

## ***GR**een And Sustainable freight transport Systems in cities*

# **RESULTS OF THE ANALYSIS – THE INCEPTION REPORT**

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## 1 INTRODUCTION

The dynamic development of transport in recent years constitutes an important factor in the economic development of the world, but it is also a source of problems, which can be observed especially in urban areas.

Mobility plays a very important role in ensuring the sustainable development of the city. Urban transport systems generate many positive effects. In addition to the unquestionable importance for the development of urban economy, urban transport systems assist in the formation of the local community, which has a positive impact on counteracting social exclusion. This manifests itself mainly in the fast and easy access to places of culture (theaters, cinemas, museums, parks, etc.). However, air pollution emitted by motor vehicles in urban areas is the source of the greatest contamination of the atmosphere. In urban areas, there is consumed approx. 70% of energy and produced approx. 80% of greenhouse gases (Istituto ... 2008). In the years 1990-2000, carbon dioxide emissions by road transport increased by 23% (Załoga 2013). This constitutes a serious threat to human health, natural resources, as well as the quality of the raw materials necessary for the production of food.

A growing number of city users results in increased demand for cargo, the large part of which is generated by industrial, retail and service entities. This applies in particular to finished products; however, due to the location of these entities in urban areas, it also applies to raw materials and semi-finished products. Distribution function initiated by these entities causes an increase in the logistics flows on a limited area. And this leads to the situation, in which the impact of urban freight transport on the urban environment becomes more and more significant. Research carried out in London show that approx. 18% of traffic in the city is generated by delivery cars supplying these entities. The next 22% of the traffic on urban roads is generated by delivery cars and carriers, which provide services for individual customers by delivering orders personally. The research also shows that some of the deliveries carried by different carriers/ delivery cars intersects and is performed at partial use of the loading capacity (Browne, Baybars 2004). In addition, one of the key problems of transport in the cities is congestion, understood as the overflow of transport network and means of transport caused by exceeding their capacity or its deficiency (Mendyk 2009), which is responsible for the increase in air pollution, energy consumption, but also for longer travel time.

While assessing the impact of MTT on the environment, the first step should involve making a division between the first-order and second-order impact (Cullinane, Edwards 2011):

- the first-order impact concerns stakeholders directly involved in the MTT (wholesalers, carriers, handling service);
- the second-order impact concerns e.g. the costs of infrastructure (roads), especially in underdeveloped countries, which causes interference with the environment and global warming.

The continuous increase in the number of motor vehicles, and above all, their exploitation, not only causes the emission of pollutants from exhaust gases, which are endanger human health, but it also reduces reserves of oil. In recent years, a very important issue becomes the reduction of pressure of transport on the environment and the scale and scope of its negative effects. Actions in this area should be conducted on different levels of government and self-government authorities with the collaboration of the private sector. On the one hand it becomes necessary to implement appropriate legal and administrative regulations, on the other hand, to develop the appropriate management of urban space. Urban planners must take into account the needs of residents in terms of employment, health, education and

transport needs, as well as provide recreational facilities, shopping places and waste management plants.

## 2 RESEARCH OBJECTIVES

The main problem arising in the process of analyzing the functioning of the transport and distribution of goods in cities is the lack of data on their implementation, in particular with regard to the classification of the vehicles, their routes, the level of demand for transport, etc.

In the area of urban freight transport, data can be classified according to three basic criteria (Taniguchi et al., 2001a, p. 50):

- variability:
  - static (fixed),
  - dynamic (variable);
- reliability:
  - deterministic (certain),
  - probabilistic (random),
  - diffused (ambiguous);
- sources from:
  - public sector (road and area administrators),
  - private sector (carriers or customers).

Table 1 shows examples of the types of data divided by the above categories.

**Table 1. Overview of selected data in urban freight (Iwan 2013).**

Data	Variability	Reliability	Source
<b>Features of the system</b>			
The geometry of the transport network and regulations	static	deterministic	public sector
Forms of land use	static	deterministic	public sector
System requirements: <ul style="list-style-type: none"> <li>• back data on traffic volume</li> <li>• other data on vehicles</li> </ul>	static	deterministic	public sector/ private sector
<b>Use of the system</b>			
Travel time – back data	static	probabilistic	public sector/ private sector
Travel time – current data	dynamic	probabilistic	public sector/ private sector
Data on road accidents and incidents	dynamic	deterministic	public sector
<b>Fleet</b>			
Specificity of vehicles (including vehicle load capacity)	static	deterministic	private sector
Vehicle location	dynamic	deterministic/ diffused	private sector
<b>Customers</b>			

Data	Variability	Reliability	Source
Location – back data	static	probabilistic	private sector
Location – current data	dynamic	deterministic	private sector
Time windows – back data	static	deterministic	private sector
Time windows – current data	dynamic	deterministic	private sector
Demand – back data	static	deterministic	private sector
Demand – current data	dynamic	deterministic	private sector

Major difficulties in terms of implementation of urban freight transport solutions result from problems associated primarily with the processes of data acquisition. This issue should be analyzed from two perspectives (Iwan 2013):

- acquisition of data directly for the implementation of good practices and implementation of this process in accordance with the principles of benchmarking;
- acquisition of data and generation of knowledge resources for later functioning of the system.

Lack of possibility in obtaining relevant data, or lack of skillful identification of its sources, caused the situation in which even with proper development of indicators it is not possible to make direct comparisons and thus select good practices for implementation. This, in turn, implies the need to make correct identification of the necessary areas of expertise, data sources, processes for their processing and related economic conditions.

The main reasons of difficulties in obtaining these data include the following facts (Taniguchi, Thompson, Yamada 2006):

- urban deliveries involve mainly private companies, which usually do not want to share data on their transactions, supplies and transported goods with their competitors and the public sector;
- there are no standardized research methods in the field of urban freight deliveries.

The first aspect is especially problematic. The fact that private companies, performing the vast majority of transport within the city, do not want to share data on the type of delivery, the degree of load capacity utilization, routes, etc. mainly results from concerns about maintaining a competitive position in the market. Therefore, the analysis of the impact of solutions on the urban environment and the functioning of the companies involved in the distribution processes within cities becomes quite difficult. Lack of data on transport routes, and in particular their length, makes it troublesome to determine the extent to which these processes are carried out.

Activities undertaken as part of Work Package 3 aim at filling the information gap in the functioning of urban freight transport. The planned tasks focused on the acquisition and analysis of data on the implementation of freight in Szczecin and Oslo, while the research focused on the provision of transport services in terms of delivery to the four main categories of entities:

- retail entities,
- HoReCa,
- service entities,
- production plants.

Overview of the activities undertaken within Work Package 3 is presented in Table 2.

**Table 2. Actions undertaken within Work Package 3.**

<b>Pakiet Roboczy</b>	<b>3</b>	
Nazwa	Analiza wpływu transportu towarowego na środowisko w Szczecinie i Oslo	
Koordynator	Dr Kinga Kijewska	
Data rozpoczęcia	1.01.2014	
Data zakończenia	31.12.2015	
Cel	Analiza wpływu miejskiego transportu towarowego na środowisko i jakość życia w Szczecinie (Polska) i Oslo (Norwegia) w czterech okresach czasu.	
Zadania	3.1 – Okresowe badania prowadzone w Szczecinie i Oslo 3.2 – Analiza wyników	
Etapy	Nazwa	Miesiąc
	3.1.1 – Rozpoczęcie analizy dla pierwszego kwartału	II 2014
	3.1.2 – Rozpoczęcie analizy dla drugiego kwartału	VIII 2014
	3.1.3 – Rozpoczęcie analizy dla trzeciego kwartału	II 2015
Rezultaty	3.1.4 – Rozpoczęcie analizy dla czwartego kwartału	VIII 2015
	3.1.1 – Wyniki analizy – raport wstępny	VII 2014
	3.1.2 – Wyniki analizy – raport cząstkowy	I 2015
	3.1.3 – Wyniki analizy – raport dla trzeciego kwartału	VII 2015
	3.1.4 – Wyniki analizy – raport końcowy	I 2016
<p>Wpływ na pozostałe pakiety robocze</p> <p>Wyniki analizy stanowiąc będą podstawę pakietu roboczego WP5. Rezultat D3.1.1 wykorzystany zostanie w początkowej fazie przeprowadzanego badania do określenia obecnej sytuacji w Szczecinie, a także oczekiwań użytkowników miejskiego systemu transportu towarowego. Pozostałe rezultaty opracowane w ramach tego pakietu roboczego stanowiąc będą podstawę do przeprowadzenia krok po kroku oceny wyników. Wyniki analiz przeprowadzonych w ramach tego etapu projektu stanowiąc będą również podstawę do wyboru odpowiednich środków i działań. Kolejnym ważnym celem niniejszego pakietu roboczego mającym wpływ na działania podejmowane w ramach pozostałych pakietów roboczych jest przygotowanie danych potrzebnych do opracowania modelu pakietu roboczego WP4.</p>		

The first stage of work undertaken within the Work Package 3 included carrying out initial research allowing for an assessment of the current status in the analyzed areas of Szczecin and Oslo.

### 3 FIRST STAGE OF ANALYSIS – RESULTS AND DISCUSSION

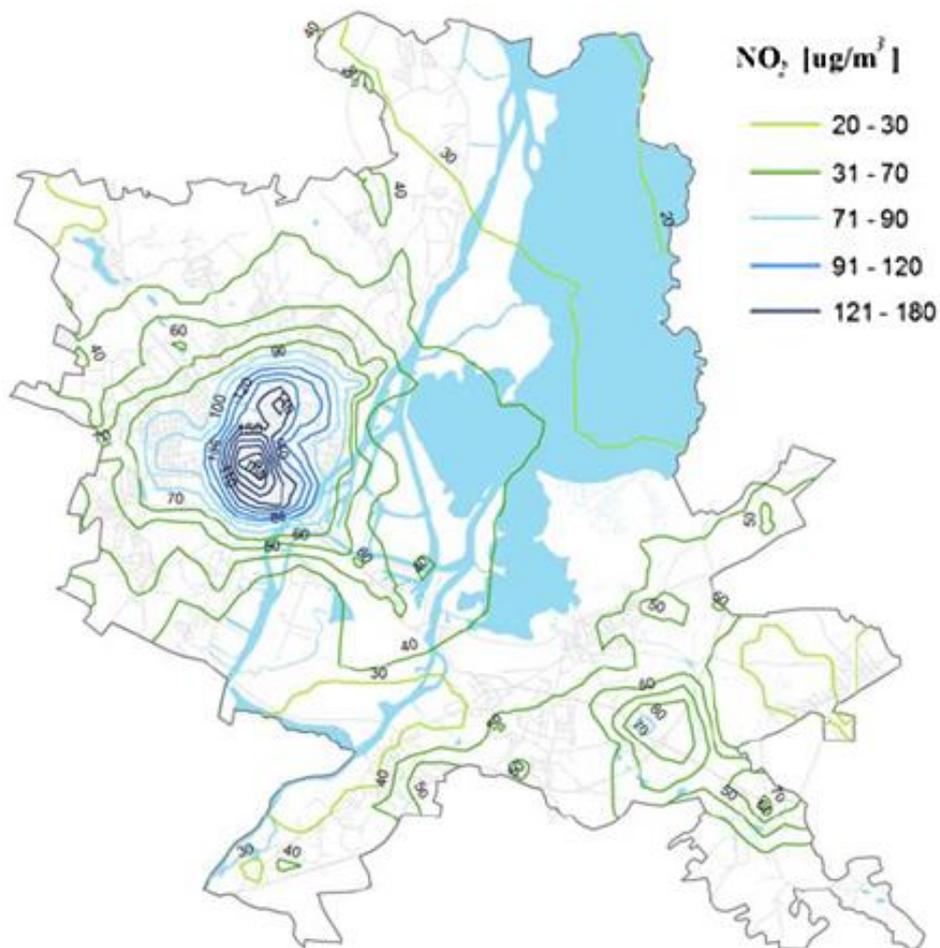
#### 3.1 Szczecin

Delimitation of the surveyed area in Szczecin focused on two factors:

- accumulation of entities in the particular area that generate increased demand for transport. The starting point for this part of the research were the results of analysis described in: R. Czyszkiewicz, W. Durka: Topografia szczecińskiej przedsiębiorczości. Szkic socjologiczno-ekonomiczny [*Topography of Szczecin entrepreneurship. Socio-economic picture*], Center for Economic and Social Development, China, 2011.
- analysis of the local impact of freight transport on the environment associated with the emission of chemical compounds, directly affecting the health of people living in

the city, such as nitrogen oxides, which have a similar impact on the human health as war gases, lead to lung damage and reduce the ability of blood to carry oxygen.

According to data from the Regional Inspectorate for Environmental Protection, NO<sub>2</sub> concentration level in Szczecin is focused around the downtown area. The highest concentration of NO<sub>2</sub> exceeding 120 µg/m<sup>3</sup> occurs, among others, within the Centre and the Old Town (Fig.1).



**Fig 1. The level of NO<sub>2</sub> concentration in Szczecin.**

Finally, the survey was carried out in the city center of Szczecin (Fig. 2).



**Figure 2. The area covered by the survey.**

Table 3 summarizes the number of entities in the surveyed area, divided into four categories (retail entities, HoReCa sector, service entities and production plants) by their location.

**Table 3. Number of entities by their type, located in the surveyed area of Szczecin divided by the streets.**

Street	Retail entities	Service entities	HoReCa	Production plants	Total
Bogurodzicy	8	4	2		14
Bogusława X	3	9	17	2	31
Brama Portowa	4	3			7
Jagiellońska	41	37	4	3	85
Jana Pawła II	17	44	11		72
Kaszubska	18	19	7	1	45
Małopolska	7	7	1	1	16
Mazowiecka		3	1	1	5
Mazurska	21	15	1	3	41
Monte Cassino	14	10	4	1	29
Niepodległości	22	9	6		37
Obrońców Stalingradu	12	8	2	3	25
Piłsudskiego	40	27	11	4	82
Pl. Grunwaldzki	5	3	2	1	11
Pl. Przyjaciół Żołnierza	1	1			2

Street	Retail entities	Service entities	HoReCa	Production plants	Total
Pl. Szarych Szeregów	5				5
Pl.Lotników	3	2	2		7
Pl.Zgody	1	2	2		5
Pl.Zwycięstwa	5	5	3		13
Plac Odrodzenia	2	2	3		7
Plac Zamenhofa			1		1
Podhalańska		2			2
Rayskiego	24	7	5	4	40
Śląska	27	19	6	1	53
Św. Wojciecha	7	7	3		17
Wielkopolska	18	13	5	2	38
Więckowskiego	2	16	1		19
Wojska Polskiego	48	47	13	3	111
Wyzwolenia	39	15	11		65
Total	394	336	124	30	884

In the research, there were identified 884 entities the operation of which generates traffic of delivery vehicles in the surveyed area of Szczecin. The survey was conducted among 69% (610 entities), while 31% (274) of entities refused to take part in the survey. Table 4 summarizes the number of entities, which participated in the survey, divided by the type of entity.

**Table 4. Number of entities, which participated in the survey divided by the type of entity.**

	Retail entities	Service entities	HoReCa	Production plants	Total
Number of survey participants	359	155	79	17	610

490 entities that took part in the survey receive regular deliveries. The remaining part of 120 entities reported that the number of received deliveries depends on the need to restock.

The research have shown that 175 entities receive deliveries of no more than 200 kg and 250 entities receive deliveries between 201-600kg. 120 entities reported that the size of deliveries is between 601-1000kg, 55 entities 1001-1500kg, 5 entities 1501-2000kg, and 5 entities receive deliveries of more than 2000kg. Additionally, more than 70% of retail entities reported a demand for deliveries between 201 -601 (34%) and 601-1000kg (38%). More than 50% of business entities from HoReCa sector generates a demand for deliveries between 201 kg and 1000 kg (39% between 201 and 600 kg and 22% between 601 and 1000 kg). In the case of service entities, the size of deliveries received by 45% is between 201 - 600 kg per week. The greatest size of delivery is received by production plants. In this category, a weekly size of delivery of 65% entities is between 1501 kg and 2000 kg. The above data was shown in Table 5.

**Table 5. Overview of delivery sizes for each industry group.**

Delivery size	Retail entities	HoReCa	Service entities	Production plants
below 200 kg	12%	13%	24%	0%
201 – 600 kg	34%	39%	45%	2%
601 – 1000 kg	38%	22%	23%	5%
1001 – 1500 kg	11%	15%	5%	7%
1501 – 2000 kg	3%	10%	3%	65%
above 2000 kg	2%	1%	0%	21%

This information was used to calculate the total average number of deliveries per week within the surveyed area and it amounted to 5486, the majority of which concerned deliveries to retail entities (2758, the average of 7 weekly deliveries per one entity) - Table 6.

**Table 6. The number of weekly deliveries for each industry group.**

	Total	Average per entity
Retail entities	2758	7
HoReCa	1680	5
Service entities	868	7
Production plants	180	6
Total	5486	6,5

The number of business entities was used to calculate the average number of deliveries per individual streets. The largest number of deliveries are made at streets Wojska Polskiego (680), Piłsudskiego (516), Jagiellońska (518), Wyzwolenia (425), Jana Pawła II (416), Śląska (322) - Table 7.

**Table 7. Delivery sizes divided by the streets.**

Name of the street	Retail	Service	HoReCa	Production	Total
Bogurodzicy	56	20	14	0	90
Bogusława X	21	45	119	12	197
Brama Portowa	28	15	0	0	43
Jagiellońska	287	185	28	18	518
Jana Pawła II	119	220	77	0	416
Kaszubska	126	95	49	6	276
Małopolska	49	35	7	6	97
Mazowiecka	0	15	7	6	28
Mazurska	147	75	7	18	247
Monte Cassino	98	50	28	6	182
Niepodległości	154	45	42	0	241
Obrońców Stalingradu	84	40	14	18	156
Piłsudskiego	280	135	77	24	516
Pl. Grunwaldzki	35	15	14	6	70
Pl. Przyjaciół Żołnierza	7	5	0	0	12
Pl. Szarych Szeregów	35	0	0	0	35

Name of the street	Retail	Service	HoReCa	Production	Total
Pl.Lotników	21	10	14	0	45
Pl.Zgody	7	10	14	0	31
Pl.Zwycięstwa	35	25	21	0	81
Plac Odrodzenia	14	10	21	0	45
Plac Zamenhofa	0	0	7	0	7
Podhalańska	0	10	0	0	10
Rayskiego	168	35	35	24	262
Śląska	189	95	42	6	332
Św. Wojciecha	49	35	21	0	105
Wielkopolska	126	65	35	12	238
Więckowskiego	14	80	7	0	101
Wojska Polskiego	336	235	91	18	680
Wyzwolenia	273	75	77	0	425
Razem	2758	1680	868	180	

The research have shown that 86% of deliveries are made by small trucks up to 3.5 T. The remaining 12% is made by vehicles from 3.5 T to 12 T. The only 2% of deliveries are made by big truck over 12 T. The largest part of the deliveries are made for retail entities; it's more than 50% of all deliveries made in the study area.

Tables 8 and 9 show the overview of the supply needs made by own transport and third party transport, taking into account their number.

**Table 8. The number of deliveries made to business entities by means of entity's own transport.**

Type of vehicles	Number of deliveries							Total
	A few times a day	Once a day	2-3 times a week	Once a week	2-3 times a month	Once a month	More seldom than that	
Cars/ vans	15	63	58	48	20	15	5	224
Small trucks up to 3.5 T	17	44	174	52	10	15	1	313
Medium trucks from 3.5 T to 12 T	0	0	28	24	21	0	0	73
Big trucks over 12 T	0	0	0	0	0	0	0	0
Total	22	84	84	189	86	38	20	610

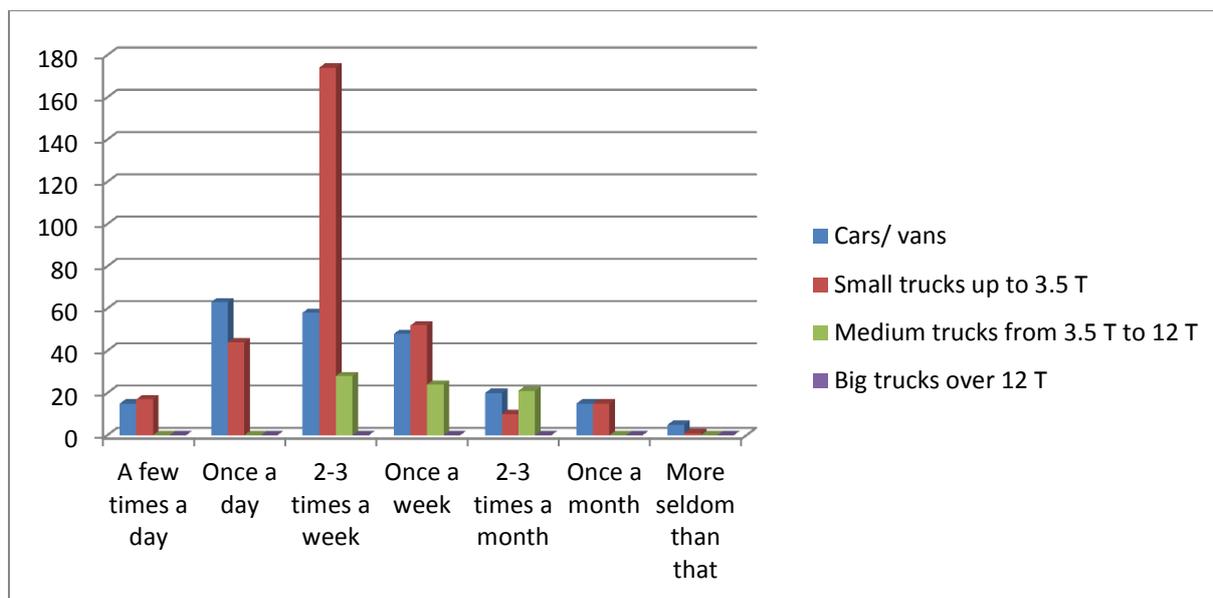


Figure 3. Deliveries made by own transport.

Table 9. The number of deliveries made to business entities by means of third party transport.

Type of vehicles	Number of deliveries							Total
	A few times a day	Once a day	2-3 times a week	Once a week	2-3 times a month	Once a month	More seldom than that	
Cars/ vans	0	27	21	19	12	6	4	89
Small trucks up to 3.5 T	5	56	166	95	59	4	0	385
Medium trucks from 3.5 T to 12 T	0	9	33	3	39	22	0	106
Big trucks over 12 T	0	0	2	3	4	8	13	30
Total	5	88	215	119	123	34	26	610

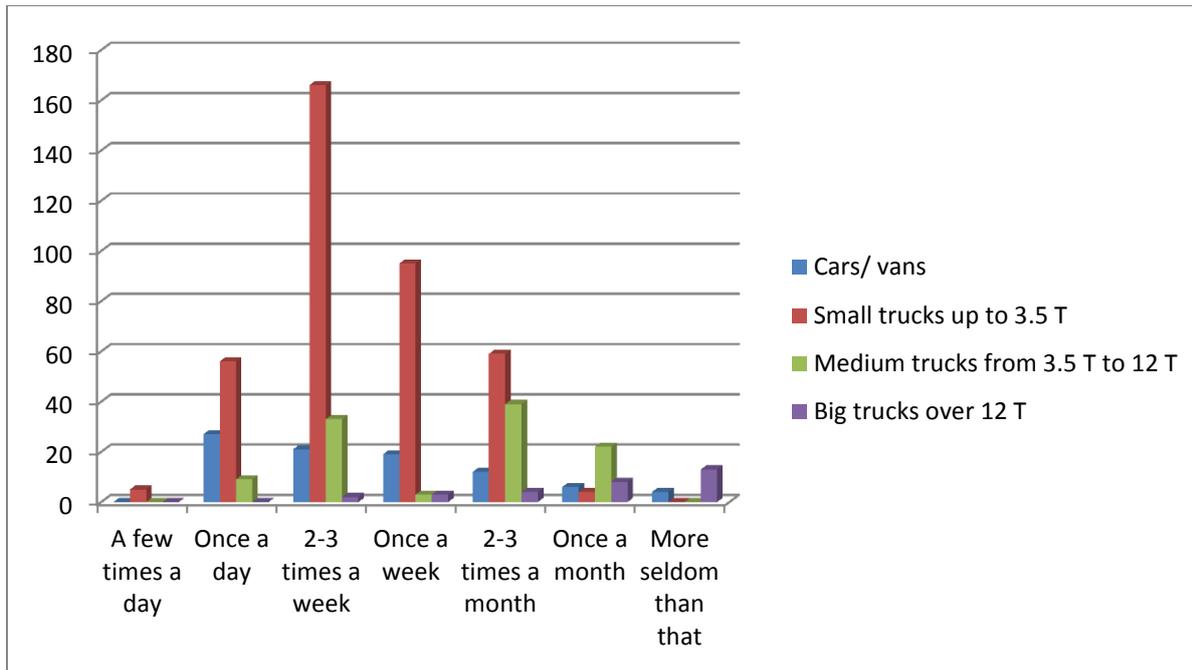


Figure 4. Deliveries made by third party transport.

Given a weekly delivery schedule, the largest part of own transport deliveries was made on Thursdays 27%, Mondays 18% and Fridays 17%. The smallest part was made on Sundays 1% (Fig. 5).

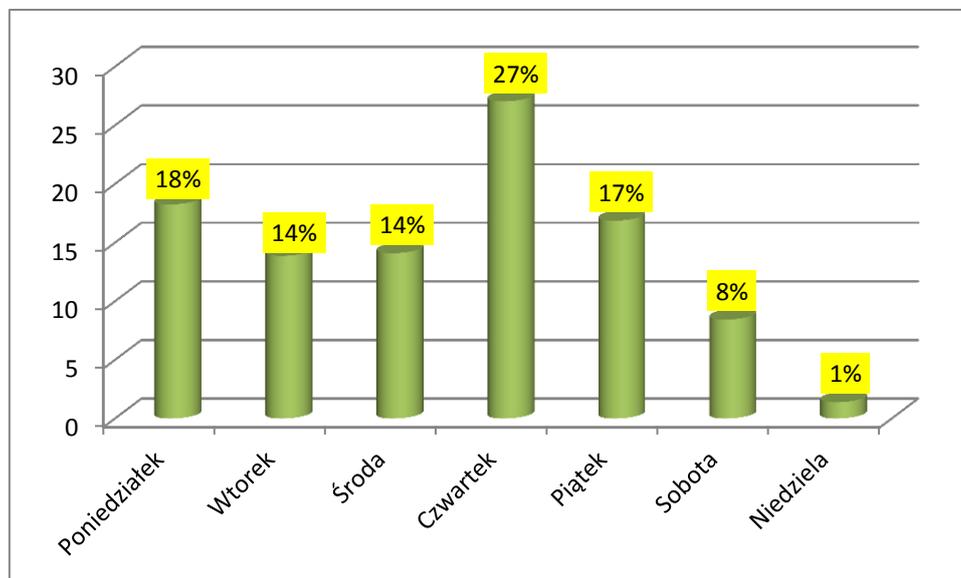
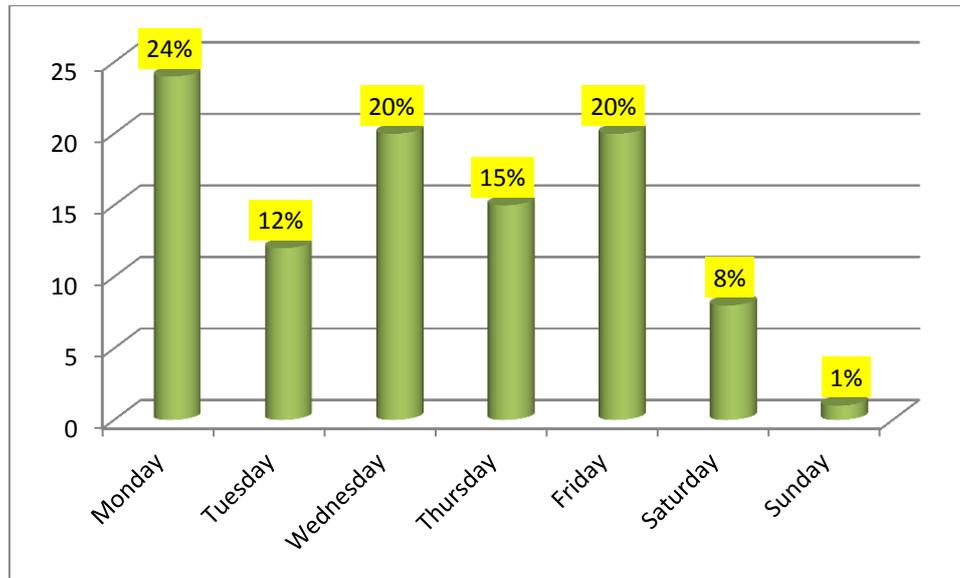


Figure 5. Percentage of weekly deliveries made by own transport divided into days of the week.

The largest part of third party transport deliveries was made on Mondays 24%, Wednesdays 20% and Fridays 20%. The smallest number was made on Sundays 1% - the same as in case of own transport deliveries (Fig. 6).



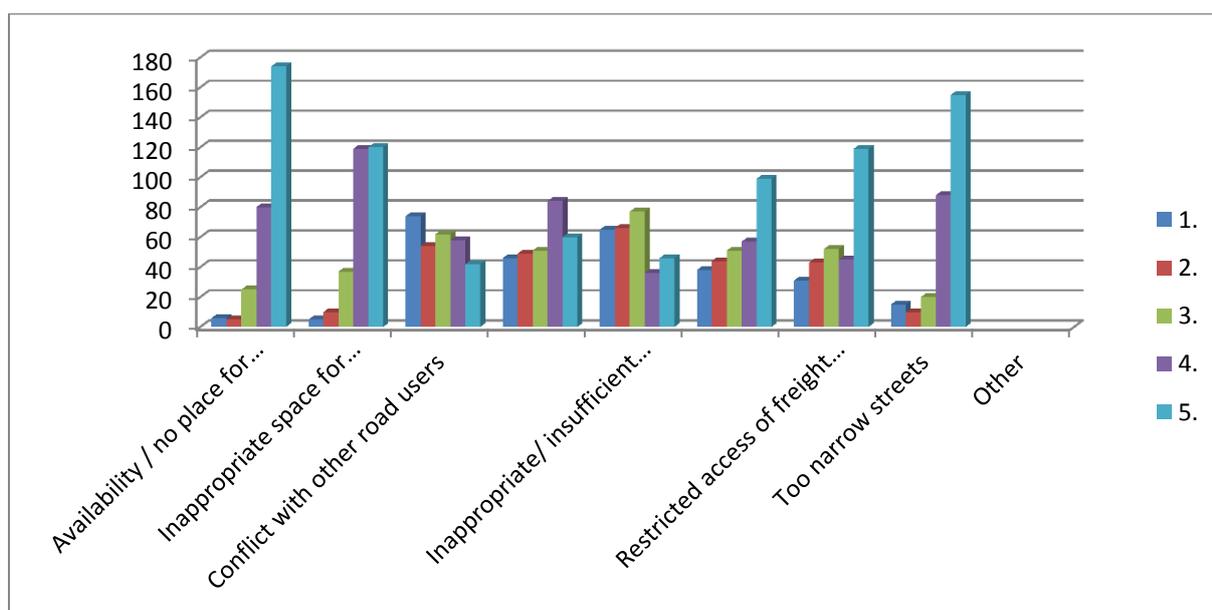
**Figure 6. Percentage of weekly deliveries made by third party transport divided into days of the week.**

An important part of the questionnaire conducted in the surveyed area of Szczecin was identification of the most important problems for freight transport, which - according to the respondents - occur in the surveyed area (Table 10).

**Table 10. Ranking of delivery problems in the center of Szczecin**

Problem	Number of answers					Weighted average
	1	2	3	4	5	
Inappropriate space for parking delivery vehicles	5	10	37	119	120	4,16
Presence of large delivery vehicles on the streets/ roads	46	49	51	84	60	3,22
Conflict with other road users in the course of delivery making (parking, loading and unloading)	74	54	62	58	42	2,79
Availability / no place for collecting/ delivery of goods and availability/ no parking spaces for delivery vehicles	6	5	25	80	174	4,42
Too much freight traffic in the city	38	44	51	57	99	3,47
Too much traffic of other vehicles (passenger cars, public transportation) in the city	15	10	20	88	155	4,24
Restrictions resulting from the city's distribution policy (e.g. too rigorous time windows)	0	0	0	0	0	0
Restricted access of freight vehicles to pedestrian zones or historical centres	31	43	52	45	119	3,61
Availability of information on existing rules and regulations for persons dealing	0	0	0	0	0	0

Problem	Number of answers					Weighted average
	1	2	3	4	5	
with freight transport, drivers and retailers						
Insufficient road traffic capacity of the transport infrastructure	0	0	0	0	0	0
Availability/ no routes intended for freight transit within the city center	0	0	0	0	0	0
Inappropriate/ insufficient legislation and regulations	65	66	77	36	46	2,77
Excessive use of regulatory restrictions (traffic restrictions, road use restrictions, parking restrictions, imposing delivery hours)	0	0	0	0	0	0
Imposing regulations (traffic, road use, parking, deliveries)	0	0	0	0	0	0
Other (please specify)	0	0	0	0	0	0



**Figure 7. Overview of challenges faced. Distribution of answers for each question, where 1 means less important and 5 means very important**

Research has shown that the most significant issue in the surveyed area is poor availability of parking spaces for loading and unloading, and parking spaces for delivery vehicles. Another issue is inappropriate space for parking delivery vehicles. Conflicts with other road users (mainly related to difficulties in loading and unloading of goods) were on the third position in the overall assessment. Less burdensome was also presence of large delivery vehicles on the streets in the surveyed area, resulting from the occurrence of large transit traffic in Szczecin. Insufficient legislation was rated similarly and mainly manifested in the lack of regulations, which take into account the needs of freight transport (e.g. such as the reduction of parking fees collection, while delivering goods). As relatively small problem in

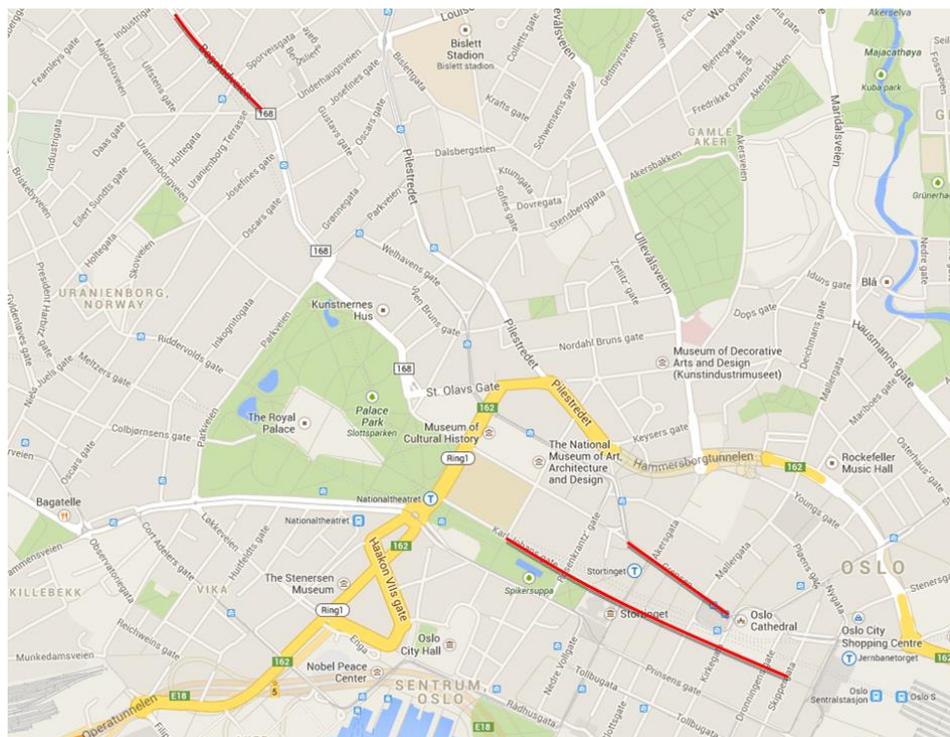
the surveyed area business entities see restricted access of freight vehicles. Undoubtedly, it is associated with the fact that there are only a few zone of this type in Szczecin, which is primarily due to the morphology of the city. The least burdensome respondents considered to be insufficient road traffic capacity resulting from too narrow streets.

As a general conclusion to be drawn after an analysis of answers, it can be stated that the key problems within the city are related to difficulties in loading and unloading associated with parking spaces for delivery vehicles.

### 3.2 Oslo

The questionnaire was translated to Norwegian and used in the interviews of 65 business entities in the period June-July 2014. 27 out of 65 business entities asked to take part in the survey, chose to participate. The main reasons for not participating was heavy workload, absence of owner/daily manager and lack of knowledge about the freight deliveries.

The interviews were conducted in three main shopping streets within the city center of Oslo; Grensen (13 interviews), Bogstadveien (12 interviews) and Karl Johan (2 interviews). These streets are depicted in red in the map below (fig. 8).



**Figure 8. Map of Oslo, where the relevant streets are marked in red**

Out of the 27 business entities that chose to partake in the survey, 11 were retail entities, 9 were service entities and 7 were in the HoReCa sector. The reason why no wholesale entities or production plants were interviewed is that none exists within the city center of Oslo.

23 of the 27 business entities interviewed had regular deliveries to their business entity. 63% of the entities had deliveries with an average size of less than 200 kg. 22% had average deliveries of 201 – 600 kg, 11% had deliveries between 601 – 1000 kg and 4% had average

deliveries of 1001 – 1500 kg. Not surprisingly, retail entities seems to receive a larger share of small deliveries, while the HoReCa industry received the largest delivery, as can be seen from the table below (tab. 11).

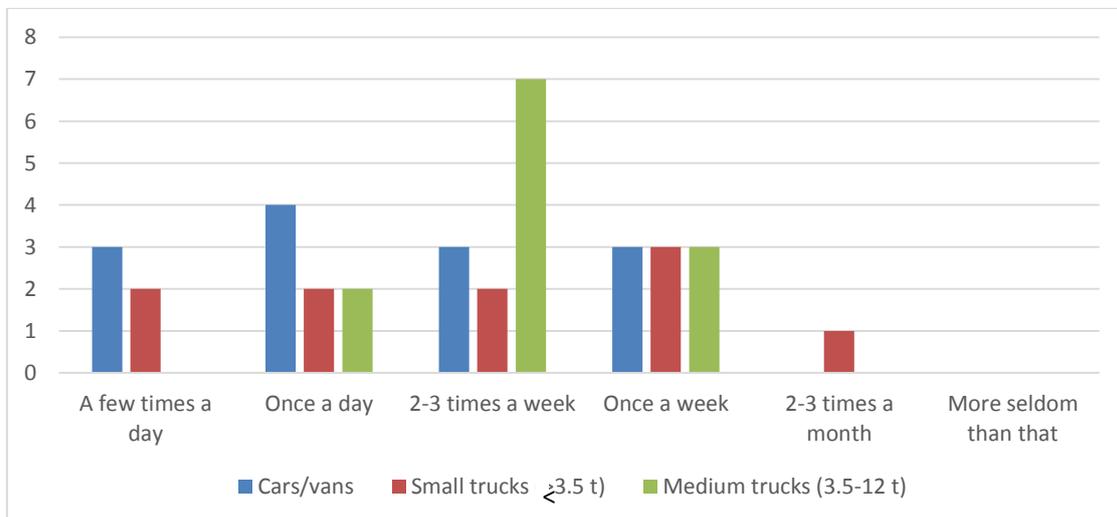
**Table 11. Overview of delivery sizes for each industry group**

	Retail	Service	HoReCa
0 – 200 kg	30%	19%	15%
201 – 600 kg	4%	15%	4%
601 – 1000 kg	7%	0	4%
1001 – 1500 kg	0	0	4%

Two of the 27 asked made use of its own transport, the rest used third party transport. This has some significance as to how many of the main challenges are visible to business owners. A significant amount (approx. 24 of 27) commented that they did not have the appropriate knowledge to rate the main problem of freight transport.

Most of the deliveries are from within the city (10) or from within the region (12), with only a few deliveries from elsewhere in the country (2) or abroad (3).

Number of freight shipments per business entity depending on type of vehicle can be seen in the figure below. Two of the four business entities reporting to receive shipments daily by car/van are using own transport. The rest of the data are from 22 business entities reporting to use third party transport. None of the business entities reported to receive shipments from large trucks (greater than 12 tonnes), most likely because these vehicles are too large to be suited to the driving conditions within the center of Oslo.



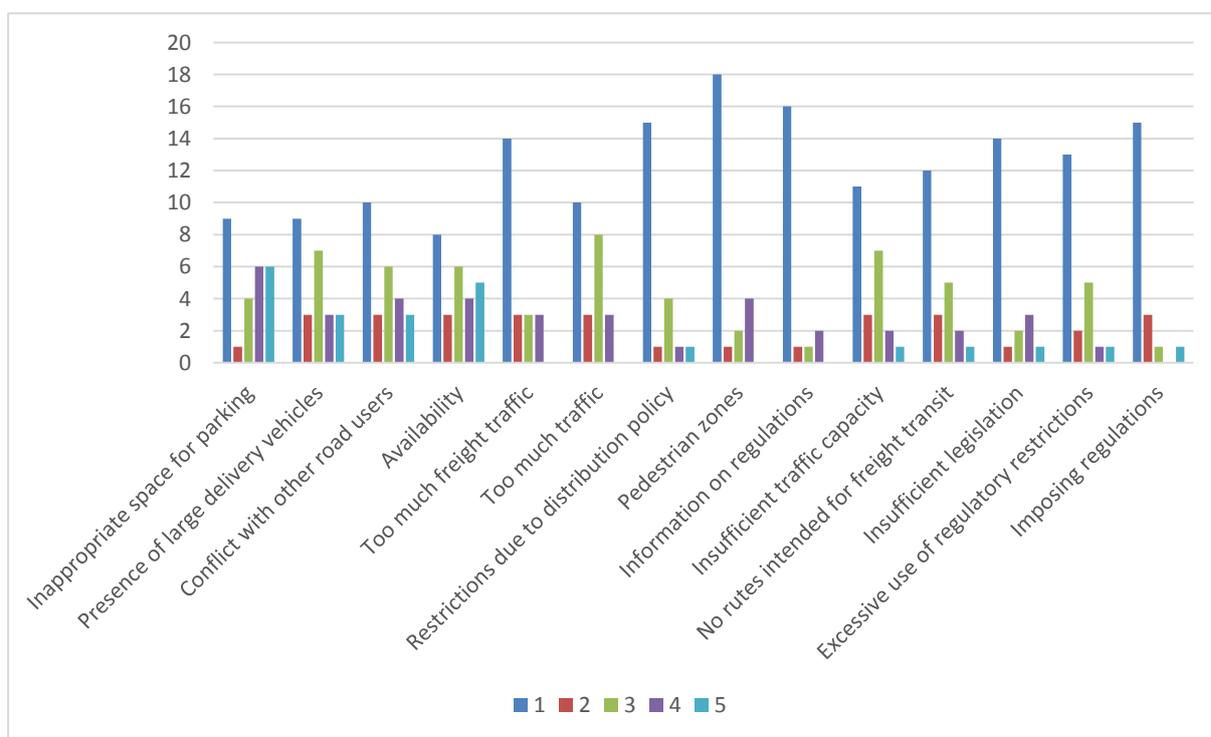
**Figure 9. Number of shipments per business entity**

When it comes to time of day, most business entities reported to receive freight shipments between 7:00 and 16:00. However, freight shipments are reported as early as 4:00-6:59 and as late as 22:00-00:59.

Some business owners felt they had too little insight into the challenges faced by freight transport in the city center, that they either did not want to rank the main problems identified by the survey, or ranked the problems that were not visible to them as 1 (less important).

As stated earlier, the survey was handed out in three main areas in Oslo city center: Grendsen, Bogstadveien and Karl Johan. The challenges cited by the business owners could vary quite significantly independent of location. For example, one business entity in Bogstadveien thought that lack of appropriate marking of the freight transport parking was a significant problem, while another business entity - on the same street – was unaware of any problem with parking for freight transport.

Another example is from Karl Johan, where one business entity, which owned its own transport found the time restricted access to pedestrian zones was problematic, another business entity which relied on third party transport did not see it as a problem at all; as the deliveries were made before the restriction took effect. The results regarding 14 different challenges are shown in figure 3 below, where the column 1 means less important and the column 5 means very important.



**Figure 10. Overview of challenges faced. Distribution of answers for each question, where 1 means less important and 5 means very important**

**Table 12. Ranking of delivery problems in the center of Oslo**

Problem	Number of answers					Weighted average
	1	2	3	4	5	
Inappropriate space for parking delivery vehicles	8	2	3	6	6	3,00
Presence of large delivery vehicles on the streets/ roads	8	3	7	3	3	2,58
Conflict with other road users in the course of delivery making (parking, loading and unloading)	9	3	6	3	3	2,50

Problem	Number of answers					Weighted average
	1	2	3	4	5	
Availability / no place for collecting/ delivery of goods and availability/ no parking spaces for delivery vehicles	8	3	6	4	5	2,81
Too much freight traffic in the city	14	3	4	3	0	1,83
Too much traffic of other vehicles (passenger cars, public transportation) in the city	12	3	7	3	0	2,04
Restrictions resulting from the city's distribution policy (e.g. too rigorous time windows)	15	1	4	1	1	1,73
Restricted access of freight vehicles to pedestrian zones or historical centres	15	1	2	4	0	1,77
Availability of information on existing rules and regulations for persons dealing with freight transport, drivers and retailers	17	1	1	2	0	1,43
Insufficient road traffic capacity of the transport infrastructure	10	3	5	2	1	2,10
Availability/ no routes intended for freight transit within the city centre	12	3	5	2	1	2,00
Inappropriate/ insufficient legislation and regulations	14	1	3	3	2	2,04
Excessive use of regulatory restrictions (traffic restrictions, road use restrictions, parking restrictions, imposing delivery hours)	12	2	5	1	1	1,90
Imposing regulations (traffic, road use, parking, deliveries)	15	3	1	0	1	1,45
Other (please specify)	24	0	1	1	1	1,33

As can be seen from figure 10, most issues are negligibly small for the majority of business entities. The number of businesses reporting otherwise varies from issue to issue, as does the gravity. To give a clearer picture of this, the average importance of each issue is presented in figure 11 below, for Bogstadveien entities, Grensen entities and all business entities, respectively (the number of entities from Karl Johan is too small to present the mean).



**Figure 11. Average score for each challenge faced for industries located in Bogstadveien, Grensen and all industries respectively.**

The last group of issues, not represented in the figures above, is “other”. Comments made by business owners under the “other” category in the problem section of the questionnaire includes: “Significant problem that private cars use the freight transport parking slot. Clearer road signs are needed.” (Grensen) “We do not see any of these problems. People working with freight transport might see the problems” (Grensen, Karl Johan and Bogstadveien).

In sum, the problems specified by the business entities were very local: few had any strong opinions on the main problems of freight transport that they couldn’t see. Some of the problems identified and specified by the business entities were not recognized, or mentioned, by their next door store; thus one could argue that some of the problems for freight transport as seen by business owners are very local. One store might have a parking opportunity that the next door store lacks. The one store would then argue that lack of parking is a significant problem, while the next door store will claim that parking is an unimportant problem.

Thus it is clear from the survey results that there are problems for the freight transport in Oslo, but the severity of the different problems are not very clear due to lack of insight into the freight transport by the business owners.

In order to identify the main problems in certain areas of town, it might be beneficial to send a survey to the different freight transport companies, or interview freight transport drivers. They might be able to answer where and when the problems with parking and traffic are the worst, among other issues.

## 4 SUMMARY

The research is a starting point for further stages of the work carried out as part of Work Package 3. It enabled for the observation of the major problems in terms of delivery in both cities, and to determine the principal difficulties identified by the respondents. The research was not a comparative analysis. All activities within the Work Package 3 aimed at solving local problems, and deliverables are to provide a basis for discussion at the working meetings organized within the Work Package 5. It is also significant that these deliverables will form the basis for the development of the model for the spread of pollution generated by urban freight transport within the studied areas.

In line with the objectives of Work Package 3, results contained in the inception report form the basis for further research. The next stages of the work undertaken in the Work Package 3 will include verification of the current results using motion detectors with vehicle classification. This will enable to determine the extent to which technology can help in the process of data acquisition. Additionally, the analysis of the results will include identification of the needs regarding additional data resources necessary to prepare the most extended picture of the movement of goods and deliveries within the surveyed areas.

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## APPENDIXES

### APPENDIX 1: THE FREIGHT TRANSPORT QUESTIONNAIRE (IN ENGLISH)

**Dear Sir/Madam,**

The survey is addressed to owners of business entities operating within the "Centrum" housing estate. It is aimed at obtaining information on freight delivery within the area of city, which is subject to the research, and also at recognizing the problems connected with freight traffic in the aforementioned area.

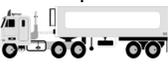
1. Please specify the kind of your business activity
  - Retail entity
  - Wholesale entity
  - Production plant
  - Service entity
  - HoReCa sector
2. Please specify the distance from the supply source
  - From within the city
  - From within the region
  - From within the country
  - From abroad
3. Are deliveries to your business entity made regularly?
  - Yes
  - No
4. Please specify the average size of deliveries made to your business entity
  - less than 200 kg
  - 201 – 600 kg
  - 601 – 1000 kg
  - 1001 – 1500 kg
  - 1501 – 2000 kg
  - more than 2000 kg

### Own transport

5. Please specify the number of deliveries made to your business entity by means of entity's own transport (i.e. by means of transport owned by your business entity).

Type of vehicles		Cars/ vans 	Small trucks up to 3.5 T 	Medium trucks from 3.5 T to 12 T 	Big trucks over 12 T 
Number of deliveries	A few times a day				
	Once a day				
	2-3 times a week				
	Once a week				
	2-3 times a month				
	Once a month				
	More seldom than that				

6. Please specify the number of deliveries, made with entity's own transport on the particular week days.

Days	Monday								Tuesday								Wednesday								Thursday								Friday								Saturday								Sunday															
Ranges of delivery hours*	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
Cars/ vans 																																																																
Small trucks up to 3.5 T 																																																																
Medium trucks from 3.5 T to 12 T 																																																																
Big trucks over 12 T 																																																																

\*Ranges of delivery hours subsequently:

1 – 1:00-3:59, 2 – 4:00-6:59, 3 – 7:00-9:59, 4 – 10:00-12:59, 5 – 13:00-15:59, 6 – 16:00-18:59, 7 – 19:00-21:59, 8 – 22:00-0:59

### Third party transport

7. Please specify the number of deliveries made to your business entity by means of third party transport (i.e. by means of transport owned by third parties).

Type of vehicles		Cars/ vans 	Small trucks up to 3.5 T 	Medium trucks from 3.5 T to 12 T 	Big trucks over 12 T 
Number of deliveries	A few times a day				
	Once a day				
	2-3 times a week				
	Once a week				
	2-3 times a month				
	Once a month				
	More seldom than that				

8. Please specify the number of deliveries, made with third party transport on the particular week days.

Days	Monday								Tuesday								Wednesday								Thursday								Friday								Saturday								Sunday															
Ranges of delivery hours*	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
Cars/ vans 																																																																
Small trucks up to 3.5 T 																																																																
Medium trucks from 3.5 T to 12 T 																																																																
Big trucks over 12 T 																																																																

\*Ranges of delivery hours subsequently:

1 – 1:00-3:59, 2 – 4:00-6:59, 3 – 7:00-9:59, 4 – 10:00-12:59, 5 – 13:00-15:59, 6 – 16:00-18:59, 7 – 19:00-21:59, 8 – 22:00-0:59

9. Please specify the ranks of the main problems of urban freight transport. Operating problems of freight delivery in Szczecin/Oslo. Ranking from 1 (less important) to 5 (very important).

Inappropriate space for parking delivery vehicles	<input type="checkbox"/>				
	1	2	3	4	5
Presence of large delivery vehicles on the streets/ roads	<input type="checkbox"/>				
	1	2	3	4	5
Conflict with other road users in the course of delivery making (parking, loading and unloading)	<input type="checkbox"/>				
	1	2	3	4	5
Availability / no place for collecting/ delivery of goods and availability/ no parking spaces for delivery vehicles	<input type="checkbox"/>				
	1	2	3	4	5
Too much freight traffic in the city	<input type="checkbox"/>				
	1	2	3	4	5
Too much traffic of other vehicles (passenger cars, public transportation) in the city	<input type="checkbox"/>				
	1	2	3	4	5
Restrictions resulting from the city's distribution policy (e.g. too rigorous time windows)	<input type="checkbox"/>				
	1	2	3	4	5
Restricted access of freight vehicles to pedestrian zones or historical centres	<input type="checkbox"/>				
	1	2	3	4	5
Availability of information on existing rules and regulations for persons dealing with freight transport, drivers and retailers	<input type="checkbox"/>				
	1	2	3	4	5
Insufficient road traffic capacity of the transport infrastructure	<input type="checkbox"/>				
	1	2	3	4	5
Availability/ no routes intended for freight transit within the city center	<input type="checkbox"/>				
	1	2	3	4	5
Inappropriate/ insufficient legislation and regulations	<input type="checkbox"/>				
	1	2	3	4	5
Excessive use of regulatory restrictions (traffic restrictions, road use restrictions, parking restrictions, imposing delivery hours)	<input type="checkbox"/>				
	1	2	3	4	5
Imposing regulations (traffic, road use, parking, deliveries)	<input type="checkbox"/>				
	1	2	3	4	5
Other (please specify)	<input type="checkbox"/>				
	1	2	3	4	5

## APPENDIX 2: THE FREIGHT TRANSPORT QUESTIONNAIRE (IN POLISH)

### Szanowni Państwo!

Ankieta, skierowana jest do właścicieli jednostek gospodarczych działających na terenie osiedla centrum. Ma ona na celu uzyskanie informacji dotyczących realizacji dostaw w obrębie badanego obszaru Szczecina, a także poznanie problemów związanych z poruszaniem się samochodów dostawczych na wskazanym terenie.

1. Proszę określić rodzaj prowadzonej przez Pana(a) działalności gospodarczej
  - Jednostka handlu detalicznego
  - Jednostka handlu hurtowego
  - Zakład produkcyjny
  - Sektor HoReCa
2. Proszę wskazać odległość od źródła zaopatrzenia
  - Z terenu miasta
  - Z terenu gminy
  - Z terenu województwa
  - Z terenu kraju
  - Z zagranicy
3. Czy dostawy w Pana(i) jednostce gospodarczej realizowane są regularnie?
  - Tak
  - Nie
4. Proszę określić wielkość dostaw realizowanych do Pana(i) jednostki gospodarczej:
  - poniżej 200 kg
  - 201 – 600 kg
  - 601 – 1000 kg
  - 1001 – 1500 kg
  - 1501 – 2000 kg
  - powyżej 2000 kg

### Transport własny

5. Proszę określić częstotliwość dostaw w prowadzonej przez Pana(ą) jednostce gospodarczej realizowanych transportem własnym (realizowane pojazdami własnymi przedsiębiorstwa).

Typ pojazdu		Samochody osobowe/furgonetki 	Ciężarówki małe do 3,5 T 	Ciężarówki średnie od 3,5 T do 12 T 	Ciężarówki duże powyżej 12 T 
Liczba dostaw	Kilka razy dziennie				
	Raz dziennie				
	2-3 razy w tygodniu				
	Raz w tygodniu				
	2-3 razy w miesiącu				
	Raz w miesiącu				
	Rzadziej				

6. Proszę określić najczęstsze godziny dostaw w poszczególne dni tygodnia dokonywane transportem własnym.

Dni tygodnia	Poniedziałek								Wtorek								Środa								Czwartek								Piątek								Sobota								Niedziela							
Przedział godzinowy dostaw*	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
Samochody osobowe/furgonetki 																																																								
Ciężarówki małe do 3,5 T 																																																								
Ciężarówki średnie od 3,5 T do 12 T 																																																								
Ciężarówki duże powyżej 12 T 																																																								

\*Zakresy godzinowe dostaw oznaczają kolejno:

1 – 1:00-3:59, 2 – 4:00-6:59, 3 – 7:00-9:59, 4 – 10:00-12:59, 5 – 13:00-15:59, 6 – 16:00-18:59, 7 – 19:00-21:59, 8 – 22:00-0:59

## Transport obcy

7. Proszę określić częstotliwość dostaw w prowadzonej przez Pana(a) jednostce gospodarczej realizowanych transportem obcym (realizowane pojazdami jednostek zewnętrznych).

Typ pojazdu		Samochody osobowe/furgonetki 	Ciężarówki małe do 3,5 T 	Ciężarówki średnie od 3,5 T do 12 T 	Ciężarówki duże powyżej 12 T 
Liczba dostaw	Kilka razy dziennie				
	Raz dziennie				
	2-3 razy w tygodniu				
	Raz w tygodniu				
	2-3 razy w miesiącu				
	Raz w miesiącu				
	Rzadziej				

8. Proszę określić najczęstsze godziny dostaw w poszczególne dni tygodnia dokonywane transportem obcym.

Dni tygodnia	Poniedziałek								Wtorek								Środa								Czwartek								Piątek								Sobota								Niedziela							
Przedział godzinowy dostaw*	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
Samochody osobowe/furgonetki 																																																								
Ciężarówki małe do 3,5 T 																																																								
Ciężarówki średnie od 3,5 T do 12 T 																																																								
Ciężarówki duże powyżej 12 T 																																																								

\*Przedział godzinowy dostaw odpowiednio w godzinach:

1 – 1:00-3:59, 2 – 4:00-6:59, 3 – 7:00-9:59, 4 – 10:00-12:59, 5 – 13:00-15:59, 6 – 16:00-18:59, 7 – 19:00-21:59, 8 – 22:00-0:59

9. Proszę określić rangę głównych problemów miejskiego transportu towarowego. Problemy operacyjne dostaw towarów w Szczecinie. Ranking od 1 (mniej ważne) do 5 (bardzo ważne).

Nieodpowiednia przestrzeń do parkowania pojazdów dostawczych	<input type="checkbox"/>				
	1	2	3	4	5
Obecność dużych pojazdów dostawczych na ulicach/ drogach	<input type="checkbox"/>				
	1	2	3	4	5
Konflikty z innymi użytkownikami dróg podczas dokonywania dostaw (parkowanie, ładunek i rozładunek)	<input type="checkbox"/>				
	1	2	3	4	5
Dostępność/ brak miejsca na odbiór/ dostawę towaru i miejsc parkingowych dla pojazdów dostawczych	<input type="checkbox"/>				
	1	2	3	4	5
Zbyt duży ruch pojazdów dostawczych w mieście	<input type="checkbox"/>				
	1	2	3	4	5
Zbyt duży ruch innych pojazdów (samochody osobowe, komunikacja publiczna) w mieście	<input type="checkbox"/>				
	1	2	3	4	5
Ograniczenia wynikające z miejskiej polityki dystrybucji (np. zbyt rygorystyczne okna czasowe)	<input type="checkbox"/>				
	1	2	3	4	5
Ograniczony dostęp pojazdów dostawczych do stref pieszych lub centrów historycznych	<input type="checkbox"/>				
	1	2	3	4	5
Dostępność informacji o istniejących regulaminach i przepisach dla osób zajmujących się zawodowo transportem towarowym, kierowców i detalistów	<input type="checkbox"/>				
	1	2	3	4	5
Niewystarczająca przepustowość infrastruktury transportowej	<input type="checkbox"/>				
	1	2	3	4	5
Dostępność/ brak tras przeznaczonych do tranzytu towarowego wewnątrz centrum miasta	<input type="checkbox"/>				
	1	2	3	4	5
Nieodpowiednia/ niewystarczająca legislacja i przepisy	<input type="checkbox"/>				
	1	2	3	4	5
Nadmierne korzystanie z ograniczeń regulacyjnych (ograniczenie ruchu, ograniczenie użytkowania dróg, ograniczenia parkowania, narzucanie czasu dostaw)	<input type="checkbox"/>				
	1	2	3	4	5
Narzucenie przepisów (ruch, użytkowanie dróg, parkowanie, dostawy)	<input type="checkbox"/>				
	1	2	3	4	5
Inne (proszę określić):	<input type="checkbox"/>				
	1	2	3	4	5

### APPENDIX 3: THE FREIGHT TRANSPORT QUESTIONNAIRE (IN NORWEGIAN)

*This is the version of the questionnaire that was used for the structured interviews. A summary of number of replies per alternative is also provided after each alternative.*

Denne undersøkelsen er ment for eiere av næringsvirksomhet i sentrum. Målet med undersøkelsen er å få kunnskap om godstransport og varelevering i bykjernen, og å identifisere problemer og utfordringer knyttet til godstransport i dette området.

1. Hva slags næringsvirksomhet drives her?
  - Detaljhandel 10
  - Engros
  - Produksjonsanlegg
  - Servicevirksomhet 8
  - HoReCa virksomhet (Hotell, Resetaurant, Cafe\*) 9
2. Hvor langt er det fra utkjørselsstedet?
  - Fra innenfor bygrensa 10
  - Fra innenfor regionen (Østlandet) 12
  - Fra innenfor landet 2
  - Fra utlandet 3
3. Er vareleveringene regelmessige?
  - Ja 24
  - Nei 3
4. Hva er vareleveringenes gjennomsnittlige størrelse?
  - Mindre enn 200 kg 17
  - 201 – 600 kg 6
  - 601 – 1000 kg 3
  - 1001 – 1500 kg 1
  - 1501 – 2000 kg
  - større enn 2000 kg

## Egentransport

5. Hvor mange vareleveringer får dere ved hjelp av egentransport? (ved hjelp av transport eid av din næringsvirksomhet).

Type transport		Biler/ varebiler 	Liten lastebil inntill 3.5 T 	Medium lastebil fra 3.5 T til 12 T 	Stor lastebil over 12 T 
Antall vareleveringer	Flere ganger daglig				
	En gang om dagen				
	2-3 ganger i uka				
	En gang i uka				
	2-3 ganger månedlig				
	En gang i månedlig				
	Sjeldnere				



## Leietransport

7. Hvor mange vareleveringer får dere ved hjelp av leietransport?

Type transport		Biler/varebiler 	Liten lastebil opptill 3.5 T 	Mellomstor lastebil fra 3.5 T til 12 T 	Stor lastebil over 12 T 
Antall vareleveringer	Ett par ganger daglig				
	En gang om dagen				
	2-3 ganger i uka				
	En gang i uka				
	2-3 ganger månedlig				
	En gang månedlig				
	Sjeldnere				

8. Kan du spesifisere når du får vareleveringer fra leietransport på de forskjellige ukedagene?

2	mandag								tirsdag								onsdag								torsdag								fredag								lørdag								søndag															
leveringstider	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
Bil/varebil 																																																																
Liten lastebil inntill 3.5 T 																																																																
Mellomstor lastebil fra 3.5 T til 12 T 																																																																
Stor lastebil over 12 T 																																																																

\*Leveringstider innenfor:

1 – 1:00-3:59, 2 – 4:00-6:59, 3 – 7:00-9:59, 4 – 10:00-12:59, 5 – 13:00-15:59, 6 – 16:00-18:59, 7 – 19:00-21:59, 8 – 22:00-0:59

9. Vennligst ranger hovedproblemene ved bytransport av varer i Oslo sentrum. Rangeringen går fra 1 (mindre viktig) til 5 (veldig viktig)

Utilstrekkelig plass for parkering av transportmidler	<input type="checkbox"/>				
	1	2	3	4	5
Mange andre kjøretøy på veiene	<input type="checkbox"/>				
	1	2	3	4	5
Konflikt med andre trafikanter i leveringsprosessen (parkering, lasting og lossing)	<input type="checkbox"/>				
	1	2	3	4	5
Tilgjengelighet/ plassmangel ved varelevering og parkering	<input type="checkbox"/>				
	1	2	3	4	5
For mye godstrafikk i byen	<input type="checkbox"/>				
	1	2	3	4	5
For mye annen trafikk i byen	<input type="checkbox"/>				
	1	2	3	4	5
Restriksjoner fra byens godstrafikkpolitikk (eksempelvis for små tidsvinduer for godstrafikk)	<input type="checkbox"/>				
	1	2	3	4	5
Begrenset adgang for godstrafikk til fotgjengersoner eller historiske sentre	<input type="checkbox"/>				
	1	2	3	4	5
Tilgjengelig informasjon om eksisterende regler og reguleringer for personer som jobber med godstrafikk, sjåførere og næringsdrivende	<input type="checkbox"/>				
	1	2	3	4	5
Utilstrekkelig veikapasitet for transport	<input type="checkbox"/>				
	1	2	3	4	5
Mangel på veitilgang for godstrafikk i bykjernen	<input type="checkbox"/>				
	1	2	3	4	5
Uheldig/ ufullstendig lover og reguleringer	<input type="checkbox"/>				
	1	2	3	4	5
For mange restriktive reguleringer (trafikk-, veibruk-, parkerings- restriksjoner)	<input type="checkbox"/>				
	1	2	3	4	5
Kommende reguleringer (traffic, road use, parking, deliveries)	<input type="checkbox"/>				
	1	2	3	4	5
Andre utfordringer (vennligst spesifiser)	<input type="checkbox"/>				
	1	2	3	4	5