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Sustainable **U**rban **C**onsolidation **C**entr**ES** for con**S**truction

Pilot sites quantitative As-Is Analysis including KPI of the As-Is situation

Public summary

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Public summary of the confidential deliverable D2.4

1.1 Introduction

The **main objective of the SUCCESS project** is to assess both the relevance and the viability of innovative Supply Chain Management concepts, among which Consolidation Centres, for the construction sector. In order to do so, the project focuses on to what extent and how these concepts could bring about tested and replicable solutions to address problems in the construction supply chain, focussing on distribution networks, construction sites and reverse logistics. These solutions should include adequate collaborative frameworks and sustainable business models.

In this context, the first objective is a clear and deep understanding of the business and operational needs of all actors of the value chain of construction logistics in urban areas.

The first technical Work Package of the SUCCESS project (WP2) contributes to this objective by **mapping the AS-IS situation** of the three major components in construction logistics (i.e. the supply chain network, the construction site and the reverse logistic) of four diverse construction sites located in different urban areas. This mapping is based on both a qualitative and a quantitative approach. The quantitative approach included a data collection phase that allowed the consortium to compute a set of Key Performance Indicators (KPI).

Deliverable 2.4 is the final deliverable of the WP2, where all the KPI were calculated and first conclusions on potential areas of improvement were drawn.

To achieve these objectives **preliminary and complementary tasks have been carried out all along the work package.** A common set of KPI for the 4 pilot sites has been defined in task 2.2 together with the data required to compute these KPI, and the guidelines on how and with what tools to collect this data. Task 2.3 designed and implemented a harmonised database of the collected data. Last but not least, many quality checks have been implemented and the quality of the collected data has been improved all along the collection period thanks to task 2.5.Task 2.4 was dedicated to setting up the tools and processes to collect data in a consistent and effective way across the four pilot sites. Information on deliveries and pickups was collected daily while other data were collected less frequently. The exercise took up to eight months of daily data collection on all construction sites. During this long period frequent controls and corrections were performed to ensure continuity and consistency of the process.

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The analysis of the collected data allowed the consortium to measure the performance of pilot sites on the agreed KPI. A detailed analysis of each KPI was necessary to better understand the characteristics and the specificities of each pilot site with regards to economics, environmental, and social sustainability perspectives.

The different construction sites selected in SUCCESS offered a wealth of learning opportunities. They represent the wealth of different types of construction sites that can be found across Europeans cities. Defining a consistent methodology to compute KPIs for the four sites was a real challenge, but the result was successfully accomplished. It provides an important database to better understand construction logistics, imagine solutions to reduce its negative externalities and assess the potential interest of a Consolidation Centre for different types of construction sites.

This summary **sums up the conclusions that were drawn by the consortium on both the impact of site specificities on the potential advantages of a CCC and on the amount of potential savings for each actor of the value chain.**

1.2 Impact of sites specificities

The specificities of each site helped to clarify what characteristics of construction sites increase the potential advantages of a CCC. By comparing KPI between pilot sites, we discovered that four main specificities impact the performance:

First, the **available storage area** of the site, i.e. the difference between the size of the field and the size of the constructed buildings, is one of the main factors impacting the performance of the construction workforce. Using available spaces has an impact on productivity, as was demonstrated in two examples featuring one big storage areas (in Valencia) versus several small storage areas (in Paris).

Second, the **relative location of the construction site within the urban area**, i.e. the distance of the site from the boundaries of the city, strongly impacts the potential savings for carriers. In Luxembourg City, Valencia and Verona, potential savings on travel time were not so important, whereas in Paris, where the site is located in the centre, travel times are highly increased by traffic congestion.

Third, the **location of the suppliers** is also a major factor impacting the potential interest of a CCC. In Valencia, the contractor collaborates almost exclusively with local partners, while in Verona the contractor had most of its deliveries coming from further than 100 km. Needless to say, travel times and planning are

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affected by more incertitude in the second case, which forces the local team to be more flexible and reactive.

Last but not least, the **organisation of logistics on the construction site** is decisive for performance. Once more, the specificities of each site allowed the consortium to compare different scenarios: deliveries with a stricter delivery time (in Valencia and Paris) versus deliveries without a planned delivery time (in Verona); an ad hoc logistics team unloading trucks (in Paris) versus a bunch of construction workers who stop their activities each time they must unload a truck (in Luxembourg City). Devoting the necessary attention to better organising the logistics in the construction site can significantly increase the performance of the construction company, but also that of the suppliers, of the hauliers, who can have a better view of the delivery plan, of the availability of handling equipment, etc.

1.3 Main results per site

In Luxembourg City, potential savings have been highlighted:

- for the construction site, thanks to just in time deliveries and a better management of logistics provided by a CCC,
- for suppliers: since most of them are coming from more than 100km away, a CCC near the city would not represent a dramatic detour,
- for carriers: improving both trucks' and site's punctuality and consequently reducing trucks' waiting time thanks to better coordinated deliveries.

In Paris, areas for improvement are quite clear, especially for carriers:

- within the construction site, the presence of an ad hoc team to handle deliveries improves the punctuality, but managing the storage areas is still difficult and "just in time" deliveries could save part of the wasted time;
- carriers spend a lot of time in traffic jams, and they have also important waiting times in front of the site before the unloading of their truck.

All in all, the collected figures show the importance of the relative site location within the urban area.

In Valencia, the first analyses made in D2.4 do not highlight important potential savings:

- the construction site does not present storage area issues and the contractor manages well the planning and unloading of deliveries,

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- most suppliers are local actors coming from near the construction site, so that a CCC would not improve the distance between storage locations and the site,
- carriers do not suffer from important congestion or waiting issues.

In Verona, the following potential savings were highlighted:

- For the construction site, 87% of deliveries are not scheduled and most of the planned deliveries are unloaded later than expected. A CCC could largely improve the planning of deliveries.
- As most suppliers are coming from more than 100 km away, a CCC could represent an interesting storage zone near the city.
- For carriers, a better organisation of logistics would allow to reduce trucks' waiting time.

All these "first feelings" will have to be confirmed (or not) during the following tasks of the project.

In addition to the initial findings for each site, some considerations on the potential savings per each type of beneficiary are also highlighted.

1.4 Amount of potential savings per beneficiary:

From the **economic** point of view, potential savings for **suppliers / hauliers** are mainly identified in the hauliers' journey time, i.e. the sum of travel times (inside and outside the city), and waiting times between the arrival time and the actual starting of the un/loading times.

Travel time inside the city is an important source of savings at least when the site is in the middle of the city (the average urban trip was 40 minutes in Verona and 2 hours in Paris).

Waiting times of trucks are between 18 and 36 minutes in the four cities. Moreover, we saw that trucks' punctuality is the key factor to reduce waiting times. Indeed, a truck reaching destination ahead or behind of schedule increases its waiting time. Even a truck arriving on time could have to wait for the unloading of another delivery which did not respect its own schedule.

The indicator devoted to "Unloading time" emphasised a potential saving, too. Allowing unloading activities with handling equipment inside trucks, which are not affected by the availability of the handling equipment provided by the construction site, could reduce the unloading time by half.

Potential savings **for construction site operators** are also important in some cases. We saw on three out of four sites nearly 20% of wasted time due to rework, waiting or looking for materials (especially in Luxembourg City). This

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shows that a better organisation of the supply chain could increase the overall productivity of the site.

Moreover, however the storage areas are managed (i.e. centralised or distributed to the nearest of many workstations) a real source of improvement is to ensure the availability of material at the right place and at the right time (neither too late nor too early). The real challenge for construction companies is to make the connection between the deliveries and the production plan.

From the **environmental and social** point of view, the travelled distance, the specifications of trucks (e.g. the euro class rating) and the number of deliveries impact on carbon and PM emissions. Needless to say, the number of deliveries and pick-ups impacts on the environmental indicators but also on the social ones, such as the congestion around the construction sites and the safety inside the site. A better organisation of deliveries could reduce their impact on city congestion.

For carbon and PM emissions, the conclusion is not so obvious. All depends on the impact of a CCC on the number of deliveries. We have to wait for the simulation results to be able to confirm the positive impact of a CCC on emissions.

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