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Long-term Evaluation

UTR 7.3 Flexible Access for Cleaner Freight Traffic

City of Utrecht

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Gemeente Utrecht



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Summary

This report describes the results of the long-term evaluation (LTE) of the measure “UTR7.3 Flexible Access for Cleaner Freight Traffic Utrecht”, which was implemented during the CIVITAS MIMOSA project (2008 – 2012). In the LTE, the original measure was analysed about four years after initial finalisation. The idea behind the long-term evaluation is to find out how measures evolve after the EU research funding stops and to analyse if measured impacts have changed positively or negatively. This provides lessons for other cities that are contemplating to implement similar measures.

The Cargohopper, once a showcase for Utrecht, no longer runs in the streets of the city. The original Cargohopper 1.0, an electric towing vehicle with three trailers, was initiated by Hoek Transport and received a lot of attention. CH1.0 replaced 5 delivery vans and around 88,000 kilometers in the city. During MIMOSA, a second CH2.0 was introduced, but that vehicle never really flourished. There were challenges related to licensing, the economic crisis forced the haulier to critically look at costs and the founding father of the CH1.0 retired. Also at the municipality, organisational changes and budgetary restrictions led to a different focus.

Successors of CH1.0 are still running in Enschede and Amsterdam, the latter being the best case study. In Amsterdam, all development mistakes in the vehicles and organisational issues in the logistical concept were overcome, leading to a situation where four Cargohopper vehicles are in operation, with a fifth vehicle in serious contemplation. Ingredients of the success are a good location of the city distribution centre, a cooperation with a local entrepreneur, strong feeling of ownership of the drivers of the vehicles (stimulated by a special certificate) and the city administration of Amsterdam as launching customer for its own goods. This success may not have been possible without the experiences that could be gained by its predecessors.

The city of Utrecht shows renewed interest in a further improvement of the city distribution schemes, following the national covenant for Zero Emission City Logistics.

1. Introduction

This report describes the results of the long-term evaluation of the measure “UTR7.3 Flexible Access for Cleaner Freight Traffic Utrecht”, which is one of the three measures for which such an evaluation was conducted. This measure was part of a package of in total 18 measures that the city of Utrecht, together with its local partners, implemented during the CIVITAS MIMOSA project, that ran between 2008 and 2012.

The long-term evaluation was enabled by the Activity Fund of the EU CIVITAS CAPITAL project¹. One of the objectives of CIVITAS CAPITAL was to enable long-term evaluation of urban mobility measures that have been implemented in earlier phases of CIVITAS. CAPITAL’s work complements the work of CIVITAS WIKI regarding the long term evaluation of the second phase of CIVITAS (2005-2008).

1.1 Motivation for the long-term evaluation

CIVITAS enables cities in Europe to experiment with new or innovative urban mobility solutions. Each so-called demonstration city in CIVITAS has implemented a number of measures that help to achieve sustainable mobility goals of the city. Since its start in 2002, over 70 cities have been active in CIVITAS as demonstration cities, and over 700 mobility measures have been implemented in ten different thematic areas². For each of the measures a thorough impact and process evaluation was conducted on the basis of a common Framework for Evaluation (CIVITAS WIKI, 2013).

The duration of the demonstration projects was four years (48 months), during which the measure had to be prepared, implemented and evaluated. Some of the issues related to the measure evaluation were that expected longer term impacts (for example related to behaviour change towards sustainable modes of transport) could either:

- a. not be determined right after the initial measure implementation, as most of the impacts are expected to be achieved in a longer period after the implementation of the measure; or
- b. not be assessed in isolation from other measures or policies that are implemented in the wider context of the particular measure.

To better understand the long-term impacts of individual or packages of measures, various efforts were made to conduct long-term evaluation on project, city of measure level. CIVITAS WIKI has performed a long-term evaluation on project and city level (final report will be available in the autumn of 2016) and CIVITAS CAPITAL (and its predecessor CATALIST) have focused more on measure levels.

The basic idea of measure level evaluation is that the long-term evaluation is as much as possible based on the same methodology as the original evaluation (CIVITAS CAPITAL, 2014), so that an accurate long-term assessment can be made. Therefore, this long-term evaluation builds on the original measure evaluation report (Utrecht, 2013), it is therefore necessary to consult the original evaluation report for further background information. Comparability has been taken into account as much as possible when designing the long-term evaluation approach for this measure. Nevertheless, it was found that circumstances in all three evaluated measures have changed in such a way that 100% scientifically accurate long-term evaluation of impacts was not possible. However, some

¹ <http://www.civitas.eu/content/activity-fund>

² <http://www.civitas.eu/thematic-groups-all>

relevant process related information has been collected and analysed, on the basis of which some lessons learned and conclusions are based.

1.2 Objective(s) and research questions

The overall objectives of the long –term evaluation of this measure are:

- to understand the evolution of the measure after the end of MIMOSA;
- to review and assess the impacts of the measure for the original indicators, based on the available information;
- to conclude the level of success of the measure anno 2016 compared to the original measure objectives.

The indicators that were used to measure the impacts of the Clean Access for Freight measure are listed in table 1 (Utrecht, 2013). These indicators could not be repeated because the Cargohopper no longer runs through the streets in Utrecht. Therefore, a qualitative assessment will be presented.

Table 1: Table of indicators of the original evaluation

No	Evaluation area	Impact	Indicator
1.	Environment	Emissions	CO ₂ , NO _x and PM ₁₀ of road freight vehicles in the city centre
2.	Transport	Freight movements	The number of goods vehicles per year in the city centre

The following research questions regarding the long-term evaluation of this measure are relevant:

1. What is the status of the Cargohopper in 2016?
2. What is the status of other access restriction zones in Utrecht?

1.3 Approach & Methodology

All the relevant information that was needed for the evaluation was obtained through documentation that was made available by the city and/or Trans-Mission and interviews with key contact persons in the administration.

1.4 Reading Guide

Chapter 2 contains a brief summary of the original measure evaluation report (Utrecht 2013)³ in CIVITAS MIMOSA. In chapter 3 the results of the long-term evaluation are presented and in chapter 4 a number of conclusions are presented.

³ <http://www.civitas.eu/content/measure-result-flexible-access-cleaner-freight-traffic>

2. Results of the measure in CIVITAS MIMOSA (2008 – 2012)

2.1 Description

The original measure as implemented in MIMOSA focused mainly on the introduction of the Cargohopper, zero emission city distribution vehicle. The Cargohopper was a response to the cities' ambition to regulate access to the inner city by polluting vehicles by stimulating the usage of clean vehicles and to reward transport companies to invest in 'super clean' vehicles. This reward consisted of elements like:

- Exemption from legally allowed time windows of delivery of goods.
- Allowing freight deliveries during the night.
- Exemption from the prohibition of the use of bus lanes.
- Providing subsidies for purchasing new clean vehicles.

A low-emission zone (LEZ) was installed in July 2007 with limited access to the city centre by vehicles below emission standard Euro4 (figure 1). The rules for access have been stricter since January 2015 (see chapter 3).

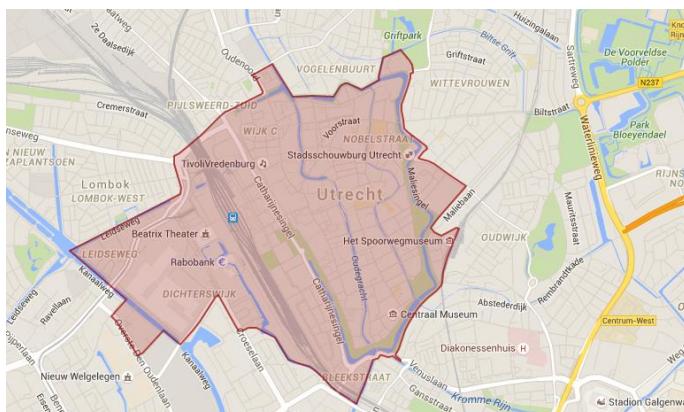


Figure 1: Low Emission Zone Utrecht (since 2007)

The low emission zone covers almost the whole city centre. About 5% of all inhabitants (which was 16,813 inhabitants on the 1st of January 2012) live in the city centre. Besides this the citycentre is visited daily by about 48,000 people working in the area (more than 20% of all jobs in Utrecht are in the city centre) and about 163,000 people travel to and from Utrecht central station in the city centre everyday. Utrecht is visited 6.9 million times a year for leisure activities. Most important in this is shopping and most shops are in the city centre. The area has about 8,200 houses and 3,800 businesses. About 21% of all Utrecht wholesalers and retailers are in the city centre and more than a third of all catering businesses (2011: 390 catering businesses). So in addition to inhabitants a lot of visitors are affected by emissions in the city centre.

2.2 Implementation

The implementation of the measure took place in three (combined) stages:

Stage 1: implementation of the Cargohopper (version 1.0), in April 2009

Cargohopper (CH) 1.0 was a 1,25m wide and 16m long electric vehicle with three small trailers that was used for the delivery of parcels in the city of Utrecht. The initiator was Mr Jacques v/d Linden from Hoek Transport, which is a member of TransMission, an organisation with 11 members of transport companies (like Hoek) and 13 hubs in the country. Utrecht is the main re-distribution point.

The Cargohopper had a maximum speed of 25 kilometres per hour and can transport the freight of 5 to 8 vans (depends on how efficiently deliveries can be packed).

At that time, the urban mobility plan was built around a cooperation between transport companies and the city regarding city distribution. The national platform “Stedelijke Distributie Nederland” was just lifting off, so there was a positive flow around city distribution.

The idea of the CH came from a small electric vehicle from Bratislava, that with the support of a local trailer construction company (van den Berg Trailer Constructor) was introduced in Utrecht. The trailers were built in such a way that it had swap body's the size of 3 Euro pallets. The idea was to have these boxes delivered at shippers and then putting them on CH to deliver the goods. In this way they were never used. The volume was too mixed: one shipper never had enough freight to fill one box for Utrecht alone. CH1.0 was filled mainly out of the volume TransMission had for Utrecht.

Although Hoek Transport works collectively with the city of Utrecht, the Cargohopper-project is solely financed by Hoek and no costs or revenues are imposed on the city. Purchase costs for the Cargohopper were €65,000 (figure 2).



Figure 2: Cargohopper 1.0⁴ in Utrecht

A loading point close to the city centre was installed in an old factory building.

Stage 2: Solar panels on the Cargohopper 1.0, in August 2009

With a subsidy from the Province of Utrecht, solar panels were placed on the roof of the Cargohopper. This allowed the vehicle to drive 8 to 9 months a year on solar power. In the other months it was powered by green electricity, making it a fully CO₂ neutral form of freight transport. Part of the success of the solar panels was that the Cargohopper could be stored outdoors, so that the early morning sunlight could charge the batteries. Later, Cargohopper had to be parked indoors (see chapter 3), by which this advantage was reduced.

Stage 3: Implementation plan flexible access cleaner freight traffic, in January 2010

An implementation plan for flexible access for cleaner freight traffic was drawn up. Key ideas from the implementation plan were to make a full catalogue of types of vehicles that were entering the city centre, including emission characteristics. In addition analyses for allowing night delivery and exemption from the prohibition of the use of bus lanes were made.

⁴ Image from <http://www.biojournaal.nl/>

2.3 Evaluation Results

The reported measure results in MIMOSA were focused on Cargohopper 1.0. In 2011, Cargohopper 2.0 was introduced, but its impacts were not taken into account at that time. Chapter 3 contains a description of the development of Cargohopper 2.0 in more detail.

Environment: Emissions

The direct environmental benefits of this measure came from implementation of CH1.0. Implementation of the Cargohopper meant a daily reduction of 5 delivery van trips from the City Distribution Centre (Stadsdistributiecentrum: SDC) into the city centre and back. This was a trip with an average distance of 20.6 kilometres. A part of this route was replaced by the Cargohopper trip; however the Cargohopper had to be loaded. Loading the Cargohopper was done with a light truck. The distance this light truck travels from the SDC to the Cargohopper loading point is 16.4 kilometres. The calculated impacts in terms of CO₂, NO_x and PM₁₀ is summarised in table 2 (Utrecht, 2013). This data was taken from the original measure evaluation report, in which more background information is described about the methodology used.

Table 2: Impact Emissions Cargohopper 1.0

Total impact Emissions Cargohopper 2009-2012 (kg)						
Utrecht no.	Pointer no.	Indicator	BaU	After	Difference After - BaU	%
1	8	CO ₂ emissions	31623 kg	8548 kg	-23075 kg	- 73%
2	10	NO _x emissions	67.8 kg	49.3kg	-18.5 kg	- 27%
3	11	PM ₁₀ emissions	6.8 kg	3.0 kg	-3.8 kg	- 56%

Source: own calculation

Transport: Freight movements

As Cargohopper 1.0 replaced existing transport from Hoek, its capacity was fully used since its introduction in 2009. This means each Cargohopper trip replaced freight of 5 delivery vans. Cargohopper made 255 deliveries a year. To load the Cargohopper 255 light truck trips of 16.4 kilometres were made. So Cargohopper saved 1275 delivery van trips a year. According to Hoek transport the average delivery van trip distance is 20.6 kilometres. Introduction of the Cargohopper gave immediate decreased freight movements.

Total transport results are a decrease of 5,100 delivery van trips and taken into account the light truck trips a decrease of 4,080 freight movements in four years. This makes a saving of 5% on delivery van trips in the city centre and 88,332 km diesel vehicle trips saved. Table 3 contains the savings by the end of MIMOSA (Utrecht, 2013).

Table 3: Freight impacts of Cargohopper 1.0

Total impact freight movements (number of trips and km)						
Utrecht no.	Pointer no.	Indicator	BaU	After	Difference After - BaU	%
4	25	Total delivery van trips in the city centre	104171	99071	-5100	-5%
		Total freight movements Cargohopper measure	5100	1020	-4080	-80%
		Total diesel freight vehicle kilometres Cargohopper measure	105060 km	16728 km	-88332 km	-84%

Source: Utrecht delivery profile 2009 and estimation freight load development Hogenberg (2012) and Hoek transport

3. Long-term evaluation

3.1 Rationale

To start with: Cargohopper is not operated in Utrecht any more. Cargohopper still exists and is successfully used in Amsterdam. Initially operated by Hoek Transport, Cargohopper was taken over by TransMission, that is an overall logistics company with 11 members of transport companies (like Hoek) and 13 hubs in the country. Utrecht is the main re-distribution point. Based on interviews with representatives from Cargohopper and city Utrecht in this chapter it is described mainly how the Cargohopper developed between end 2012 and 2016. The information contains some interesting lessons learned for other cities who are confronted with challenges related to city distribution and how to overcome them.

Therefore, the long-term evaluation is qualitative by nature. Because Cargohopper is no longer used in Utrecht, it is impossible to recalculate savings. Simply assuming that deliveries, that were originally made with Cargohopper, are now replaced by regular vans is not correct, as the distribution market has also changed since 2012. At the same time, Utrecht has installed more strict regulations regarding the LEZ. This is summarised in paragraph 3.2. Paragraph 3.3 provides a detailed overview of the development of the Cargohopper.

3.2 Development of Access regulation measures for freight in Utrecht 2013-2016

Utrecht's actions regarding the access regulation of polluting vehicles between 2009 and 2015 were organised in the ALU – Action plan Air quality Utrecht (Actieplan Luchtkwaliteit Utrecht). The ALU was part of the NSL – National Cooperation Platform Air Quality (Nationaal Samenwerkingsprogramma Luchtkwaliteit) in response to the EU Air quality regulation. Based on amongst others research performed by TNO (2016), it was found that additional measures were needed in Utrecht in addition to the ALU to achieve the EC targets for air quality.

LEZ regulation

It was decided to change the regulation around access to the LEZ. In addition to the original regulation, since January 2015 the LEZ cannot be entered by diesel person vehicles and light trucks that are older than 2001. These are vehicles without a soot filter. The size of the LEZ is not changed.

Vehicles powered by other fuels than diesel can enter the LEZ. Some exceptions are made for special vehicles, for which an exemption can be allowed for a maximum of 12 days per year. This regulations do not only count for Utrecht, but also for other cities with a LEZ like Rotterdam and Amsterdam (at least for the trucks; for minivans and passenger cars there are some differences caused by local political councils). There exist a difference in how the LEZ's are monitored. In Rotterdam and Amsterdam they use camera's for controlling the access, in Utrecht they use vehicles with mounted cameras that monitor vehicles⁵.

According to research performed by TNO (TNO, 2016), it was discovered that compared to 2014, the amount of polluting vehicles (passenger cars and light trucks) was reduced with 80% for diesel passenger cars (2,8% share prognosis⁶ for 2015 compared to the 0,5% measured) and with 70% for light trucks (6,5% prognosis to 1,8% measured). The LEZ restrictions will have an impact of the share of clean vehicles in the city centre. The question is to which extend this has led also to cleaner air and less pollution. Measurements, prognoses and analyses have according to TNO not significantly led to a reduction of air pollution *because of the LEZ regulation*. The autonomous developments had a large impact on the 16% air pollution reduction that was measured. However, it was conclude that regarding PM's the introduction of the LEZ had a positive impact, because the reduction of PM's was higher than in Rotterdam and Amsterdam where no additional restriction measures were installed at that time. Utrecht was the first city in the Netherlands with stricter prohibitions for older passenger cars and light trucks. Rotterdam and Amsterdam have now followed the Utrecht example.

Night Distribution

Regarding night distribution, following the original implementation plan a covenant was signed with CBL (a branch organisation of supermarkets). The covenant said that supermarkets first had to make an individual analysis about the possibilities for night distribution. So far there have been no such analyses made. It does not say that night distribution does not take place. As long as noise emission levels are not exceeded, the municipality is not involved officially.

Use of bus lanes

In addition to the above mentioned programmes there exists a specific action plan freight transport Utrecht (Utrecht 2015-2). In the action plan it is expressed that the city of Utrecht (still) wants to stimulate the use of clean vehicles in city distribution. Therefore, a (nationally initiated) green deal zero-emission city logistics (ZES) was signed as part of the Dutch Energy Treaty. Specific reason for the (renewed) action plan was to speed up the achievement of one of the goals in the Transport White Paper about zero emission city distribution.



Zero Emission
Stadslogistiek

Part of the measures is to stimulate (still) the purchase of clean vehicles by transport companies. In addition, another measure from the implementation plan that is still relevant is the exemption of the prohibition of the use of bus lanes by clean vehicles. An initial feasibility study (as described in the original measure evaluation report) showed interesting potential for such a measure. The current status of this measure can be summarised as follows:

- A pilot has taken place in 2013/2014 to allow some vehicles to use bus lanes for city distribution purposes on some routes. The evaluation results, however quite subjectively presented, showed that the bus lanes by clean vehicles deliver travel time savings for users

⁵ This controlling vehicle was also partly enabled by MIMOSA (measure 3.1)

⁶ In this prognosis it had been taken into account that the vehicle fleet follows an autonomous flow of 'cleaning', because engines are getting cleaner.

and that this is a stimulating factor for the purchase of clean vehicles. The measure has not shown a measured negative impact on other road users. In addition, transporters perceived more reliable delivery times thanks to the measure. Finally, they appreciated the reward for their investments in clean vehicle technologies.

- Transport companies would like to see that the pilot is extended also to other areas with bus lanes in the city.
- The ambition is to achieve ZES (Zero Emission City Logistics) in 2020, or at least provide a clear vision for the future. By developing stricter regulations (stricter than the renewed ones for the LEZ), the city and stakeholders hope to achieve this goal.
- The exact rules about who can enter the city centre, at what time and with what type of vehicle is at the moment of production of this LTE-note still under discussion.

3.3 Development of Cargohopper 2013-2016

As was described in chapter 2 and the related measure evaluation (Utrecht, 2013), the Cargohopper version 1.0 was a very big success. There was world-wide a lot of interest in CH1.0 and it was even copied in China. Delegations from all over the world came to see the success story, which was (apart from a good idea and entrepreneurship from Hoek Transport) very well marketed. Interesting to notice that there was more interest in CH *outside* the Netherlands than *in* the Netherlands. In this paragraph it is described how the Cargohopper developed after the lifetime of CIVITAS MIMOSA, and how this initial success story finally disappeared from the streets in Utrecht.

Cargohopper 1.0 → Cargohopper 2.0

During the lifetime of CIVITAS MIMOSA, Cargohopper 2.0 was developed. There were a number of shortcomings to CH1.0, among which the speed and the fact that only parcels could be delivered. The CH1.0 was ‘cute’ and useful and answered to the need to have a visible electric vehicle on the street. However, the vehicle was not practical in daily use for delivering pallets and parcels. The reality was that the CH1.0 delivered parcels in the morning, while the bigger vans would deliver pallets in the afternoon often at the same address. The people behind CH1.0 knew this of course and started looking for a better solution.

A different vehicle was needed to enable the distribution of pallets AND parcels, which would require additional investments. An additional feature is the transportation of odd or ugly goods that cannot be transported by regular carriers (based on the business case on exceptional goods). The platform “National City Distribution” launched in 2009 an award of 250.000 euros for a best innovating distribution concept. A new consortium with Hoek, Gepu, harbour authority and city won the bid by means of a plan initiated by Cargohopper. Part of the resources was used to develop a new Cargohopper (version 2.0) at an investment cost of 85.000 euros. CH2.0 was designed to deliver parcels and pallets.

However, the new Cargohopper was never really used on a regular basis like Hoek operated CH1.0 before. There are a number of reasons to mention.

In the first place, there was a good dedicated driver on the new Cargohopper. This was important, because driving an electric vehicle like CH requires practice and caution to avoid damage to the vehicle. Already at the time of CH1.0 drivers received a “Cargohopper driver certificate” (see image) to achieve some level of ‘ownership’ by the driver to take care of the vehicle.



However, in the first year CH2.0 was not street legal. It was operated anyway, but without licence. From the start it proved to be too heavy, because it was poorly build. So there was not enough payload to make it count. The new trailer was far too heavy (2,475 kg), which reduced the pay load to 1,600kg. To get it street legal turned out to be very difficult, because the RDW (Dutch Road Registration Authority) did not want to give in on the original “N1 Homologation”. After one year of struggling with the Dutch road authorities a solution was found through TUV in Germany. They approved the necessary changes on the handbrake (discs instead of drum brakes) and licenced the vehicle (together with the new CH 2.1 for Enschede). Due to European law the RDW could do nothing more than to honour the apply for a switch from German licence plates to Dutch, by which the licence plate problem was solved.

Once the license was arranged, it appeared that, because the trailer was too heavy, less cargo could be loaded on the vehicle to stay within the limits of the vehicle (6,200 kg, with a net cargo weight of theoretically 1,725 kg but during the transfer from the German licence plate to a Dutch one, somehow the Dutch RDW saw fit to reduce it to 1,600 kg). This net weight did not allow for a profitable business case.

Cargohopper 2.0: Searching for a profitable business case

After CH2.0 (figure 3) appeared to be not as successful as hoped, the original hub demolished, the crises at it deepest point and the initiator of Cargohopper 1.0 (mr Van der Linden) getting ill and retiring, changes for a successful development of the system in Utrecht were challenging. TransMission headquarters stepped in and took over the idea and organisation, as the partner from Mr Van der Linden at Hoek Transport was not interested in keeping Cargohopper alive.



Figure 3: Cargohopper 2.0 in Utrecht⁷ for parcels and pallets

A second try was made to try to turn around the downward spiral. A consortium with Cargohopper, de Rooij, GLS, DHL and PostNL discussed with the municipality options the idea of implementing a full zero-emission hub on a new location. A subsidy was awarded for stimulation of actions. The initial expected subsidy (\pm 130,000 Euros) was higher than in the end was made available (\pm 30,000 Euros), caused by budgetary constraints at the city and change of staff. Plans faltered in the end by only Cargohopper and PostNL being interested in the end: Cargohopper because they had no hub anymore, PostNL because they thought it could be a good base for their bicycle deliveries. Costs

⁷ Image from www.cargohopper.nl

where too high (support from city hall inclusive), so Cargohopper and PostNL gave up by the lack of possibility to make a sound business case. Before the trigger was pulled, a number of ideas have been analysed for potential new markets and customers to achieve a positive business case.

Idea 1: Usage of the Cargohopper for construction logistics

As the majority of logistic flows in and out a city centre is caused by the construction sector, it was tried to use CH2.0 for building logistics. As the inner city and central station are under large construction works, there is a lot of need to transport building materials into the construction sites. Cargohopper had contacted Heijmans to transport materials for them. The idea was to make it very customer specific, Cargohopper would deliver exactly what was needed on the site and would reduce all the individual mini vans with construction workers and their materials. If delivery of construction materials would be optimised, it is also expected that what is called 'failure costs' (broken materials, e.g. it is sprawled around the construction site too many times – estimated to be 10% of total construction costs) can be reduced. BAM did not respond, but Heijmans saw potential due to a bright young intern with a real vision on logistics.

The construction logistics did not work because of the following reasons:

- Unwillingness by the construction companies to cooperate in delivery of construction materials to the building site.
- The environmental department of the municipality did not allow deliveries to the building site after working hours to avoid noise pollution for the residents in the neighbouring buildings. If such idea would have been launched in the planning phase of the construction logistics, then it might have worked. It appeared that the idea to use Cargohopper came at a time when all decisions had been made and permits granted.

Idea 2: Usage of the Cargohopper to collect paper waste materials from shops

Another idea was to not only to provide the shops, but also to collect the rest materials, like paper carton and plastics on the return. This task was until then performed by the municipal waste collector service, at considerable cost for the shop owners and at a too low frequency. Besides, the shop personnel had to carry all the materials in to the street at collecting day. Some of the shops would benefit because it would reduce the amount of space needed in the shop to keep the empty cardboard boxes. The spokesman of TransMission explained that this initiative could not be implemented because of initial opposition within some parts of the municipality. In the end, this opposition was reduced, but the main reason it did not work, was that the shops had long running contracts with the city and the approach of Cargohopper was not professional enough. Cargohopper (and Van Vliet) only provided the drivers with some leaflets and asked them to discuss the possibility with the shop personnel. But the shop personnel are not in charge, so no solution was found.

Idea 3: Usage of the Cargohopper for delivery of fresh and perishable goods

In cooperation with the municipality it was tried to use the CH2.0 for delivery of fresh and perishable goods, such as food for the restaurants. The usage of CH2.0 for fresh goods also appeared impossible, because the catering of restaurants is special for two main reasons:

1. The delivery of food to restaurants is more than simply delivery of goods, there is a strong emotional factor involved. Catering services not only deliver what was ordered, but also bring extra food and special offers in the hope to sell more 'at the door of the restaurant'. This emotional factor cannot be replaced by 'interns driving the Cargohopper'.
2. Restaurants order a lot of last minute deliveries at very flexible times, so the Cargohopper would be ready for use when needed, even if the delivery would be unprofitable. The spokesman of the city of Utrecht indicated that the 'order discipline' in Utrecht is different

from neighbouring municipalities; there are a lot of last minute deliveries requested in the city centre of Utrecht.

Why the Cargohopper disappeared from the streets in Utrecht

So in the end (around 2013) CH2.0 could not achieve the same success as the CH1.0, because in summary:

- There was a crisis, which resulted in around 25% less deliveries but with similar cost levels.
- The CH2.0 was not profitable (mainly because it was too heavy).
- There was less organisational power at the municipality and at Hoek Transport, who were the initial success factors in CH1.0.
- Cost reductions were made in the wrong place, which damaged the CH2.0 and for which there was no money to repair.
- The scheduled windows for delivery times, to which Cargohopper had anticipated, were according to the interviewee of TransMission not controlled well enough. The result was that competitors could easily avoid the time windows restrictions for delivery, which is still an issue today.
- The idea of bundling goods from other companies (transporting them with CH) appeared to be a difficult: hauliers did not trust the intention and kept entering the LEZ to delivery small amounts of goods. Maybe the crises and the fact that the time windows were not controlled enough played part in this as well. So besides the volume out of TransMission CH, got only a few new clients.

In the end The CH1 and 2.0 were sold by Hoek as they were not used anymore. Details are not relevant here.

Cargohopper 2.1 in Enschede

In 2014 Cargohopper 2.1 was launched in Enschede as a result of a ‘bottom up’ initiative by Platform “National City Distribution” with local entrepreneurs to reduce the number of trucks in the city. CH2.1 was developed with a lighter trailer of 1,700 kg and has a solar roof to cover larger distances. To date the CH2.1 in Enschede is not really used as planned. The reason again is the lack of a profitable business case. Entrepreneurs in Enschede wanted the Cargohopper, but from the start on were not willing to pay a bit extra for it. Instead, they promised to sign contracts on collecting paper, carton, coat hangers, and Internet deliveries services. But once CH was running, no one was home. The transporting company in Enschede, HST⁸, can run the CH2.1 without loss because of regional subsidy, but it is more a showcase vehicle than a real sustainable alternative.

Lesson learned from Enschede: don’t (for example) use environmental concerns as the basis for your innovations. After all it is the business case that counts. If a sustainable business case can be developed, then the system will work well. Without the right financial triggers, the system fails. A unique aspect of the Cargohopper experience is that for one of the first times entrepreneurs (transport companies) tried to find an environmental solution. Most of the times it is the other way around: environmental planners want to develop freight solutions without a proper clue of the economic costs and benefits. However tough, this is the only way to achieve sustainable triggers in urban logistics.

⁸ www.hst.nl

Cargohopper 2.2 Amsterdam – all pieces together (2014/2016)

The Cargohopper entered its 'third life' in the shape of Cargohopper 2.2 in Amsterdam. With all the experiences gained in previous trials (Utrecht, Enschede), the case study Amsterdam currently runs with great success. The ingredients are:

- A perfect location at the edge of the city near Duivendrecht. From this location, the whole inner city can be reached.
- A successful match with a local entrepreneur (Deudekom⁹, a Moving Company), that was looking for new business due to the crisis. Part of this is offering moving services with an electric vehicle.
- Amsterdam has a strong vision for 2025 about city development, including logistics¹⁰.
- A start up subsidy was provided by the city of Amsterdam and the Province of Noord-Holland.
- Technical problems from earlier versions of the Cargohopper have been solved, for example:
 - the lightweight trailer,
 - possibility to carry parcels, pallets and “ugly goods”,
 - the solar roof was abandoned and replaced by outdoor charging facilities,
 - loading doors at the right place,
 - a smart charging facility,
 - a better battery (although more weight, at least more robust),
 - a new boost for the Cargohopper driving certificate, and
 - providing stand-alone heaters to heat the cabin in winter. This latter lesson was learned in Enschede, where the range of the Cargohopper in the autumn was strongly reduced. Not because it was too cold, but because the heating system in the vehicle consumes too much power. There was some kind of hot-air blower to demist the windows, but this reduced the battery capacity enormously.
- The fact the Amsterdam operation started with four vehicles, made it a serious proposition for chains and the city.
- The city is active as launching customer of CH2.2, by letting copier paper from their house-supplier Canon for the 80 different office locations be delivered by Cargohopper. The HVA Amsterdam University of Applied Science will likely follow this example on a much larger scale together with PostNL.

⁹ <http://www.deudekom.nl>

¹⁰ www.amsterdamsmartcity.com



Figure 4: Cargohopper 2.2¹¹ in Amsterdam

The CH2.2 in Amsterdam is a vehicle at an investment cost of 85.000 euros. This is still quite expensive compared to a 7,5 tons regular van at around 65.000 Euros investment costs. However, if the city would seriously push for full electric city logistics, then the CH2.2 is a reasonable alternative at this stage. There are 4 Cargohopper vehicles in operation in Amsterdam in 2016. There are ideas to develop the Cargohopper further by (again) trying to look at delivery and collection, construction logistics, etc.

Facts of the Amsterdam case of Cargohopper:

- Amsterdam receives around 60,000 tons of goods every day.
- The Cargohopper delivers 1,300 tons of goods per year.
- Every Cargohopper drivers on average 50 kilometre per day.
- There are 60 to 70 drops per day with an average size of 2,1 package (so no real bulk goods).
- The CH2.2 is in operation since 2014 and there is strong potential for growth. There is room for a fifth Cargohopper and if the University of Applied Science HVA will become a customer even more.
- Vehicle technology is improved but still based on 2009, there is need for the development of new types of vehicles.

Could Cargohopper be re-introduced in Utrecht again?

There are some differences between Utrecht and Amsterdam. First of all, regarding the Cargohopper Amsterdam actively supports the system (amongst others to act as launching customer), like Utrecht did with CH1.0. Such support and ambition, together with a solid long term vision is needed as fertile ground for innovations such as Cargohopper. There have been some changes in the organisation in Utrecht that have not led to a continuum for innovations like Cargohopper to flourish. More factually speaking, the local market in Utrecht may simply not be large enough for Cargohopper, which requires a larger amount of delivery addresses. In Amsterdam, there is simply more volume and the LEZ is larger than in Utrecht. It also counts that the LEZ is really controlled in Amsterdam by camera's, while in Utrecht this is not perceived to be a level playing field.

¹¹ Image from Bert Roozendaal from Cargohopper

4. Conclusions

Based on the analyses from the previous chapters, a number of conclusions can be drawn. Firstly, Cargohopper in Utrecht was an important stepping stone for TansMission (initiated by Hoek Transport) to develop the Carhopper vehicles. Without the initial steps taken by Mr van der Linden in 2008, that delivered CH1.0, a successful CH2.2 in Amsterdam may not have occurred. In addition to the vehicle itself, the logistical concept was more important. How can you regulate and stimulate new and clean vehicles for distribution in a strongly competitive market with low profit margins? TransMission and Hoek Transport maybe called frontrunners in the sense that they have looked at sustainable forms of city distribution purely from a market perspective. Most other initiatives are set up more from e.g. an environmental perspective, which in then end leads to an unprofitable business case and therefore limited upscaling potential; once the subsidy stops, the vehicle stops.

The Cargohopper case study shows us that it takes an entrepreneurial perspective from a city administration and a sustainable perspective from the business sector to launch new initiatives. The city of Utrecht has played an important role here, to cooperate intensively with the initiators in the set up phase. All the relevant reasons mentioned above have led to the situation that, although Cargohopper no longer runs in the streets of Utrecht, there is renewed interest in taking a 'next step' in the organisation of Utrecht's city distribution schemes. This involves the LEZ and the logistical concepts behind e.g. beerboat and Cargohopper.

Thanks to a covenant to achieve Zero Emission City distribution (following the Dutch Energy Treaty responding to the Kyoto and Copenhagen climate treaties), there is renewed interest in clean city distribution, Cities as launching customers and with serious upscaling focus (like in Amsterdam) can help to support this.

Finally, a mind (and action) shift is needed in goods delivery; with online shopping really boosting and the so-called "tsunami of white vans" causing troubles we need to rethink the basics of the delivery concept. As we have seen in Amsterdam, for example, it should be more and more the end-user dictating how goods should be delivered to achieve efficient goods delivery, and not the transporters. Actions in this direction go beyond the scope of this study.

About the long-term evaluation

The long-term evaluation of this measure could not be based on the original methodology that was used during MIMOSA, mainly because Cargohopper disappeared in Utrecht. Therefore, it was decided to provide a chronology of occurrences since the end of MIMOSA, based on interviews with representatives from the city of Utrecht and TransMission. All in all this has led to a satisfactory overview of the current situation, including a description why.

After all, the long-term evaluation of this measure was quite feasible and well-timed, although it took quite some time to get in contact with the right contact persons. It provides Utrecht and potential follower cities necessary information about involvement of the logistical sector in a longer term; you need long-term cooperation, transparent regulation to enable a level playing field and finally you need to look at innovations from a budgetary perspective. Like the other LTE analyses that have been made, looking at the process of a measure was more relevant than focussing on the actual impacts.

Resources

Documentation:

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www.greendealzes.connekt.nl/en/testing/

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