Zero-Emission City Logistics Maturity

The Development of the Zero Emission Maturity Model for City Logistics

Zero-Emission City Logistics Maturity

The Development of the Zero Emission Maturity Model for City Logistics

2021

Thato Motloung   Breda University of Applied Science
Hans Quak   Breda University of Applied Science
Kasper Mittelmeijer   Hogeschool Rotterdam
Nilesh Anand   Hogeschool Rotterdam
Ron van Duin   Hogeschool Rotterdam

Zero-Emission City Logistics Maturity

Background

From the publishing of the Brundtland report in 1987, scientists have been studying and quantifying the effects of greenhouse gases and their sources, it has taken over 20 years to have cohesive action and now that countries are aware of the dire consequences of climate change, it is time for change and the logistics industry is not exempt.

In efforts to reduce CO2 emissions in the Dutch logistics industry, 26 municipalities and a number of front running logistics companies have signed the implementation agenda for zero-emission zone implementation; an initiative poised to reduce carbon emissions by 10 megatonnes in the Rotterdam/Moerdijk cluster by 2030. This requires that commercial vehicles entering cities be fully zero-emission (with exemptions for certain Euro 6 compliant vehicles).

It is currently unclear what efforts companies are making to prepare them for zero-emission city logistics and this is a cause for concern as the zero-emission zones will be implemented in 3 years (2025), in addition to logistics service providers, the zero-emission zones happen to be in inner cities where a multitude of businesses in retail can be found, current studies looking into zero-emission zones are addressed at logistics companies, however, the zero-emission zones impact will go beyond the logistics landscape as shop owners whose core business is not logistics will be directly affected.

Goal

The larger front running logistics companies in the Netherlands are well on their way to zero-emission, however, it is unclear whether smaller companies will be able to meet the targets on time, **this study undertakes to develop a model which stratifies the levels of development towards zero-emission city logistics** and use it to demystify SME readiness for the zero-emission zone implementation on the 1st January 2025 in efforts to create awareness and offer advice on how SME's could increase their maturity incrementally over the next few years.

Interest Groups

The research is currently being used as an educational tool for a variety of target groups

- **Undergraduate**: Undergraduate logistics students are currently in the process of data collection for the population of the tool with the outcomes being exposure to research and data collection, the practical logistics implications of zero-emission regulation, identifying and managing the expectations of the stakeholders involved as well as impacts of low maturity level.
- **Postgraduate**: Three masters students in supply chain management from the Hogeschool Rotterdam have/are working on expanding the maturity model to encompass the maturity of municipal initiatives in line with the ZE zone rollout. The city logistics municipal maturity model has been developed by masters student Kasper Mittelmeijer and is in the process of validation and application in a follow up thesis assignment.
- **Local Government**: The maturity level of SME's is particularly interesting for municipalities to determine where companies stand and see what they can do to support SME progress. The Logistics Community Brabant has proposed to table the maturity results at a meeting with the Brabant provincial government in order to create urgency for educational campaigns.
- **Business**: The determination of ZECL maturity also aids in creating cases for best practices by using results to benchmark, once created, these best practices will guide the development of companies that are lagging behind. Additionally, in 2022 a website will be created with the questionnaire where businesses can automatically get a maturity score based on their responses as well as advice on how to progress further.

Deliverables

Phase 1: Maturity model development
    Two maturity models were developed successfully, one aimed at SME's and the other at municipal readiness.

Phase 2: Development of quick scan
    The ZECL-MM quickscan has been developed, however, the scoring is determined from analysing the QuickScan answers and not generated automatically, this is a feature that will be developed in 2022

Phase 3-4: Testing and deployment at companies
    This deliverable was completed successfully, with more than 30 scans completed between September 2021 and November 2021, the ramp up phase will be done with a survey, as opposed to a QuickScan with open questions, to facilitate ease of data manipulation.

Breda University OF APPLIED SCIENCES

HOGESCHOOL ROTTERDAM

Topsector Logistiek

Zero-Emission City Logistics Maturity

The development, validation and application

With the zero-emission zone's impending implementation, it is important to establish the competence of SME's located in the predetermined zones to deal with logistics in a more sustainable way.

Development

The ZECL-MM for SME's was developed by Thato Motloung and Hans Quak, with a focus on small to medium enterprises. The model is two dimensional, with one dimension being the maturity levels from 0. "Oblivious" to 5. "Optimised", the second dimension focuses on the decision making and action-oriented functions within a company, these are called the areas of transformation. In addition to the SME model, a complementary model directed at the maturity of municipalities was developed by Hogeschool Rotterdam student Kasper Mittelmeijer.

Validation

The validation of the maturity model was done via discussion with subject matter experts Ron Duin, and Guy Somers, who have previous experience in developing the Synchromodality Maturity Model. The initial model was also validated by interviewing transporters who work for PostNL Extra@home Amersfoort as well as DHL and Roadrunner logistics offering insights from a different of perspectives.

Application

The initial application of the model was undertaken by the Hogeschool Rotterdam distribution minor students, the 12 students collectively conducted the ZECL-MM QuickScan at 30 companies within the earmarked ZEZ in Rotterdam. The results of this initial rollout indicated a low maturity level among the businesses, most of which are in retail and some being sole proprietorships. The maturity model will be rolled out further, as students from other universities of applied science undertake to establish the ZEZ readiness of more SME's and cities

Breda University OF APPLIED SCIENCES

HOGESCHOOL ROTTERDAM

Topsector Logistiek

Zero-Emission City Logistics Maturity

Application: Maturity Determination

Introduction

Students are encouraged to familiarise themselves with the maturity model and the motivation behind why it's relevant to determine company maturity. This is done by watching the 5 part knowledge clip series introducing them to city logistics, zero-emission zones and the assignment

Tool: ZECL-MM Knowledge Clips
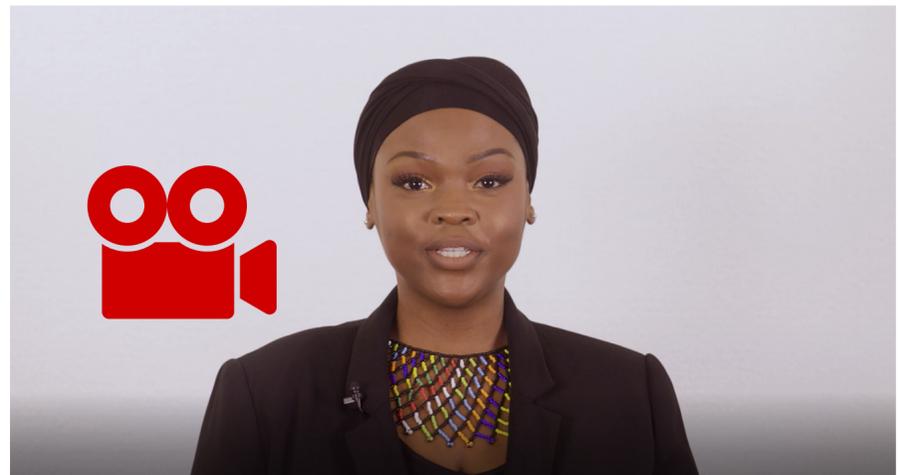
QuickScan

Once students are familiar with with the issues surrounding city logistics and the motivation towards zero emission zone implementation, they are then introduced to the QuickScan as a tool to collect data from the SME's in the earmarked ZEZ.

Tool: QuickScan Guideline

Tool: QuickScan Google Form

ZECL-MM QuickScan

Maturity Determination

The results from the QuickScan are then analysed by the students, who are encouraged to be creative with how they display the insights obtained from the data collection and determine the maturity of companies based on the results. Students can then offer recommendations to the SME's on how to improve their maturity.

Tool: QuickScan Guideline

ZECL-MM QuickScan Process

ZE Zone scout | Company ID & contact | QuickScan Interview | QuickScan Analysis | Benchmarking

Benchmarking QuickScan Results

Oblivious	0
Awareness	1
Interest	2
Managed	3
Established	4
Optimized	5
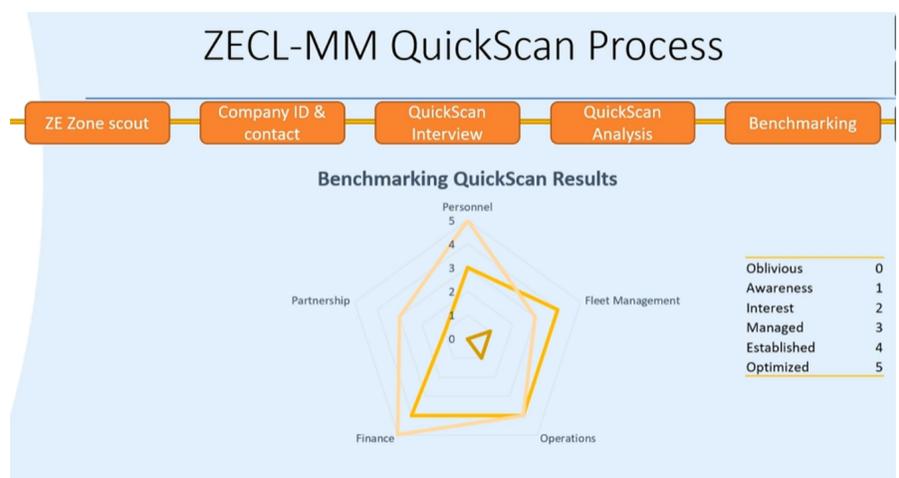
Zero-Emission City Logistics Maturity

Results: Rotterdam Zero Emission Zone

The Zero Emission Maturity Model QuickScan was conducted by 12 HBO level students in the designated Rotterdam zero-emission zone from September to November 2021. 30 companies were scanned, 93.3% of which were small to medium enterprises, the exceptions being Albert Heijn and Spar City. Of all the enterprises interviewed, 80% are receivers and the remaining 20% are shippers.

Most of the interviewees cited cost leadership as their strategy, with the aim of attracting more customers, one interviewee stated "Op dit moment is het voor de organisatie zaak het hoofd boven water te houden, dus zoveel mogelijk nieuwe klanten te werven." a statement which echoes the sentiments of other sole proprietors. This being so, there was a congruent lack of information about the impending zero-emission zone regulations and thus only two out of the 30 companies are making use of the zero-emission vehicles, these two are Albert Heijn and Spar which points to a concerning lack of awareness among small businesses in the Rotterdam area, which has been promoting sustainable logistics practices for a number of years.

The majority of SME's are in ownership of a single vehicle, mostly vans which they use to stock goods and deliver, indicating that they are a target market for the zero-emission zone education even if they are not logistics service providers, in the pie chart "Employed Drivers" one can see that only 28% of respondents outsource their transport, 14% of owners drive their own goods and the remaining 58% hires drivers to deliver goods for them, when asked whether the drivers are aware of ZE policies 10% responded positively which paints a bleak picture on the lack of awareness.

The stacked bar graph below lists responses from a few of the yes/no questions used to establish awareness, the interviewees were surveyed about their mid-long term goals and strategies and whether they related to sustainability, 83% of SME's responded that they dont have any sustainability goals, have no zero-emission awareness or trainings and they did not know of the SEBA susbsidy scheme for electric vehicles.

In the stacked bar graph, the peach coloured stack (far right) relates to an unsure result, it is unclear at this point whether the response was filled by the students to indicate that they are not sure or whether the interviewee themselves are not sure.

Overall the results of the QuickScans indicate an urgent need for intervention, possibly in the form of educational campaigns and stakeholder interaction.

City Logistics Segment

Segment	Count
Retail	20
Cold Chain	1
Facility	1
Post and Parcel	3
Other	4

Fleet Size

Fleet	Count
0	4
1	17
2	2
3	1
5+	2
LSP	3

Employed Drivers

Category	Percent
0	14%
1	41%
2	7%
3+	10%
External Transport	14%
Own driving	14%

Legend: ■ 0 ■ 1 ■ 2 ■ 3+ ■ External Transport ■ Own driving

Question	No	Yes	Unsure
Sustainability Strategy	24	6	0
Sustainability KPI	26	2	2
ZE Education	25	0	5
Seba Awareness	24	5	1

Legend: ■ No ■ Yes ■ Unsure
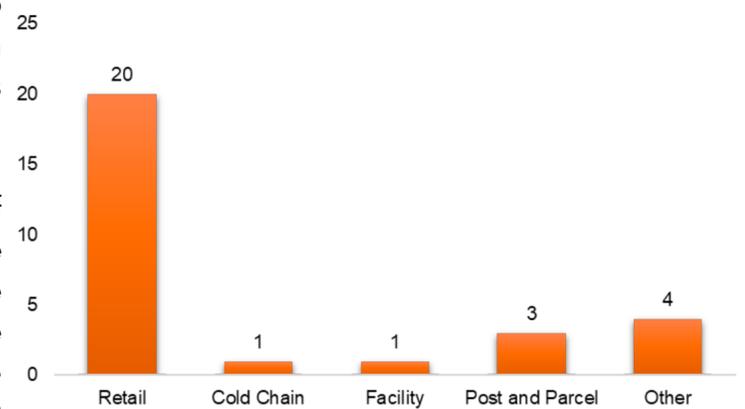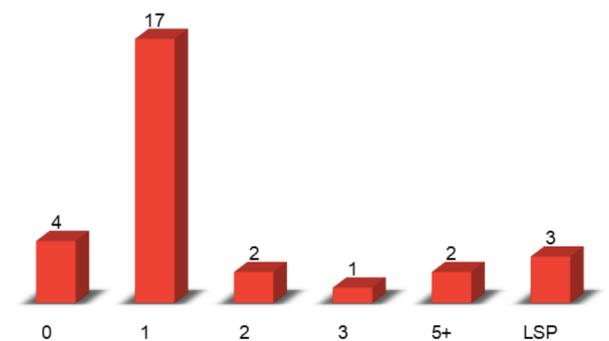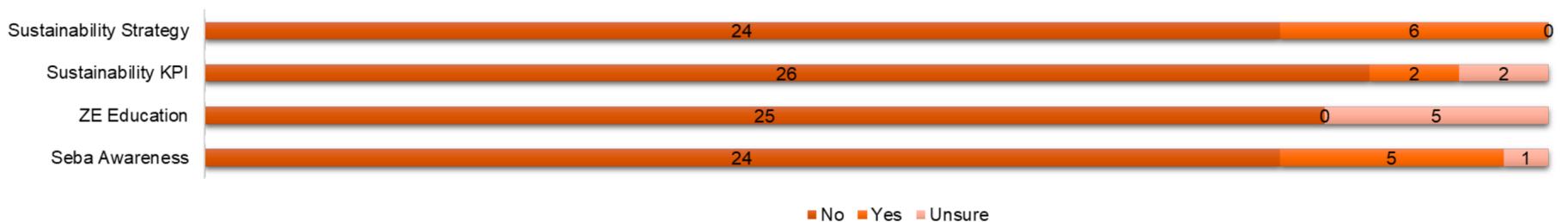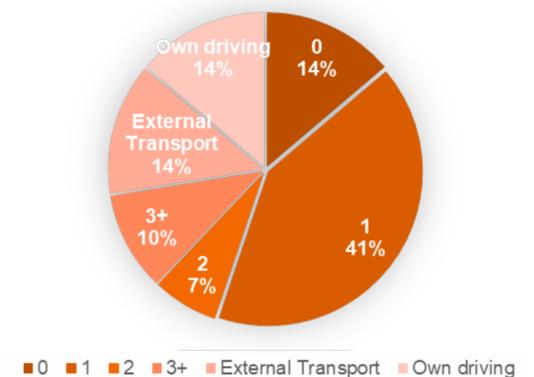
Zero-Emission City Logistics Maturity

Maturity Table

Below are the results of the maturity analysis visualised on a heat map with each row dedicated to a different company and the columns relating to the areas of transformation. The key with the levels and the colours related to them is on the right. Level 0 represents an immature process or department and level 5 represents maturity.

Rotterdam Zero-Emission Zone Maturity

	Company	HR	Fleet	Operations	Finance	Purchasing
1	Tugba Home	0	0	0	0	2
2	Max-Edelmetaal	0	0	0	0	0
3	Malik	0	0	0	0	1
4	Mlouza	2	2	1	3	2
5	Body muscles supplementen	1	1	1	1	3
6	Mega Bike Rotterdam	1	1	1	2	3
7	Ahoy hengelsport	1	1	2	1	2
8	De Jonge vakkleding	0	1	1	1	2
9	Mystiek	1	1	2	1	2
10	Alblas tweewielers	1	1	2	2	1
11	Florist	0	0	0	0	0
12	Albert Heijn	0	1	2	2	2
13	Paraddy Sportswear	1	1	1	1	1
14	Vitra	0	0	0	1	1
15	Temarch&Co	1	1	0	0	2
16	SPAR city Witte de With	3	2	2	2	3
17	Williams Canteen	2	1	1	1	0
18	Wok to go	0	2	1	0	2
19	Shabu Shabu	1	1	0	0	1
20	Ajisan Ramen	1	1	1	1	2
21	Smartlab Fix	0	0	0	0	0
22	JM	0	0	0	0	0
23	De Nieuwe Kaap	0	1	1	1	1
24	Eetcafé Erasmus	0	0	0	0	0
25	Güven Wonen	0	0	0	0	0
26	Toon hoek vishandel	0	0	0	0	0
27	Divan Concept	0	0	0	0	0
28	Bloemenland	0	0	0	0	0
29	JOOST | Macarons & More	1	2	1	1	1
30	Foxi mobiel	0	0	0	0	0
	Average	**1**	**1**	**1**	**1**	**1**

Key

Colour	Level
(dark red)	Level 0
(red)	Level 1
(orange)	Level 2
(yellow)	Level 3
(light green)	Level 4
(green)	Level 5
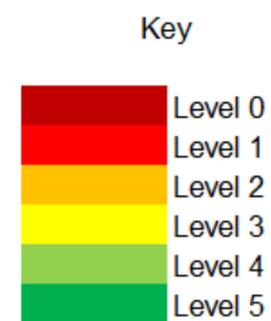
As alluded to in the QuickScan results, this heat map indicates a very low maturity across the board which is problematic, the highest scoring companies got a 3 and even then, this was the only 3 in the row. When going through the responses it was clear that the companies that got a 3 were using logistics service providers who are currently testing out zero emission vehicles, thus giving them a stronger score out of association. This shows that SME's who are not considering purchasing ZE vehicles have a great chance of maintaining business in the zero emission zone if they outsoure logistics to a company that is already driving zero emission.

Zero-Emission City Logistics Maturity

Conclusion and Further Actions

With the looming implementation of zero emission zones it is important for the Rotterdam municipality to speak to business owners at grassroots level and pursue educational campaigns. It is also pertinent that incentive schemes be created in order to persuade business owners to take action and build their maturity.

It is clear that there is a need and an urgency for conducting further ZE maturity scans in order to establish whether the issue of immaturity is localised or whether other municipalities are facing the same issues. As such, the maturity scans will be continued at BUas and Hogeschool Rotterdam, a number of applications have been made in the educational programme where students will collect data, these activities will be done for:

Breda University Undergraduates
•BUas Free Electives
•Connection to Industry and Research (First years)
•BUas Minor

Hogeschool Rotterdam Masters students
•Two ongoing thesis assignments due in January 2022

Possible Internship Assignments
•Maturity Model for Cities – How signatory cities in Noord Brabant are handling ZEZ implementation
•Maturity Model for SME's – A dive into SME city logistics maturity (Breda and Tilburg)
•Roadmap to Zero-Emission: Guiding SME's towards zero-emission readiness

On the further development of the maturity model:
•Use feedback from Rotterdam Minor students to improve the QuickScan
•Monitor the maturity of SME's over time to see if companies are progressing towards zero-emission
•Create online surveying tool which gives respondents feedback on how to improve maturity
•Use QuickScan and Maturity Model in more regions (via the collaboration of Dutch universities of applied sciences in the Center of Expertice KennisDC Logistiek)
•Create online surveying tool for respondents to fill in themselves (without student involvement) that can provide respondents feedback on how to improve maturity (or more practical: provides them with next steps towards more sustainable or ZE city logistics)
•Provide insights (in case of higher respondent rates) in differences in cities, logistics segments, company sizes, etc.

Zero-Emission City Logistics Maturity

Further reading and more information

Related (planned) publications following from this project**:**
•Anand, N., K. Mittelmeijer, T. Motloung, R. van Duin, H. Quak (2021). Development of city logistics maturity model for municipality performance measurement. Vervoerslogsitieke werkdagen, Mechelen 18-19 November (postponed to 11-12 March 2022 due to COVID-restrictions)
•Motloung, T. and H. Quak (2021). Towards a zero emission city logistics maturity model. Vervoerslogsitieke werkdagen, Mechelen 18-19 November (postponed to 11-12 March 2022 due to COVID-restrictions)
•K. Mittelmeijer (2021). The Development of a Maturity Model to measure progress on Sustainable City Logistics in the Netherlands. MSc thesis.

submitted abstract:
•submission to Green Cities 2022 (5th International Conference Green Cities – Green Logistics for Greener Cities): Hans Quak, Thato Motloung and Ron van Duin, A zero emission city logistics maturity model; how far are companies in their preparations for a more sustainable city logistics organisation