Sustainable City Logistics

Analyzing and modeling the current freight traffic in the Poelestraat

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Introduction

In 2014 the municipality of Groningen signed the Green Deal Zero Emission Stadslogistiek, stating the goal to obtain an emission free city distribution by the year of 2025 and an emission free city centre in 2030.

One of the proposed solutions to reach this goal is to place an urban consolidation centre near the city borders in order to consolidate the freight bound to the city and to optimize logistics. The Learning Community 'Sustainable City Logistics', at the RUG, is currently researching the possible implementation of an urban consolidation centre near the city centre. The Oude Kijk in 't Jatstraat has been monitored in a previous research.

Problem and research question

The information about the current freight traffic in the city centre of Groningen is insufficient to support decisions for change.

The scope of this Integration Project is the Poelestraat in Groningen, since it is located within the window time area and other shop types are present in the street compared to the Oude Kijk in 't Jatstraat.

Research question: What are the logistic service levels of individual shops and businesses, what is the cumulative supply profile and to what extent is nuisance experienced in the Poelestraat?

Important sub question: Is it possible to make a generic method to efficiently obtain a realistic supply profile of a street?

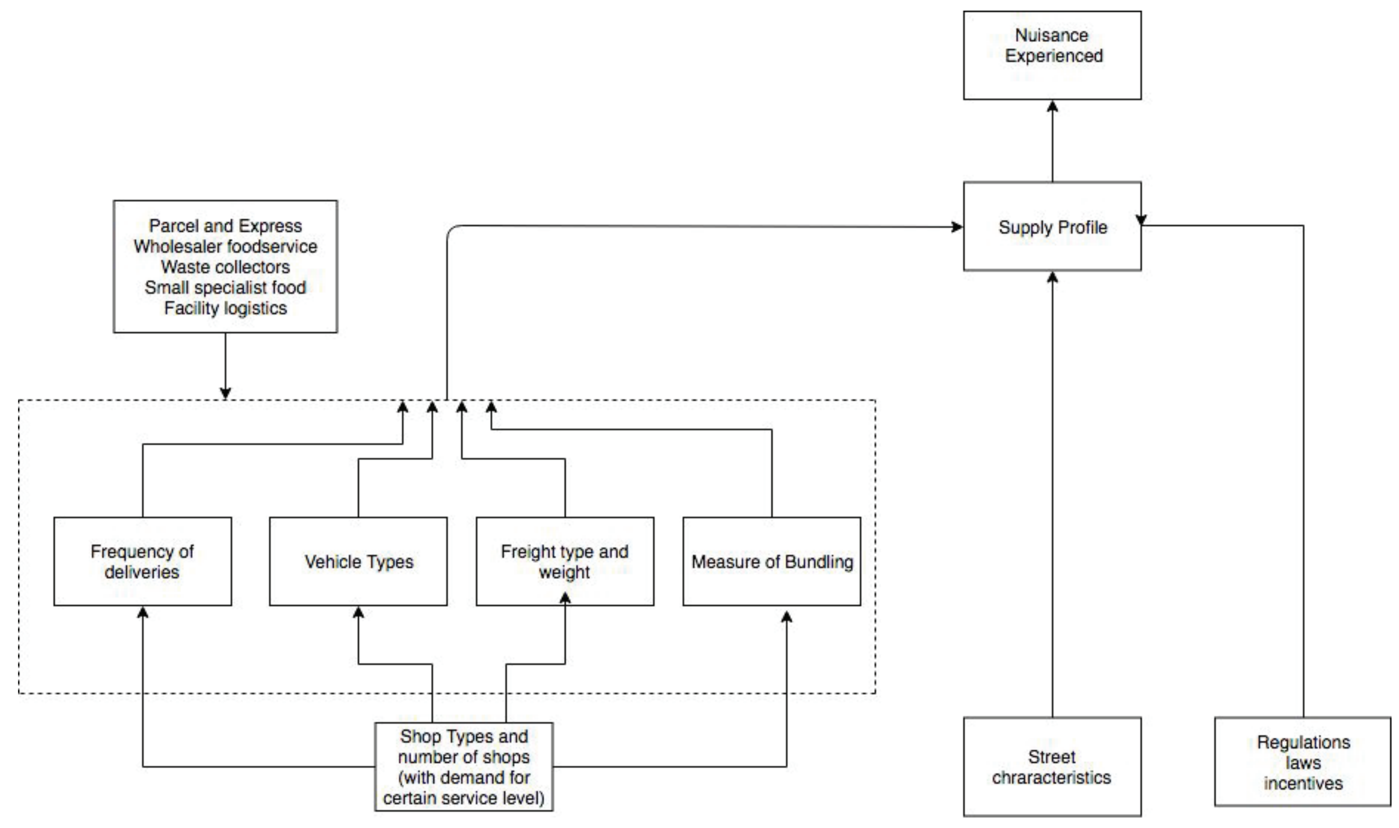
Prediction tool

Organisation distribution	Network organisations	Central distribution	Incidental distribution	Own supply	Private individuals deliver
	27,0	1,3	19,5	14,4	0,5
Network provider	**PostNL**	**Dpd, DHL, UPS, GLS, TNT**	**Hanos**	**De Klok Dranken**	**Bier&co**
	8,9	9,8	6,3	1,8	0,3
Time until delivery	**Differs**	**One day**	**Two days**	**Three days**	**Four days**
	0,2	0,7	5,5	15,2	26,5
Stock space	**Small**	**< 5 m2**	**5-10 m2**	**10-15m2**	**> 15m2**
	14,3	12,2	11,7	1,2	18,0
Delivery frequency	**Daily**	**5 times per week**	**4 times per week**	**3 times per week**	**2 times per week**
	14,3	6,3	7,3	11,3	16,1
Vehicle type	**Van(<3.5 ton)**	**Small truck(3.5-7 ton)**	**Truck (7-18 ton)**	**Truck-trailer (>18 ton)**	**Cargobike**
	16,2	12,5	25,8	0,0	6,3
Freight type	**Foods**	**Drinks**	**Care products**	**Office supplies**	**Furniture**
	27,5	27,3	0,3	3,2	2,2
Freight weight	**Up to 5 kg**	**5-10 kg**	**10-20 kg**	**Tens of kg's**	**Hundreds of kg's**
	1,6	0,2	7,9	20,8	16,0
Unloading procedure	**Container**	**Pallet**	**Clothes rack**	**Trolley**	**Loose boxes/ crates/barrels**
	22,0	7,9	0,0	14,8	18,3
Bundling	**Yes**	**No**			
	28,8	15,0			

A Da	1
A1	1
A1 C	1
A1 D	3
A2	4
A2c	4
A3	4
A3c X	3
A5	1
A6	5
B	1
C	2
D	1
I	1

In order to answer the sub question mentioned above, the detailed information available from the two streets is processed and used to predict logistic behaviour for another street. The processing consists of categorisation of shops, validations with k-means clustering and summarising data in pivot tables. The number of shops and the shop types (lower left corner) are required as only input for the prediction, outputs are ten predetermined logistic indicators. The advantage of the prediction will be a decrease in time needed to obtain a logistic profile of a street, compared to the method used before. Furthermore, new interview data can be added to the underlying database, the calculations are automatically updated.

Conceptual model



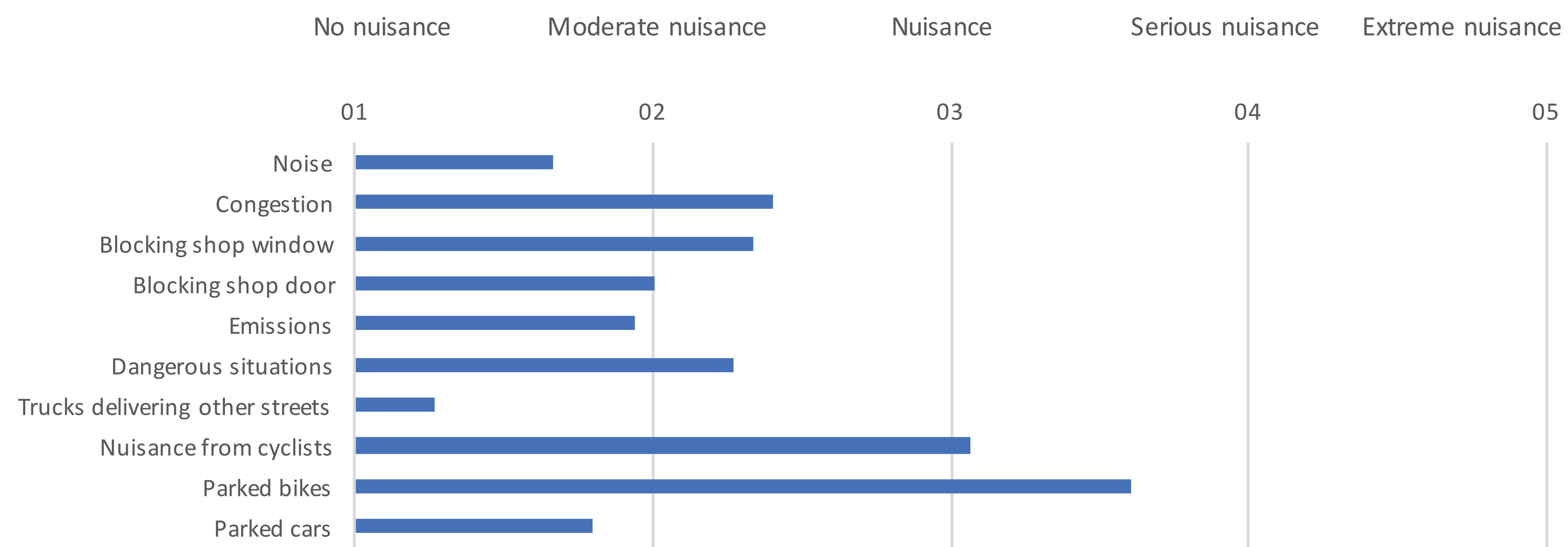
Methods

Interviews with shop owners: Obtaining logistic information and data about the nuisance experienced in the street.

Interviews with logistic service providers: Obtaining logistic information from the parties who deliver the service, to increase the quality of the assessment of the efficiency in the current situation.

Observations: Counting traffic and logistic movements in the street whilst paying attention to the extent to which freight is being bundled

Results



Vehicle type	Average stay	Standard deviation
Truck	00:38:40	00:33:09
Van	00:13:47	00:15:34
Small truck	00:10:40	00:09:04

Vehicle type	Average passes/ morning (8.30am-12am)
Truck	8
Van	7
Small truck	3
Car	28
Scooter	10
Bike	253
Waste truck	2
Cleaning vehicle	5

The interviews are structured in nine categories, the same categories are used to view the results. The information from the interviews is predominantly presented in graphs. The nuisance overview is showed here. The tables summarize the results of the observations in the street. Only a part of the results are shown.

Conclusion

By means of analysing and modelling the interviews and observations, the current situation in the Poelestraat is embodied in an overview of nuisance experienced and a supply profile. Nuisance from cyclists, parked bikes and congestions are determined to be most disturbing. Possibilities for improvement are enforcement of regulations and clear rules for the loading and unloading procedure. It appeared that deliveries are currently predominantly delivered by parties which are already bundling freight. Agreements between suppliers and shop owners, specialised vehicles and difficulties regarding food delivery regulations are found to impede the implementation of an urban consolidation centre. Lastly, by using the data obtained from the Oude Kijk in 't Jatstraat and the Poelestraat, a prediction is designed. Further research must provide data of missing shop types to complete the tool, this will also increase the reliability.