of measure
Society	1 - Acceptance level of the D4Service App	Nº
Transport	2 - Average load factor	%
Energy	3 - Vehicle fuel efficiency	%

Table 2: Expected impacts and indicators

Method of measurement

Impact indicator	Method *	Frequency			Target Group	Domain (demonstration area or city)
		Bef.	Dur.	After		
1 - Acceptance level of the D4Service App	DC	n.a.	n.a.	40	freight operators	Spain + Peru
2 - Average load factor	DC	n.a	n.a.	40	freight operators	city
3 - Vehicle fuel efficiency	DC	n.a	n.a.	40	freight operators	city

* (Data collection (DC), Estimation (E), Survey (S)

Table 3: Method of measurement

Detailed description of the indicator methodologies:

1. **Acceptance level of the D4Service App** – This indicator was measured considering the number of delivery vehicles that use the D4Service app. This information was provided by Inelcan, who keep track of how many users the App has. This number takes into account vehicles in Las Palmas de Gran Canaria, but also in the rest of the Canary Islands and Spain as well as Peru, as these are the countries where the app developed within this measure is currently being used. There was no baseline as the system was a new solution.

2. **Average load factor** – For this indicator, the variation in the average number of parcels delivered was considered compared to the baseline situation. A positive variation means an increase in the average number of parcels delivered by vehicles. This data was provided by Inelcan and obtained from their database from the App.

3. **Vehicle fuel efficiency** – This indicator was assessed considering the variation in the litres of fuel consumed per kilometre. A negative variation means there was a fuel saving thanks to the use of the D4Service. The data for the variation was also provided by Inelcan, obtained from their database. There was no baseline as the system was a new solution.

The objective of companies is to make the most of every vehicle, and this is why the intention is not to reduce the number of kilometres travelled but to increase them, at the same time as there is a reduction in the litres of fuel consumed per kilometre.

However, when it comes to fuel consumption, this is dependent on the type of vehicle (truck, light vehicle, van, etc.) as well as on the age of the vehicle. This is the reason why the only indicator that can be used for all of them at the same time is the variation in the consumption, not the absolute value of fuel consumption.

Finally, the average number of parcels delivered per day is a value with a high variance, as this depends on the type of parcels. This is the reason why the indicator chosen was also the variation and not the absolute value.

The Business-as-Usual scenario

Without this measure, many local freight distribution companies would still use their old tools and therefore not have improved their indicators (their load factor would remain the same as before, and they would not have savings in fuel consumption, etc.). The D4Service app offered them an opportunity to make their deliveries more efficient.

C2 Measure results

Impact category	Impact indicator	Unit of measure	Baseline	Ex-Ante	Ex-Post
Society	1 – Acceptance level of the D4Service App	Nº	0	1,500	1,732
Transport	2 – Average load factor	%	-	+5.0%	+8.6%
Energy	3 – Vehicle fuel efficiency	%	-	-3.5%	-4.7%

Table 4: Measure results

C2.1 Society

1 – Acceptance level of the D4Service App

The acceptance level of the D4Service App developed in this measure has been 15% higher than expected. In May 2020, 1,732 logistics vehicles were using the App. This mainly includes vehicles from logistics companies from Las Palmas de Gran Canaria, as well as some in the rest of Spain and Peru.

C2.2 Transport

2 – Average load factor

Concerning the benefits expected from this app for companies, the estimated values for indicators have been exceeded too. The D4Service App allowed an increase of 8.6% in the

average number of parcels delivered per day, meaning it helped logistics companies to plan more efficient and optimised routes.

C2.3 Energy

3 – Vehicle fuel efficiency

There has been a 4.7% reduction in the litres of fuel consumed per kilometre for the companies that used D4Service App. It should be taken into account that this is the average reduction of all vehicles, so the savings were different for each company, and could have been higher, depending on the type and age of vehicles used.

C3 Quantifiable targets

No	Target	Rating
1	Reduction of kilometres in freight vehicle (5%)	NA
2	Reduction of noise and emissions (7%)	★★★
3	Reduction in use of fossil fuels (5%)	★★
4	Decrease number of freight vehicles in the inner city (5%)	★
5	Increased satisfaction among customers about the quality of service (10%)	NA
NA = Not Assessed O = Not Achieved ★ = Substantially achieved (at least 50%) **★★ = Achieved in full ★★★ = Exceeded**		

Table 5: Assessment of quantifiable targets

Target 1 was not assessed. Deliveries in the inner city have been more efficient thanks to the D4Service, as the app allows for more efficient delivery management, and as a result there are more kilometers with fewer vehicles. The objective of the app was not to reduce the distance travelled but to make it more efficient, which can involve an increase of kilometers travelled.

Target 2 was Exceeded and Target 3 was Achieved in full. The D4Service resulted in a reduction in the use of fossil fuels because, as indicator *3 - Vehicle fuel efficiency* shows, there has been a reduction of 4.7% in the liters of fuel consumed per kilometer. Moreover, there was also a reduction in noise and emissions in the whole city by more than 7%, as can be observed in the "percentage of people troubled by noise" indicator[1]. This result was achieved through the implementation of several measures from the DESTINATINOS project, so several actions

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[1] see the "MER Introduction: Global Executive Summary and Common Indicators" document

contributed to reduce the number of people troubled by noise, including the D4Service. The evolution of this indicator during the project lifetime is presented in Table 6.

Baseline (2016)	2019
95% > 55dB, 37% > 65dB, 1% > 75dB	69% > 55dB, 13% > 65dB, 0.05% > 75dB

Table 6: Percentage of people troubled by noise

Target 4 was considered Substantially Achieved, as the "number of parcels delivered per day" indicator increased (as presented in section C2), implying that the same total number of parcels can be distributed with fewer vehicles. Therefore, the total number of freight vehicles in the city is likely to decrease. However, this was not specifically evaluated.

The satisfaction among customers about the quality of service in Target 5 has not been assessed. However, as the App allowed a reduction in consumption per kilometer and an increase in parcels delivered on average, it could be assumed that customers are satisfied with this tool. Moreover, as indicator *1 - Acceptance level* shows, more companies than expected (1,732) are already using the App, which also shows that customers are satisfied with the service.

C4 Up-scaling of results

As two of the three indicators presented above measure not the absolute value but variation, it is expected that the values would not suffer big changes if the app were to start being used by more logistics companies. However, the up-scaling of results would result in more companies benefiting from the advantages and therefore less fuel consumption and less noise and emissions in general in the city.

Nonetheless, it is expected that the average reduction of fuel consumption will decrease with time as the vehicles used for the deliveries will be newer and therefore more efficient over the years.

D Process Evaluation Findings

D1 Drivers

This measure is based on an Intelligent Transport System solution (a Transport Management System) that is already mature, and therefore users are familiar with it. The users of this new D4Service did not face big difficulties when it came to using the app.

D2 Barriers

Not involving all stakeholders from the very early design stages has led to the non-inclusion of some features in the app that would have been useful for them.

D3 Main Lessons Learned

The main lesson learned from this measure was that all solutions to urban freight problems should be aligned with the overall urban freight strategy of the city (the SULP). Besides this, the local partners realised the importance of engaging with local stakeholders from the early stages of measure definition, to identify their needs and requirements.

If there would be an opportunity to repeat the measure, local partners would try to involve public stakeholders from the very early design stages. That would have helped to include some features in the App that were aligned with the overall sustainable freight strategy of the city.

E Evaluation conclusions

The urban freight digital solution (D4Service) was developed on time and according to the original needs and requirements. However, concerning the evaluation of the measure, it should be mentioned that it was difficult to assess the impact of these kinds of digital-based solutions when third parties – such as urban freight companies – are involved. Urban logistics is a very competitive sector and all stakeholders involved are usually reluctant to share data. This is why the indicators used in the evaluation of measure LPA 5.1 were related to data that Inelcan could obtain from the use of their app. However, it was not possible to obtain information from the side of logistics companies who used the app (savings they experienced, etc.), as they were reluctant to share it.

F Additional information

F1 Appraisal of evaluation approach

At the beginning of the project, the indicators foreseen for the evaluation of this measure were different from the ones presented in this document. However, due to a lack of data, these indicators were changed to those which the company in charge of the D4Service app could provide the required evaluation data.

F2 Future activities relating to the measure

In the future, Inelcan, the company that developed the D4Service App, plans to implement its business plan in order to attract more customers.