Graduation Plan

Master of Science Architecture, Urbanism & Building Sciences

Graduation Plan: All tracks

Submit your Graduation Plan to the Board of Examiners (Examencommissie-BK@tudelft.nl), Mentors and Delegate of the Board of Examiners one week before P2 at the latest.

The graduation plan consists of at least the following data/segments:

Personal information	
Name:	Marcel de Groot
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Studio		
Name / Theme:	Urban Metabolism | Urban freight transport	
Main mentor:	Dipl.Ing. U.D. (Ulf) Hackauf	Dep. of Urbanism *[Faculty of Arch]*
Second mentor:	Dr.ir J.H. (John) Baggen	Dep. of Transport and Planning *[Faculty of CiTG]*
Argumentation of choice of the studio:	Urban freight transportation concerns the movement of goods through cities, generated by economic needs of businesses and people. Urban freight flows are with respect to sustainability, accessibility and liveability inherently connected with the performance of cities and their metabolism. Logistics are considered as the link between resources, products, products and consumers (Zheng & Zhang, 2010). Since this graduation project will examine the flows of goods and resources (freight) of households within cities borders and especially re-evaluate the performance of 'infrastructures', 'modes' and 'nodes' behind those flows, this topic fits in the studio of urban metabolism. In the end, the research will seek eco-friendly ways by reducing negative environmental, social en economic externalities to perform and accommodate urban freight in the future.	

Graduation project	
Title of the graduation project	Delivering the future of urban freight *Towards a strategic framework of urban freight for households in the MRDH*
Goal	
Location:	Rotterdam-The Hague metropolitan area (MRDH) *(in particular the cities of Rotterdam, The Hague and Delft are considered)*

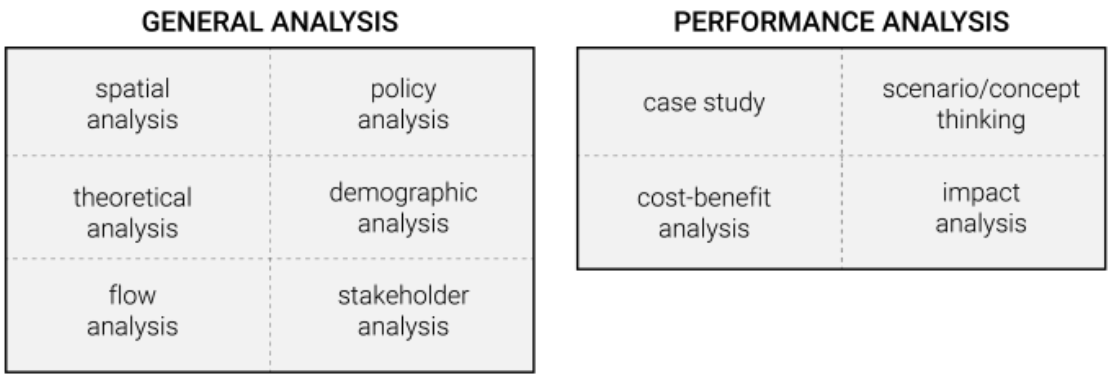
The posed problem	With the adoption of automobile vehicles as the main mode of transportation, urban freight is considered as the generator of negative externalities in urban areas. It's the inescapable truth that these vehicles do make intensive use of depletable resources of energy, human and carbon (Goldman & Gorham, 2006). Urban freight transportation on the road has environmental, economic and social impact on cities (Taniguchi, 2014). Additional to this, trends such as urbanisation (more people, logistic sprawl) and globalisation (e-commerce) are exacerbating impacts on society even more since these dynamics are responsible for changing spatial logistic lay-out, modes and infrastructures and thus for an increase of flows and distances. Lowering transportation costs, however, has priority over efficiency in transportation flows and vehicle kilometres. In the case of most cities, current freight policies are at the moment insufficient to tackle the increasing negative externalities due to lack of knowledge and awareness on urban freight and measures (Dablanc, 2007). Also insights of interests and interaction between urban freight stakeholders are limited. Decisions on transportation tend to focus on economic growth and the creation of jobs (Goldman & Gorham, 2006). Sustainable development is a guide for creating a future in the long term. One of the prerequisites for sustainable development is sustainable transportation. Therefore, to achieve the goals of sustainable development the negative impacts of transportation needs to be mitigated. Solutions need to be found that mitigates transportation impacts, without disadvantaging quality of life and exacerbate depletion of other resources (Russo & Comi, 2012). The thesis also tries to respond by means of urban freight to the Paris Climate Agreement, the Dutch government signed in 2015, the Coalition Agreement in 2017, the translation to the preliminary Dutch Climate Agreement in 2018 and the MRDH goals. With that, the Netherlands has set clear goals: a regional reduction of 30% of greenhouse emissions in 2025, a national reduction of 49% in 2030 and 95% in 2050, compared to 1990 (MRDH, 2018; Rijksoverheid, 2019).
research questions	**MRQ**: How can a framework of urban freight transportation accommodate the increasing logistic demand of the MRDH in a sustainable and liveable way? **SRQ1:** How is the urban freight transportation currently organised in the MRDH in terms of: a) initiatives, concepts and measures b) spatial organisation of logistic facilities c) stakeholder management

	SRQ2: What are the impacts of urban freight transportation in the MRDH? **SRQ3:** How can the organisation of urban freight transportation be improved in the MRDH in terms of: a) innovative and sustainable concepts b) spatial organisation of logistic facilities c) stakeholder management **SRQ4:** How can the different components of the framework synergise urban freight transportation in the MRDH? The research questions are built up in a way that the first part of the research consists of the analysis of the status quo of the urban freight and what the impacts are (you need to know the current state before you can improve). The second part of the research consists of the actual improvements and finding synergy between those three components. To feedback on the main research question, this finally needs to be applied on the MRDH.
design assignment in which these result	The lack of understanding and alignment in measures from municipalities calls for a comprehensive framework, consisting of the understanding of the three components*, that needs to be developed for mitigation of negative externalities. The framework has to seek synergy in the three different components, in the first instance developed from the perspective of the (three) municipalities in the MRDH, but could be useful for other authorities of metropolitan and regional areas as well. At the end of the research, a strategic framework for freight transportation in the MRDH can be proposed, based on the three components. In concrete sense, this means a spatial strategy with a set of interventions that are affecting urban freight activities in a way that it aligns with the goals of the framework: mitigating negative externalities of transportation and accommodating the increasing logistic demand. Deliveries of urban freight to consumers is becoming challenging and thus the research will find ways to accommodate this in cities in a liveable and sustainable way. * *1) the use of innovative and sustainable concepts, measures and initiatives [what and how];* *2) spatial organisation of logistic facilities [where];* *3) stakeholder management [by whom]*

Process

Method description

There are two different categories of research methods/analysis distinguished: general analysis, which are studies dedicated to a general understanding on phenomena (of urban freight) on a spatial, conceptual and legal level. They analyse e.g. different maps, data, documents or literature to synthesise new information. Performance analysis are studies dedicated to the performance of different knowledge. They test designs or ideas and could provide new insight into the research and design process. The following research methods are applied for each of the categories:

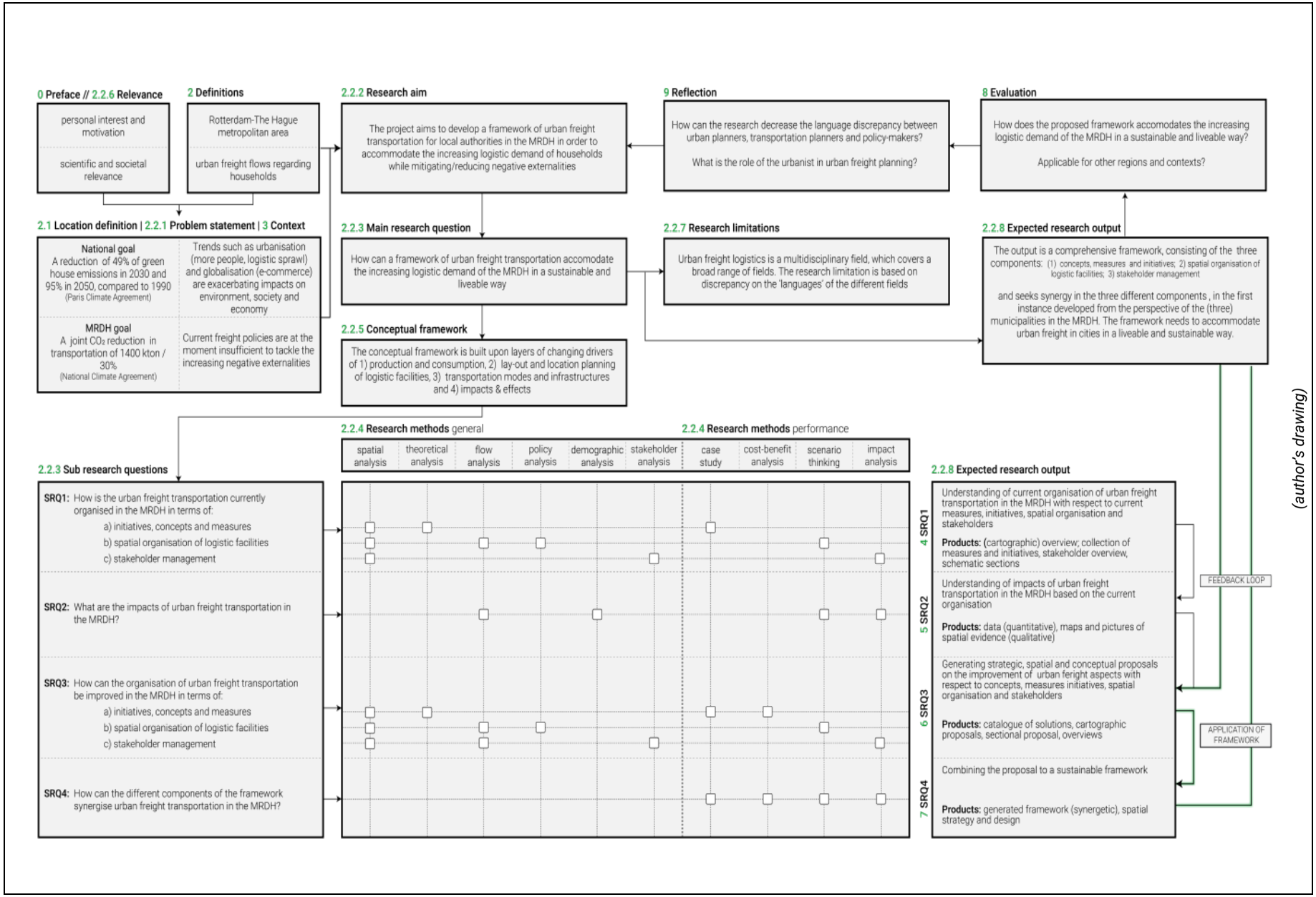


(author's drawing)

Some of the methods are thus used for deriving numbers, facts, causes and how a specific system works since some of the variables (e.g. # trucks, # warehouses, emissions, distances) and their performance (e.g. capacity, intensity, efficiency) are quantifiable. Other methods are linked to the spatial side of logistics and are related to the supply chain and its stakeholders.

An understanding of current flows, supply chain and the operation of logistics need to be acquired. Collected data can give this more body. Also, important stakeholders need to be identified. From a general idea, the next step will be spatialising the supply chain and stakeholders which will turn the research from general understanding to a specific understanding. Location-specific optimisation techniques and measures could be generated and applied directly. Parallel on this, research and a collection will be done on the current concepts and methods of sustainable freight transportation. Combining and integrating the knowledge, the concepts and location-specific findings into a complete framework should result in fulfilling the research aim.

The following spread summarises and concludes the methodological chapter with the overview of the research framework.



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Literature and general practical preference

General transport theory:

Rodrigue, J.P., Comtois, C., & Slack, B. (2013). The geography of transport systems (Third edition).

Research about logistic phenomena (globalisation, e-commerce, logistic sprawl)

Research of some of well-known authors in the field of urban freight:

Allen, J.	Dablanc, L.	Russo, F.
Brown, M.	Heitz, A.	Taniguchi, E.
Bjørgen, A	Lindholm, M.	Tavasszy, L.A.
Comi, A.	Ploos van Amstel, W	Van Duin, J. V. H.

Governmental and municipal documents:

CRa. (2019). (X)XL-verdozing. Retrieved from https://www.collegevanrijksadviseurs.nl/binaries/college-van-rijksadviseurs/documenten/publicatie/2019/10/29/xxl-verdozing/%28X%29XL+verdozing+-Minder%2C+compacter%2C+geconcentreerder%2C+multifunctioneler.pdf

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MRDH. (2018). CO_2-reductie mobiliteit Regio Rotterdam Den Haag. Retrieved at 24 November 2019 from https://www.ce.nl/publicaties/download/2473

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Reflection

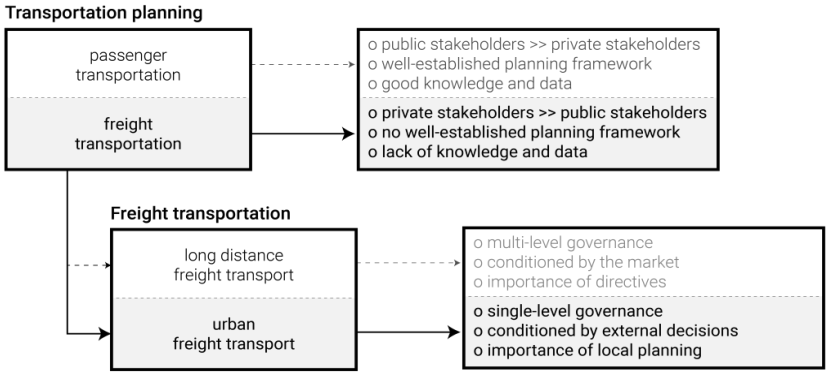
Relationship graduation topic, studio topic, master track and master programme

There is an inherent relationship between urban freight and urbanism. The urban metabolism and the urban freight activities, which constantly changed and influenced through technical, societal, political and economic effects, make use of the urban space, our cities. The planning of urban freight affects the sustainability, liveability and climate goals we aspire as urbanists and therefore emphasises the urgency to find integration with the urbanism discipline. The integration is recognized as crucial in reaching goals of sustainable development. The freight transportation planning discipline will be examined and redefined from the urban planning perspective with the approach of the Urban Metabolism studio as the topic will develop an urban system for freight transport that is less damaging to the environment.

Scientific relevance

Transportation planning consists of planning for passenger transport and freight transport. Both planning fields are important for the liveability and accessibility in cities and are thus important themes in the field of urbanism. There is, however, a tendency to neglect freight planning in urban planning (Bjørgen et al., 2019). Urban transportation is usually associated with public transportation, as shown on figure 2.9. The consideration of urban freight within the planning discipline remained limited up to the twenty-first century. Issues related to urban freight transportation were neglected by urban planners (Rodrigue et al., 2013). Various, independent taken measures are now performed in a suboptimal way or are not appropriate for the local context, which has resulted in unintended side effects.

The lack of knowledge and the lack of awareness at local authorities and planners are one of the largest barriers nowadays in planning a proper urban freight strategy. With new emerging challenges in the field of urban freight, a better understanding of current urban freight problems by urban planners needs to be developed by searching more overlap in both transport planning and urban planning disciplines in order to find alignment to come with a strategy to mitigate negative externalities. The lack of understanding and alignment in measures from municipalities calls for an integrated approach, which is built upon a comprehensive understanding of urban freight transport. Although, the project does not come with mathematical and 'technical' understanding, it will be required for an urbanist to understand completely the spatial, social and legal aspects of it. The project will contribute by showing ways and methods for urban planners to look at urban freight issues. From urbanism point of view, this also can be considered as an exploration in other foreign fields, an attempt to bridge the scientific discrepancy between the different 'languages' within the urban freight field.



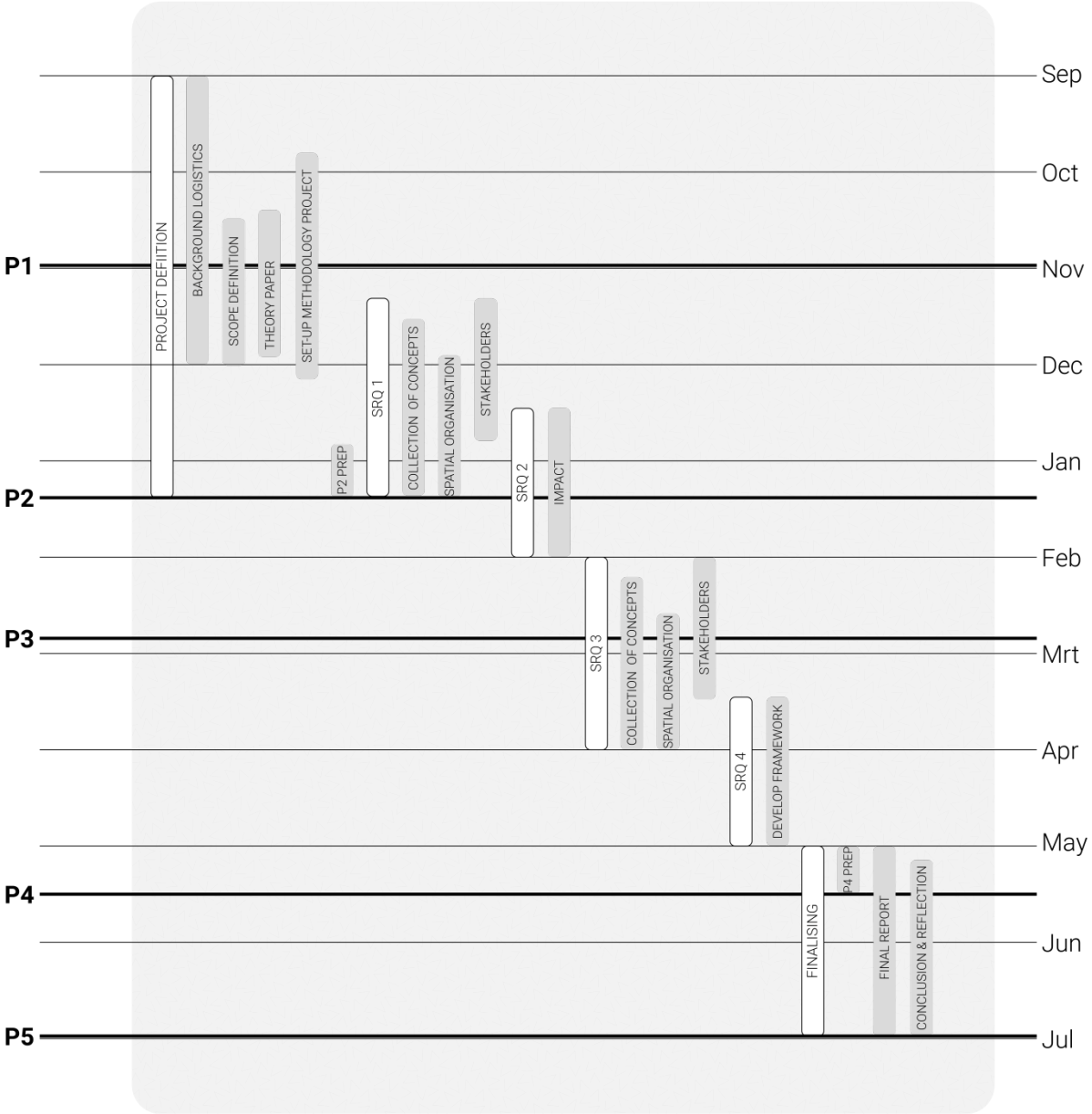
(adapted from Le Pira et al., 2017)

Social relevance

Urban freight affects sustainability, liveability and traffic performance of cities. It has a direct impact on human health, an estimation of 0.5 million people die each year from air pollution as a consequence of urban freight transport (Kauf, 2016). Urban freight transportation is supporting cities' activities, however, they also have a high negative environmental, economic and social impact. Examples are air pollution (environmental); traffic congestion and delivery delays (economic); and safety and decrease of liveability on the overall built environment (social).

With the trend of increasing freight volumes through cities, urban planners and decision-makers face the challenge to mitigate negative externalities before it becomes unbearable in cities. Due to other exacerbating trends such as globalisation, urbanisation and up-coming e-commerce, optimisation of the urban freight system regarding distribution and management of flows like waste, food and people is necessary to on the one hand make the transition towards sustainable development and on the other hand accommodate the increasing demand. Therefore, the thesis tries to research eco-friendly transportation strategies concerning logistic facilities, vehicles and infrastructures to make cities more liveable and sustainable, while accommodating the current and future's demand. At the same time, the thesis also responds on several climate goals concerning greenhouse emissions on global, national and regional and city scale (Paris Climate Agreement, National Climate Agreement, Greendeal Zero Emission Stadslogistiek).

Time planning



Sources plan

Bjørgen, A., Seter, H., Kristensen, T., & Pitera, K. (2019). The potential for coordinated logistics planning at the local level: A Norwegian in-depth study of public and private stakeholders. Journal of Transport Geography, 76, 34–41. https://doi.org/10.1016/j.jtrangeo.2019.02.010

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Zheng, L., & Zhang, J. (2010). Research on Green Logistics System Based on Circular Economy. Asian Social Science, 6(11), p116. https://doi.org/10.5539/ass.v6n11p116