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The idea of “FQP Projectability Semicircle” in determining the Freight Quality Partnership implementation potential of the city

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Abstract

This article focuses on the issue of optimization of urban freight transport, aimed at the widest possible implementation of sustainable development through the prism of identifying determinants of effective functioning of the concept of Freight Quality Partnership (FQP) in Szczecin. The main idea behind the article was, however, to consider those reasons in a unique way, i.e. assign specific ability characteristics to FQP, previously reserved in the literature only for freight transport, i.e. storageability and transportability). The result of such an innovative perspective was the possibility of identifying semantic field and the key dimensions of FQP implementation potential by extracting the term “projectability” as a term characterizing the city’s potential to implement FQP components, as well as the FQP idea potential towards the individual FQP components. The empirical part of the article presents and discusses the results of the survey conducted on three groups of urban stakeholders. As a result, the idea of “FQP Projectability Semicircle” was formulated that can characterize the potential of each city to use solutions initiated and implemented under the Freight Quality Partnership.

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1. Introduction

Nowadays, the key challenge for cities is the desire to limit the transportation needs in the smart way, while maintaining and - if possible - increase the local economic prosperity and quality of life of its inhabitants. This observation stems from reading many publications and studies e.g.: E. Taniguchi et al. (2001), J. Witkowski, M. Kiba-Janiak: (2012), M. Browne et al. (2012), Iwan (2013).

Striving to ensure that specific welfare for all residents (individual and industrial) in the city often faces conflicts of interest and contradictory objectives, as reported by each key stakeholder groups (Iwan 2013). Therefore, it may be advisable to consider issues that relate to urban freight transport (UFT), which on the one hand, contribute to meeting the consumption needs of inhabitants and purchasing needs of urban manufacturers, traders and service providers, but on the other hand, have a negative impact primarily on urban environment, thus deteriorating the quality of life of residents. This is a particularly important issue because modern city management should be focused on the desire to provide the highest compliance of solutions adopted with the key objectives of global measures to promote sustainable development (Iwan 2014). Unfortunately, it must be concluded that the issues of freight transport are often neglected when planning urban systems, even though they have a significant impact on the negative environmental impacts of unsustainable transport as a whole. But certainly, a full look at the city is promoted by the idea of “Smart City” as evidenced by the fact that there are several thousands of projects based on the smart idea being implemented around the world today, and their number is growing at a rate of nearly 20 percent per year. Some of them, however, are only marketing with the word “smart” being used as a communication of the city authorities with the environment. However, clearer prerequisite for the promotion of the idea of “Smart City” is active EU policy, which is to support and promote intelligent cities in the EU in 2014-2020 through the Group of the European Innovation Partnership for Smart Cities and Communities of the European Commission. In addition, to achieve success, it becomes fundamental to acquire comprehensive skills in managing sustainable urban development in the spirit of “smart city” to plan, implement and evaluate all “smart” measures in each of its areas, i.e. quality of life, people, intelligent management, economy, environment, transport and communications in a competent and comprehensive way.

2. FQP potential of the city

Rarely, however, considerations concerning the broad aspect of urban logistics or those applicable in the field of UFT have duly exposed full general economic aspect, not only the cost aspect (cost effectiveness). Yet, the demand understood as an effective demand for logistics projects submitted by all stakeholder groups in the city, both in terms of their size (number) or quality, have fundamental circumstances. Therefore, paying attention to the key fact, which is a clear differentiation of the demand for a variety of concepts or solutions implemented in cities, depends to a large extent on the potential to implement these solutions. Under this concept, the authors of this article understand the “resistance, and in fact the degree of resistance of postulated solutions within the concept of Freight Quality Partnership to the conditions occurring in the city (its implementation potential) and the effects of this implementation and maintenance of individual projects”. The supply of solutions must skillfully keep up with this process, which leads to a deliberate choice of best FQP practices, analysis of city adaptation conditions, the creation of dedicated solutions taking into account the morphological features of the city.

To minimize the risks associated with potential threats, obstacles and difficulties, it is required to prepare a correct FQP implementation program in the city (e.g. use of appropriate educational programs or the preparation of adequate infrastructure), taking into account the absorption potential of the city. This resistance just like the e.g. transport potential (Korzeń 1998) consists of three fundamental dimensions, therefore, it may be either “*natural*”, and result from the inherent characteristics of the components of the FQP concept (e.g. the complexity of the project, the state of implementation maturation and determination, competence and qualifications of contractors, level and directional of interactions to other urban programs (complementarity). It can also be “*technical*”, in which of key importance become implementation features associated primarily with the requirements of infrastructure, which, for obvious reasons, best would mean to be universal and standardized. Finally, the last differentiator is to be “*economic*” associated primarily with the efficiency of all projects and postulated solutions included in the FQP.

Hence, the postulated preventive actions is taking responsibility for respecting the time, costs and durability of projects and solutions.

Assuming that such concepts as, for example: the storageability/transportability potential, permanently entered the terminology of logistics, explaining the characteristics of the manner and degree of impact of a particular freight on the environment and the degree of sensitivity of freight to phenomenon and conditions occurring during transport and storage processes that may lead to adverse changes in the quality of this freight. Also in relation to the idea of FQP, through the analogy it is possible to introduce synthetic term characterizing the city potential to implement FQP component programs, as well as the potential of the idea of FQP itself in relation to the individual FQP program components in the form of "projectability" (Figure 1).

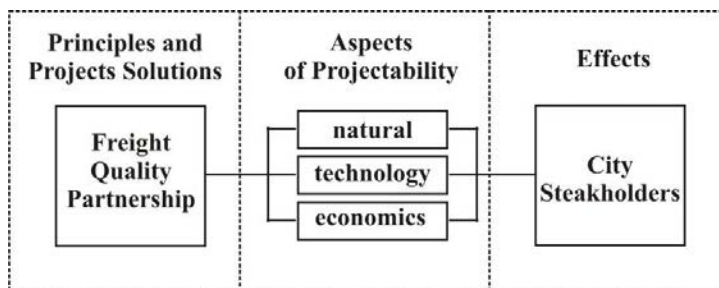


Figure.1. The idea of the city potential to implement the concept of FQP
Source: Own study.

3. Analysis of survey results

The observed practice proves that the implementation of distribution processes in urban areas faces many difficulties within the city centers. This is mainly due to the significant concentration of point objects, i.e. manufacturing plants, retail and service entities, the objects belonging to the HoReCa sector, schools and universities, as well as public administration. On the one hand, the city centers focus commercial, service, administrative and tourism functions, and on the other hand, they are usually an accumulation of the key hubs of urban transport system. It all makes urban deliveries a special challenge to ensure the smooth and effective functioning of the whole urban organism, while frequently encountering a significant number of difficulties associated with the traffic restrictions (e.g. associated with the occurrence of closed zones due to the historical buildings), linear infrastructure not adjusted to the growing number of vehicles (e.g. mostly narrow streets and one-way traffic organization), or the lack of a sufficient number of parking spaces.

Surveys were carried out in two periods: May-June and September-October 2015. One of the basic criteria for the selection of the study area was the direct impact of urban freight transport on the urban environment, and with the delimitation, the criteria included in particular the data concerning the level of toxic emissions, especially NO₂.

According to data from the Regional Inspectorate of Environment Protection, level concentrations of NO₂ in Szczecin revolves around the downtown area, in particular within the Centrum, Łekno, Niebuszewo-Bolinko, Niebuszewo, Stare Miasto, Śródmieście Zachód, Śródmieście Północ and Turzyn. The highest concentration of NO₂ in excess of 120 µg/m³ occurs within Centrum, Stare Miasto, Niebuszewo-Bolinko, Śródmieście Północ and Śródmieście Zachód. Within the remaining areas in the analyzed area, the recorded concentration was 100-120 mg/m³.

The study aimed to identify the opinions of three groups of stakeholders, i.e. businesses and drivers delivering freight to the study area (300 people), the residents (250 people) and basic self-government bodies, i.e. estate

councils, which are the direct representatives of the residents (11 units) . The collected results were presented at the working meetings (so-called “round tables”) involving various stakeholders of urban freight transport in Szczecin. Meeting are organized as a key element of the Freight Quality Partnership, functioning in the framework of the GRASS project[†]. The main objective of these meetings is to integrate and ensure co-operation between municipalities, businesses, transport operators, environmentalists and other UFT stakeholders in Szczecin. This is the basis for developing a set of best practices for the transport of goods, enabling its functioning in an environmentally friendly, economical, safe and efficient way[‡]. The starting point for actions taken is the in-depth analysis of the issues noticed by meeting participants in the context of the efficiency of urban deliveries, interacting freight transport system with the urban setting and its impact on the environment. Reported issues and their rank often vary depending on the reporting entity.

As the most important issues the surveyed companies considered the lack of adequate information on traffic restrictions related to e.g. the road works, road capacity overload or inadequacy of infrastructure for the current needs (very narrow streets). Another very important issue reported by this group of respondents are differences in restrictions in urban areas, which relate to hours of access to the city center or entry restrictions for vehicles that do not meet certain requirements e.g. size, weight, emissions or noise. As relatively important respondents considered the delay in deliveries resulting from the occurrence of congestion. Representatives of transport companies in particular complained about the lack of parking spaces for loading and unloading, which resulted in the need to stop vehicles on the lanes and the need to employ additional staff to guard the vehicle, while the driver delivered the order. Representatives of hotels and restaurants frequently complained about the noise and air pollution, which - clearly in the opinion of visitors - decreased quality of their services. All UFT stakeholders in Szczecin jointly complained about neglecting their needs and observations by the municipal authorities when implementing certain orders, prohibitions or restrictions.

A separate group of stakeholders surveyed were truck drivers working within the study area. Table No. 1 includes ranking of delivery issues indicated by this group in the center of Szczecin.

Table 1. Rating of delivery problems in the city center of Szczecin from the perspective of drivers.

Delivery problems	Ranking (weight)					Weighted average
	1	2	3	4	5	
Poor availability for loading/unloading and dedicated parking spaces for delivery vehicles			2%	5%	93%	98%
Insufficient space for parking delivery vehicles			4%	14%	82%	96%
Conflict with other road users			3%	91%	6%	81%
Presence of large delivery vehicles on the streets		2%	6%	89%	3%	79%
Insufficient legislation and regulations		4%	2%	89%	5%	79%
Too much traffic in the city			37%	55%	8%	74%
Restricted access for freight vehicles to certain urban areas	6%	7%	65%	22%		61%
Too narrow streets		82%	16%	2%		44%

Source: own study.

[†] GRASS GReen And Sustainable freight transport Systems in cities

[‡] J. Allen, G. Thorne, M. Browne: *Przewodnik po dobrych praktykach w towarowym transporcie miejskim*, BESTUFS, 2007, p. 35.

As revealed by the study, the biggest obstacle in the study area was poor availability of parking spaces for loading and unloading operations and dedicated parking areas for commercial vehicles (up to 98% of respondents gave it the highest rank). Another indicated difficulty was insufficient space to park vehicles (82% of respondents), while the third rank was given to conflicts with other road users (mainly related to difficulties in loading and unloading). Less burdensome proved to be the presence of tonnage trucks in the study area, resulting from the occurrence of significant transit traffic in Szczecin. Similarly rating received insufficient legislative support, manifested mainly by the lack of legislation addressing the needs of delivery transport (e.g. limitation of parking fees while delivering goods). Relatively little bothersome was, according to the drivers, the presence of the city zones of limited access for delivery vehicles within the study area. This results undoubtedly from the fact that there are relatively little zones of this type in Szczecin, which is mainly due to its morphology. The least burdensome respondents considered restrictions resulting from too narrow streets.

As a general conclusion, which arises following the analysis of responds given by the respondents, one can formulate a statement that the key issues of Centrum concern mainly difficulties in loading and unloading related to the possibilities of parking vehicles.

Another surveyed group consisted of residents of selected streets, who were handed out the questionnaire including:

- respondent's age,
- problems associated with freight transport noticed in the place of residence,
- solutions to solve these problems - category of solutions are presented in Table 2.
- A starting point for determining the category of solutions included the methodology developed within the C-LIEGE project.[§]

Table 2. Categories of solutions to improve the functioning of UFT developed within the C-LIEGE project.

Category of solutions	Description
Promoting eco-driving among drivers	Training drivers in a responsible and eco driving, and behavior on the road.
Introduction of loading/unloading and transit restrictions	Temporary and comprehensive restrictions for loading and unloading for vehicles that e.g. do not meet the standards of pollutant emissions, without the required permits and licenses, as well as identifying routes that allow to bypass the zone most affected with congestion.
Mobility credits schemes/congestion charging	Limiting access to the city area for vehicles by introducing charges for transport companies for each entry to the zone, carried out using the "mobility credits" distributed by the public administration (or by cash payments in the case of exceeding the assigned "credit"). Access control system installed in commercial vehicles records each entry to the zone and allows for the introduction of mixed payment and enforcement of charges in relation to different users.
Integrated logistical tools	. Web-based logistical tools enable combining and coordinating producers, buyers and logistics providers for placing orders, in order to optimize the logistics flow and consolidation.

[§] C-LIEGE *Clean Last mile transport and logistics management for smart and efficient local Governments in Europe. The project aimed at sharing experiences and good practices of urban logistics, including the so-called soft measures and strategies for ecologically clean urban freight transport and last mile logistics. It aimed to promote clean and energy-efficient transport and freight distribution in urban areas.*

Promotional campaigns for sustainable transport	Promotional campaigns to increase awareness of the responsibility and eco-efficiency among suppliers, carriers, consumers and distribution companies. Promoting alternative drives.
Information on freight routes	Guiding vehicles entering the city center to a planned route, e.g. by placing special road signs or providing road maps with planned routes and key traffic information for trucks.
Special conditions of urban planning	Integration of requirements of sustainable transport with land use, urban planning processes, etc. by preparing contracts and determining building conditions (including executive regulations) and building permits for new business ventures and large complexes, taking into account the specific needs of freight transport.
Local freight transport plans	Strategic freight transport plans (formalized and non-formalized), which will be the basis for a systematic analysis of freight and activity of local stakeholders, taking into account the constraints of the city, as well as short and long-term objectives and activities planned.
Intelligent route guidance in freight transport	Integrating the planned routes of trucks and the information intended for them with the navigation software. In line with this objective, data gathered from the remaining vehicles in traffic on their location, freight and planned destination may be linked to data on traffic in real time.
Freight Operators Recognition Scheme (FORS)	Development of special labels for logistics companies, which care about the environment-friendly use of their vehicles and/or other similar solutions. This will create a better image of companies and the growing importance of green logistics.
Low emission zones	These zones include restrictions on a total ban on access to designated areas of the city as well as incentives for deliveries at certain times.
Systems of financing the purchase of vehicles	Attractive subsidized public financing models (e.g. leasing), which stimulate the logistics operators and transport companies to use more environmentally friendly fleet.
Freight Transport Quality Partnership	This is the type of agreement between the city authorities, business representatives, logistics operators, transport companies, organizations dealing with the protection of the environment, local communities and other stakeholders specifying how to work together to solve the existing freight transport problems. Usually the partners exchange information, experience and initiate projects regarding transport issues. FQP activity is related to the organization of regular meetings called "Round tables", where participants discuss current transport problems and take decisions on solving them.
Night deliveries	Deliveries during the night not burdened with transport congestion and the allocation of additional unloading spaces, as well as temporary routing for freight distribution.
Dedicated parking places for loading/unloading	From the point of view of environmental protection, business activity and flows, and road safety, it is best for delivery vehicles to avoid blocking traffic lanes, as well as the reduction of the waiting time for a parking place for loading and unloading. For this purpose, it is advisable to separate parking spaces dedicated to loading and unloading of delivery vehicles.
Alternative delivery systems	Sharing delivery vehicles, consolidating deliveries in the same areas; delivery logistics based on the use of bicycles (cycling logistics), night deliveries, parcel lockers, etc.

Source: Own study.

The study involved a group of 250 residents. Table 3 shows the age structure of the respondents. The biggest part of the respondents were aged 41-50 (61 persons), while the smallest those aged 20 years and less (17 people).

Table 3. Age structure of the population studied.

Age	No. of respondents
20 or less	17
21-30	52
31-40	44
41-50	61
50-60	56
more than 60	20
Total	250

Source: Own study.

51% of respondents see freight transport carried out at their place of residence as very troublesome, 35% do not see it as a big problem, while only 14% do not see any impact of freight transport carried in their place of residence on his or her routine. Table 4 presents the distribution of answers by age.

Table 4. Distribution of answers concerning delivery problems in the city by age groups.

Age	No problem noticed	A little troublesome	Very troublesome
20 and less	5%	84%	11%
21-30	19%	23%	58%
31-40	17%	44%	39%
41-50	12%	26%	62%
50-60	11%	27%	62%
more than 60	4%	59%	37%

Source: Own study.

The problems reported the respondents regarding deliveries in their place of residence are mainly related to blocking entrances and crossings by delivery vehicles (86%) and blocking parking spaces (83%), as well as blocking traffic lanes (69% of responses) . Another problem indicated was most often obscure visibility at pedestrian crossings (9% of respondents - mainly among people aged 60 and more). The hierarchy of the problems identified is shown in Table 5.

Table 5. Problems reported by residents of selected streets regarding deliveries.

Delivery problems	
traffic restrictions (congestion)	78%
blocking parking spaces	83%
blocking lanes	69%
blocking entrances and crossings	86%
other	9 %

Source: Own study.

When rating categories of possible UFT solutions in Szczecin, respondents were asked to indicate their level of utility by specifying whether they are completely useless, poorly useful, hard to say, useful and very useful. The solutions after they have been rated by the respondents were ranked as follows:

- Promoting eco-driving among drivers
- Introduction of loading/unloading and transit restrictions
- Mobility credits schemes/congestion charging
- Integrated logistical tools
- Promotional campaigns for sustainable transport
- Information on freight routes
- Special conditions of urban planning
- Local freight transport plans
- Intelligent route guidance in freight transport
- Freight Operators Recognition Scheme (FORS)
- Low emission zones
- Systems of financing the purchase of vehicles
- Freight Transport Quality Partnership
- Night deliveries
- Dedicated parking places for loading/unloading
- Alternative delivery systems.

The last group of respondents consisted of representatives of the estate councils. This group was asked two questions relating to: identification of delivery problems in areas managed by these councils and identification of possible solutions. Respondents were asked to prioritize them in terms of the level of significance. For this purpose the following scale was used: 0 – in my opinion the problem does not exist, 1 – problem exists but is not significant, 2 - the problem is significant. Table 6 shows the categories of problems that were presented to representatives of estate councils, listed according to answers given by them.

Table 6. Categories of UFT problems in Szczecin.

Problem	Description
The provisions concerning cycling in relation to delivery	According to the Road Traffic Law of 20th June 1997 (Journal of Laws 1997 No. 98, item 602, as amended), bicycle is a vehicle with a width of up to 0.9 m operated by the muscles of a person riding the vehicle; vehicle of a width greater than 0.9 m designed for the transport of persons or goods operated by the muscles of a person riding this vehicle is called a bicycle trolley. Therefore, bicycle trolleys (which include delivery bicycles) cannot move on cycle paths, which greatly reduces their practical application.
ITS traffic management system	No adequate traffic management system. The current system is focused only on the selected tasks. It is essential to develop a comprehensive system that supports traffic throughout the city (not only access roads to the city center)
Different expectations of road infrastructure users	Promotion of cycling in the city hinders the movement of other vehicles. Extension of bicycle paths in the city center is often done at the expense of roads for motor traffic, causing their narrowing and capacity reduction.
No city logistics coordinator	No body managing the logistics of transport in Szczecin responsible for collecting current data and the reconciliation of different stakeholders and initiating activities to limit the negative impact of urban freight transport on the urban environment.
Transit traffic in the city center	A survey of drivers conducted in 2010 in the center of Szczecin have shown that most vehicles were only passing through the center, and their aim was to reach destinations located outside its borders. Large transit traffic in the center of Szczecin due to the lack of choice of other roads (lack of alternative routes that bypass the city center)
Low awareness of residents	Residents see the problem of an insufficient number of places for unloading delivery vehicles in the center, but they are not ready to make concessions that could improve the current situation (e.g. giving up parking spaces).
Availability of information about existing freight transport policies and regulations	No information for those involved in professional freight transport, drivers and retailers. Imposing regulations (traffic, road use, parking, delivery)
“Bottlenecks”	The system and capacity of streets in the center of Szczecin make it difficult to introduce innovative solutions in freight deliveries.
No economic incentives to apply good practice in the field of urban logistics	Implementation of certain solutions in the field of environmentally friendly freight transport is often associated with high costs which are entirely borne by the company, which implements them.
Motorway tolls	Due to motorway tolls a major part of vehicles choose the roads through the city.
The structure of passenger and freight transport	A large and growing number of cars means difficulties for delivery vehicles resulting e.g. from the lack of unloading spaces.
Too narrow streets	For example in the case of historical buildings of the city center

Source: Own study.

When rating possible solutions to common problems, the same categories of solutions were used as in the case of the analysis of the residents' opinion. The respondents of this group ranked the proposed solutions in the following manner:

- Promoting eco-driving among drivers
- Introduction of loading/unloading and transit restrictions
- Local freight transport plans
- Special conditions of urban planning
- Integrated logistical tools
- Promotional campaigns for sustainable transport
- Information on freight routes
- Freight Operators Recognition Scheme (FORS)
- Systems of financing the purchase of vehicles
- Low emission zones
- Freight Transport Quality Partnership
- Night deliveries
- Intelligent route guidance in freight transport
- Dedicated parking places for loading/unloading
- Alternative delivery systems
- Mobility credits schemes/congestion charging.

In light of the analysis of the responses given by representatives of the three groups of Urban Freight Transport stakeholders concerning the UFT problems in Szczecin, it must be noted that proposals reported in their responses were grouped into seven specific FQP areas due to their characteristics. In addition, the acronym created on the basis of these proposals enables in a special way to formulate the idea of "FQP Projectability Semicircle" postulated by the authors of this article, which was presented in Figure 2.

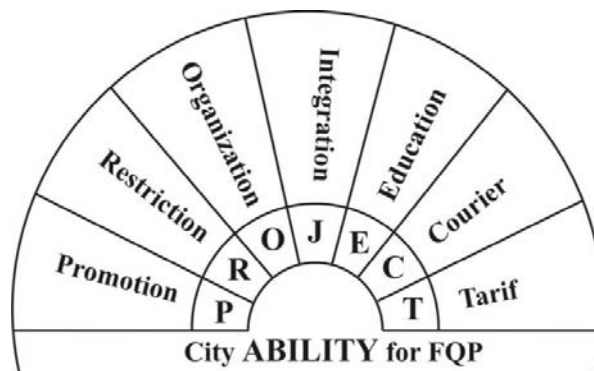


Figure 2. FQP Projectability Semicircle Idea.

Source: Own study.

As already mentioned, making a synthesis of the answers given by all three groups of stakeholders, their groups of solutions formed conventional "PROJECT" acronym, because they relate to certain sets of possible measures or actions taken under FQP (these particular areas are presented in Table 7) .

Table 7. PROJECT acronym under “FQP Projectability Semicircle Idea”.

P	-	Promotion	Promotion of solutions.
R	-	Restriction	Restrictions on access
O	-	Organization	Organization of functioning.
J (=I)	-	Integration	Integration of information.
E	-	Education	Education of stakeholders.
C	-	Courier	Alternative deliveries.
T	-	Tariff	Access tariff.

Source: Own study.

4. Conclusion and recommendation

Freight Quality Partnership concept initiated in Szczecin on 2013 has identified five strategic goals to be achieved, which are contained synthetically in the following areas of desired actions and behaviors:

- mutually beneficial cooperation between stakeholders
- effective implementation of innovative solutions
- active participation of all stakeholders
- monitoring and parameterization of the effects of implementation
- the widest possible acceptance of actions taken.

Periodic meetings called “round tables” implemented under the GRASS project by representatives of various stakeholder groups, without a doubt contribute primarily to an increase in awareness of specific problems related to the organization and functioning of urban freight transport in the city center of Szczecin. However, the reported remarks, demands or proposals for measures must take into account the city’s design potential to absorb this type of ideas. Therefore, it seems that the original idea of “FQP Projectability Semicircle” will be taken into consideration both in terms of ease of implementation of design changes, as well as considerations of a purely theoretical nature.

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