Research in Transportation Business & Management xxx (xxxx) xxx–xxx

Contents lists available at ScienceDirect

Research in Transportation Business & Management

journal homepage: www.elsevier.com/locate/rtbm

Urban freight transport in city strategic planning

Maja Kiba-Janiak

Wrocław University of Economics, Nowowiejska Street No. 3, 58-500 Jelenia Gora, Poland

ARTICLE INFO

Keywords:
Urban freight transport
Strategic planning
City maturity
Taxonomic measure

ABSTRACT

The issue of urban freight transport in city strategic planning is discussed in this paper. There are two main purposes of the paper - a theoretical one and empirical one. The author's concept of maturity levels of cities in planning and implementing activities in favor of urban freight transport is the theoretical objective, while the empirical objective deals with the analysis of selected European capital cities in terms of urban policy in creating long-term plans in the area of urban freight. In order to achieve these objectives the author has conducted a survey among selected European cities. As a result of the conducted survey, the description of the process maturity levels of studied cities with the use of a taxonomic measure in the field of planning and implementing urban freight transport actions has been proposed. The concept of process maturity of cities in the field of planning and carrying out actions in urban freight transport may be a practical tool for local authorities willing to self-improve and develop in this field.

1. Introduction

Urban freight transport (UFT) deals with all flows of materials and goods in a city organized by professional institutions (Dablanc, 2007). Despite the fact that it is a vital element of economic development of the city, it is becoming a growing concern for the health and the quality of life of city residents. According to Dablanc (2007) it represents about 20–30% of vehicle kilometers and generates from 16% to 50% of air pollution emissions in the city. According to the European Commission, a significant number of European cities lose EUR 80 billion every year due to chronic congestions. Frequent road accidents also constitute a problem. Over 38% of all road accidents in EU countries take place in urban areas (European Commission, 2013a, 2013b). Urban freight transport is one of the sources of this problem. Nevertheless, a large number of cities still pursue the out-of-date policy in this field (Dablanc, 2007). According to the Special Eurobarometer survey (European Commission, 2013a, 2013b) it is possible to observe an increasing "urban mobility gap" between European cities. Some of them stand out as far as the level of progress in the process of planning and implementing UFT actions is concerned, while the majority of them do not have any experience in this field or their experience is negligible. In the opinion of respondents local authorities should be responsible for the road traffic reduction (both passenger and freight) in the city (European Commission, 2013a, 2013b). However, according to research in many EU cities long-term transport plans concentrate primarily on public transport and transport infrastructure, omitting freight transport (Allen, Browne, & Holguín-Veras, 2015; Kiba-Janiak, 2015; Lindholm, 2012; Lindholm & Browne, 2013). Therefore, it is essential that local authorities include not only passenger transport but also freight transport into city strategic planning and then carry out actions facilitating this field in accordance to the plans.

In this paper two objectives have been presented - a theoretical one and an empirical one. The author's concept of maturity levels of cities in planning and implementing activities in favor of urban freight transport is the theoretical objective, while the empirical objective deals with the analysis of selected European capital cities in terms of urban policy in creating long-term plans in the area of urban freight. In order to achieve these objectives the author has conducted a survey among selected European cities. The survey helped to elicit answers to the following questions:

- What is the role and place of urban freight transport in the strategic plans of EU capital cities?
- Are there any differences among European capital cities in terms of including long-term freight transport planning into the city policy and if so, what are the reasons behind them?
- What are the differences among studied cities in implementing projects in the field of urban freight transport?
- Which EU capital city has the potential to become a benchmark for other cities in terms of strategic planning in the field of urban freight transport?

As a result of the conducted survey, the description of the process maturity levels of studied cities in the field of planning and implement-

E-mail address: maja.kiba-janiak@ue.wroc.pl.

http://dx.doi.org/10.1016/j.rtbm.2017.05.003
Received 6 October 2016; Received in revised form 31 March 2017; Accepted 7 May 2017

ing urban freight transport actions has been proposed. There is one innovative feature which distinguishes this concept from others a quantitative and holistic approach to the assessment of a city maturity level in the field of planning and implementing urban freight transport.

The paper is organized as follows: the first part presents the objective and the scope of the paper. The second part deals with the essence of urban freight transport in city strategic planning. Furthermore, it focuses on trends and changes which will take place in the future and will have a significant impact on UFT. The next part of this paper presents in a brief way the most important documents drawn up by the European Commission which contains the guidelines for European cities on how to formulate long-term objectives in the field of urban freight transport. Section 4 focuses on the author's concept of maturity levels of cities in the field of planning and implementing UFT actions. The next two parts of this paper present a research method and the results of the conducted questionnaire, including the identification of process maturity levels of cities in the field of planning and implementing UFT actions. The final part of the article put forward conclusions and pointers for further research.

2. The significance of urban freight transport in city strategic planning

Urban freight transport, understood as all flows of materials and goods in the city organized by professional institutions (Dablanc, 2007) plays a significant role in the functioning of the city. Increasing needs and consumption habits of the city inhabitants cause the increase in the demand for freight transport, which in turn largely contributes to the increase in congestion and environmental degradation. The solution of these problems requires that the city authorities set and achieve long-term goals, including not only the present needs of particular stakeholders of urban freight transport, but also future trends and changes (Iwan & Kijewska, 2014). Among these trends and changes one may identify:

1. Challenges concerning environmental protection (European Commission, 2009) - there is a growing need for reducing the negative impact of the transport sector on the environment. In 2008 the European Union adopted the climate and energy package which set objectives concerning a 20% reduction of greenhouse gas emissions in the EU compared with 1990. TERM Report 2008 published by the European Environment Agency shows that many Europeans are still exposed to high levels of air and noise pollution. In particular, concentrations of airborne particulate matter PM_{10}, the main source of which is transport, exceeds recommended limits in many places in Europe (European Environment Agency, 2009).
2. An increasing shortage in fossil fuels – in the coming decades fossil fuel prices will be higher and the demand will rise, which, as a consequence, may result in higher prices. The necessity of the transformation to a low-carbon economy and growing concern about the safety of energy supply will cause higher demand for a renewable energy supply which is cheaper thanks to modern technological solutions and mass production (European Commission, 2009).
3. The growing population in cities (growing urbanization) - the current inhabitants of EU cities represent over 70% of the whole population (www.ec.europa.eu, 2015). It is expected that this figure is set to rise to 84% in 2050 (European Commission, 2009). The growing city population will also cause an increase in the demand for freight transport which is projected to rise by over 80% by 2050. It is expected that in 2050 in the EU countries road freight transport will continue to play a dominant role (European Commission, 2009).
4. The increase in innovative and ecological solutions - in connection with a wider access to advanced technology and as a result of EU requirements concerning environmental protection, transport companies will make more use of innovative and ecological means of transport, e.g. electric vehicles. Due to this fact there is a need to construct the infrastructure allowing the functioning of these means of transport in the city by e.g. the construction of electric car charging stations (for example, Berlin is planning to construct 400 electric car charging stations in the near future (Berlin Municipality, 2015).
5. The development of solutions in the field of ICT - recently an increased access to cutting-edge IT solutions has been observed. The solutions may largely facilitate urban freight transport. Nevertheless, the effective implementation of such solutions in the field of freight transport requires the implementation of such standards in the whole of Europe.

Tendencies and changes presented above indicate the significant role of local authorities in shaping urban freight transport. Unfortunately, for many local authorities freight transport is still a marginal issue (Ballantyne, Lindholm, & Whiteing, 2013), while according to Lindholm (2012) and Ruescha et al. (2012) they should be leaders and initiators of actions performed in favor of UFT. Local authorities in many countries (Lindholm, 2012; Witkowski & Kiba-Janiak, 2014) are responsible for the control of the traffic system in the city, the security of the inhabitants or environmental protection, etc. Therefore, taking into account the objectives concerning freight transport in strategic documents of the city should be taken as given. Cities carry out their tasks on the basis of the development strategy including the mission, vision and main long-term goals (Fig. 1).

The city development strategy should include various city spheres in a holistic way so as, in the result of its implementation, to enhance the quality of life and the competitiveness of the city. In order to carry out the strategy in an effective way the local authorities should develop tools and procedures allowing its implementation, assessment and improvement (Kiba-Janiak, 2015). On the basis of the main strategic document the local authorities draw up various functional plans, such as transportation plan, the education development plan, labor market plan, etc. The transportation plan should include long-term goals regarding both passenger and freight transport. Next, on the basis of the transportation plan the detailed plans for freight transport, passenger transport and ICT systems should be drawn up. In some cities the transportation plan is so detailed with regard to both passenger and freight transport that drawing up further plans is not necessary. It is important that transportation plans need to be drawn up by the local authorities with the participation of such UFT stakeholders as: residents, shippers, receivers, transport companies, public transport operators and other institutions such as: associations, institutions and companies established by local authorities, etc. It can be done within a Freight Quality Partnership (FQP) as it is practiced for example in London. On the basis of detailed plans particular projects concerning urban freight transport may be carried out with the participation of other stakeholders.

The necessity of taking into account long-term goals in the field of freight transport results not only from the need to enhance the quality of life in the city but also from the guidelines of the European Commission.

3. The EU guidelines for formulating long-term goals in the field of urban freight transport

The problem of city pollution caused by freight transport was noticed by the European Commission which drew up many documents including guidelines formulating long-term goals in the field of urban freight transport. Local authorities should be aware of those documents, which on the one hand can serve as guidelines enabling the improvement of UFT and on the other hand show the restrictions which can be introduced in the future. It is not possible to present in this paper all of those documents, therefore a limited number of them have been

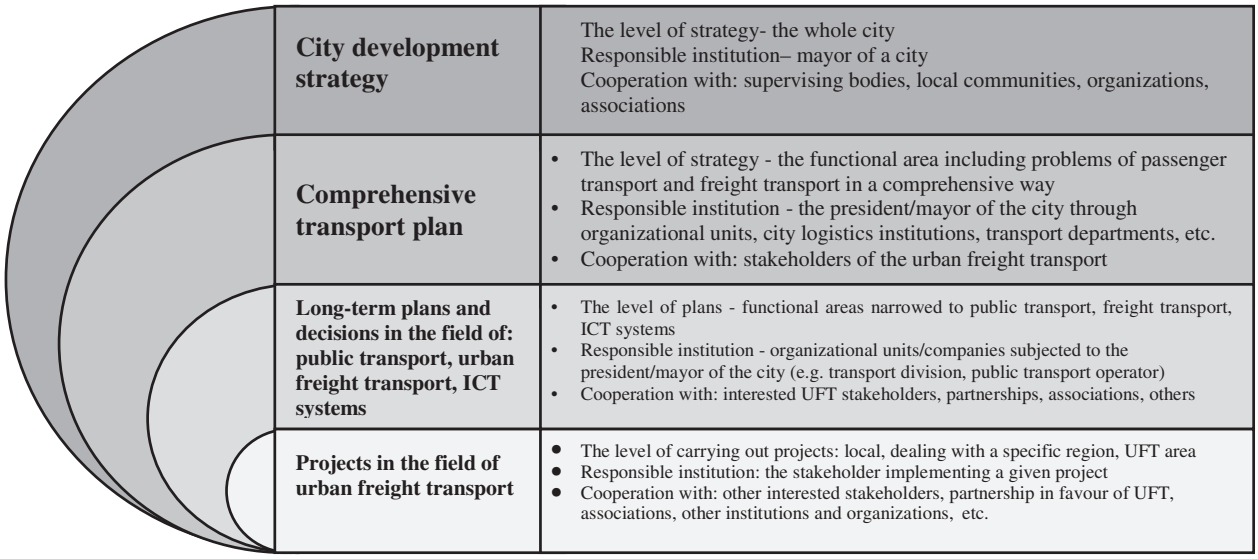

Fig. 1. The place of freight transport in the city development strategy.
Source: Own work modified on the basis of Kiba-Janiak, Importance of logistics in city development strategy, Logistyka 1/2015.

Table 1
Selected European strategic documents influencing urban freight transport.
Source: Own work modified and extended on the basis of Kiba-Janiak, Importance of logistics in city development strategy, Logistyka 1/2015.

Year	Title of document	Scopes regarding the area of urban freight transport
2001	A Sustainable Europe for a Better World: A European Union Strategy for Sustainable Development (Commission Communication, 2001)	The main scope of the strategy was to develop a proposal for a long term sustainable strategy for Europe. One of the most important problems identified in the document was transport congestion which mainly affects cities.
2006	Review of the EU Sustainable Development Strategy – renewed strategy (European Council, 2006)	The main aim of the strategy is the struggle to make transportation systems meet the needs of the society simultaneously minimizing negative effects of transport onto economy, society and environment.
2007	Green Paper. Towards a new culture for urban mobility (European Commission, 2007a)	The main aim of the document was to develop a framework for the new culture of mobility in a city by joint activities on behalf of innovative solutions for city transport in order to reduce pollution, congestion and providing access to public transport.
2007	Freight Transport Action Plan (European Commission, 2007b)	The document focuses on the significant role of freight transport in a city. It emphasizes the necessity of integration of passenger and freight strap ort in a city.
2007	On the Community strategy to reduce CO_2 emissions from passenger cars and light commercial vehicles (European Parliament Resolution, 2007)	The document contains groups of objectives (connected with the decrease of CO_2 emissions by the vehicles) in relation to the supplying party (namely manufactures) and demanding party (consumers).
2009	Action Plan on Urban Mobility (European Commission, 2015)	The action plan sets consistent frames for community initiatives with regard to the mobility in cities. Particular attentions were directed at a greater inclusion of freight transport into local policy and long-term planning.
2009	A Sustainable Future for Transport: Towards an Integrated. Technology-led and User-Friendly (System European Commission, 2009)	The document adopted the following objectives connected with the provision of a fully integrated and well-maintained transportation network, the implementation of more environmentally sustainable transportation and securing the leading position of the EU in the field of services and transportation technology.
2010	Directive on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport (European Parliament, 2010)	Introduction of a framework into the implementation of Transportation Intelligent Systems in cities.
2011	White Paper. Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system (European Commission, 2011)	The continuation of activities stipulated in the White Paper 2001 with regard to the creation of internal transportation market with a strong emphasis on the development of competitive and sustainable transport. This document also presents the aims concerning ecological city transport, such as: reducing by half the number of conventional cars in city transport by 2030; eliminating them from cities by 2050 and obtaining logistics free of CO_2 emission in cities by 2030
2013	Together towards competitive and resource-efficient urban mobility (European Commission, 2013a, 2013b)	The reinforcement of the support to European cities for resolving mobility problems. Motivation for cooperation of all government levels (European, national, regional and local) in introducing sustainable urban mobility. Furthermore, this document emphasized the need of involving city authorities into building the essential capacity in the city aiming at the implementation of UFT good practices, the cooperation of all stakeholders and providing the interoperability of local logistic solution on the basis of intelligent transportation systems, etc.
2016	A European Strategy for Low-Emission Mobility (European Commission, 2016)	Accelerate the implementation of low-emission mobility by higher emission of the transport system, low-emission alternative energy for transport and low- and zero emission vehicles.

presented in Table 1. The main criteria for selecting those documents were their objectives connected with urban freight transport. Among those objectives one can identify: the decreases both in environmental degradation in the city and in transport congestion, greater inclusion of freight transport into local policy and long-term planning, introduction of Transport Intelligent Systems (ITS) in cities, cooperation between UFT stakeholders.

The extent of the problem presented by air pollution has already been realized by the European Union in 1992 during the Convention on Climate Change. The continuation of arrangements adopted at the convention was the establishment of the reduction norms for greenhouse gases for the countries which have signed the declaration. These arrangements consisted of preliminary guidelines for member countries with regard to developing strategic objectives on the emissions of greenhouse gases on the part of for example road transport. In the years 2001 and 2006 two documents were published: “A Sustainable Europe for a Better World: A European Union Strategy for Sustainable Development” and “Review of the EU Sustainable Development Strategy – renewed strategy”, respectively. The purpose of both of those documents, in particular of the 2006 strategy, was to establish long-term objectives with regard to minimizing negative effects of transport on the economy, society and environment. Another document, which directly referred to road transport in a city was the “Green Paper. Toward a new culture for urban mobility”. This document presents the framework for local governments to take up activities in order to reduce pollution and congestion. In the same year yet another two documents were published focusing on the necessity to intensify the activities on behalf of freight transport in a city in order to reduce the CO_2 emissions. One can assume that those three documents comprise a strong basis to develop urban freight transport strategy on a local level. In 2009 another document was created “Action Plan on Urban Mobility” focusing particularly on the importance to include freight transport into local policy and long-term planning. In the document “A Sustainable Future for Transport: Towards an Integrated. Technology-led and User-Friendly System” several objectives related to environmental friendly transport have been introduced. It was also underlined that the larger inclusion of public sector in transportation planning and cooperation with UFT stakeholders is required (European Commission, 2009). In further document “Directive on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport” (European Parliament, 2010), a framework into the implementation of Transportation Intelligent Systems in cities has been developed. As far as the “White Paper” is concerned, particular goals concerning ecological city transport were shown. Those purposes among others relate also to urban freight transport and influence strategic planning (European Commission, 2011). The next document mentioned in the table, which signals the necessity of changes in the field of urban freight transport is European Commission Notification “Together towards competitive and resource-efficient urban mobility”. In this Notification special attention was paid to the complexity of city transport and hence the necessity of drawing up long-term plans by cities which take into consideration both passenger and freight transport (European Commission, 2013a, 2013b). Finally, in 2016 a further document has been launched “A European Strategy for Low Emission Mobility”. The main purpose of this communication from the European Commission was to accelerate the implementation of low-emission mobility in cities.

Despite the fact that the European Commission has drawn up a considerable number of documents indicating the direction of city development in the field of UFT, one can still observe the lesser involvement of local authorities in urban freight transport in comparison with passenger transport. In many European cities freight transport is not included in long-term transportation goals (Lindholm, 2010) and there is a lack of positions dealing with such tasks in the organization structures of local authorities (Lindholm, 2012).

The objectives set by the European Union and concerning urban freight transport are very ambitious and they require a good deal of involvement from the city authorities. One of the first steps in the implementation of the guidelines described above should be taking into consideration the objectives concerning urban freight transport in city strategic plans and drawing up detailed plans allowing the carrying out of these objectives. One of the documents which include guidelines for drawing up mobile city plans is specific guideline for a Sustainable Urban Mobility Plan (SUMP). In the literature on the subject one can also find essential guidelines for drawing up urban freight transport plans (Lindholm & Ballantyne, 2015; Taniguchi, Imanishi, Barber, James, & Debauche, 2014; Colonna, Berloco, & Circella, 2012; Allen et al., 2015). However, both the guidelines and above mentioned EU documents do not include the maturity stages of particular cities into planning and the implementation of activities in favor of more ecological and faster freight transport in the city.

4. City maturity in the field of planning and implementing activities in the area of urban freight transport

Freight transport in the city plays a significant role, especially for inhabitants who purchase goods in shops, work places, entertainment centers or order goods from home. One can mention only several activities in the city which do not need the delivery of material resources (Crainic, Gendreau, & Potvin, 2009; Swamy & Baindur, 2014). Therefore, it would seem that UFT should have essential meaning for the city authorities but unfortunately, in many cases it does not have (Lindholm & Behrends, 2012). Research shows (Kiba-Janiak, 2015; Lindholm & Browne, 2013) that in many cities objectives concerning freight transport are not taken into consideration in development strategies and/or in city transportation plans and even if they are, the freight transport policy is much narrower than the passenger transport policy (Allen et al., 2015; Lindholm & Behrends, 2012). According to Lindholm (2010), one can observe significant differences in the attitude of the local authorities towards the urban freight transport especially between Old Member States of the European Union and the New Member States of the European Union. In the former group of cities urban freight transport usually plays an important role in the transport development strategy in the city. Among cities which have been carrying out EU strategic goals in the field of urban freight transport for many years are: London, Amsterdam, Paris, Copenhagen, Stockholm, Gothenburg and Barcelona (Dablanc, 2007). In the cities belonging to the so-called New Member States of the European Union freight transport has a marginal significance (or is not taken into consideration at all) in city development strategies (Witkowski & Kiba-Janiak, 2014). Therefore, it can be stated that European cities are on various levels of the processing maturity as far as planning and the implementation of freight transport in the city are concerned.

The concept of process maturity has its origins in the 1970s and it is believed that it denotes the state of readiness to carry our particular research (Brajer-Marczak, 2015). In the literature there a number of models of processing maturity of the organization (Rohloff, 2011; Wendler, 2014, Cuenca, Boza, Alemany, & Trienekens, 2013; Kluth, Jäger, Schatz, & Bauernhans, 2014; Kramarz, 2015; Scheel von, Rosing von, Skurzak, & Hove, 2015). According to Aksztol and Chomuszko (2012) one can distinguish among them the following: Capability Maturity Model (Chrissis, Konrad, & Shrum, 2011; Scheel von et al., 2015), Business Process Maturity Model (Object Management Group, 2008; Scheel von et al., 2015); industry models, often inspired by CMM/CMMI or BPMM and general models of the organization include some elements of the maturity, e.g. Information Technology Infrastructure Library (ITIL) which contains a part coping with the process maturity: Process Maturity Framework (Aksztol & Chomuszko, 2012). These models allow the determination of the maturity level of the organization which is understood as “the state which may be gradually

changed and may be considered as the effect of a particular process". It is achieved by creating particular features, the collection of which is a special potential enabling carrying out of tasks" (Kania, 2013). According to Hatten and Rosenthal (1999), the effective model of the process maturity should integrate short-term and long-term planning in order to seek for competitive advantage constantly.

Taking into account the large diversity of European cities in planning and implementing activities facilitating freight transport in the city (Lindholm & Blinge, 2014), the starting point for drawing up long-term plans in this field could be the identification of their process maturity level concerning UFT. This identification would constitute the analysis of human, material and information resources of the local authorities responsible for effective UFT functioning. Therefore, the process maturity of the city in the field of planning and implementing the urban freight transport is the state which may be gradually changed by means of the collection of properties reflecting the capacity and the involvement of local authorities allowing the planning and carrying out UFT tasks in cooperation with other UFT stakeholders.

In the models of the process maturity described above usually there are about five phases of maturity, which include among others: an initial level, a repeatable level, a defined and awakening level, an excellence level and a continuous improvement level. In the case of city maturity evaluation concerning freight transport, the task is much more difficult due to the different function of the city compared to the commercial organization. A city municipality usually is obligated by national regulations to coordinate the traffic flow in a city (including both public and freight transport). However, there are some minor activities undertaken in the area of urban freight transport (mainly related to access restrictions). Therefore, in this case it is difficult to distinguish the initial level of city maturity understood as a level at which none activity related to UFT has been undertaken by a local authority. Other difficulties arise due to the lack of data on urban freight transport. Many cities do not gather the data on the flows of cargo in the city and do not take into consideration the objectives concerning this kind of transport in strategic documents. There are still no standards in Europe which would unify the way of gathering the data concerning urban freight transport. It also creates difficulties in distinguishing maturity levels differentiated by various data. Bearing in mind all the above information, a simplified formula has been adopted in this paper to evaluate city maturity level regarding only phases of planning and implementing UFT activities. The purpose of this model is to assess cities' maturity levels taking into account freight transport planning and the scope of undertaken UFT activities. In this model the ex post analysis of the success or failure of implemented UFT projects has been omitted. In the author's opinion on the success or failure of an implemented project it is not only a city which has an impact but also other stakeholders. Therefore, the success or failure of the project depends on the activity and maturity of various stakeholders and is not always correlated with city maturity level. Considering all these limitations five levels of city maturity (low, low/medium, medium, medium/high and high) regarding UFT planning and implementing have been identified:

1) Low maturity level – the first level of the maturity – UFT is not a priority for the city, the city is mainly focused on the passenger transport, the objectives concerning freight transport are either on a very general level or they are not present at all in strategic documents. In the organization structure of the city there are no positions dealing only with the tasks concerning urban freight transport. The city does not gather any data on urban freight transport (e.g. traffic congestion, the amount of cargo coming into and out of the city, etc.). In the city there are no implemented projects concerning urban freight transport and even if they are, they mainly concern the regulations referring to limitations (time and/or spatial) of the access for delivery vans to particular zones in the city. At this stage the majority of decisions are made mostly individually by the local authorities, any cooperation with UFT stakeholders (especially private transport companies, retailers, shippers, etc.) takes place only pursuant to the current regulations (e.g. the obligation of public consultation).
2) Low/medium maturity level – the second level of the maturity - a local authority does not fulfil all requirements for low level of maturity but at the same time fulfils some requirements for medium or high level of maturity. If a city is continuously improving the planning and implementing activities in the field of freight transport and will fulfil all requirements for low level of maturity it can be classified to the medium maturity level in the future.
3) Medium maturity level – the third level of the maturity - UFT is increasingly important for the city. In the strategic objectives of the city and/or in the transportation plan one can find clearly determined goals for freight transport, although there may be still a lack of plans dealing exclusively with urban freight transport. In the organization structure there is usually a position which carries out tasks concerning urban freight transport partly or in full. The city gathers the data on urban freight transport in a fragmentary way. The data is usually gathered less often than every five years. The city also rarely participates (as a partner) in EU projects concerning UFT. In the city a number of projects have been already implemented mainly those which deal with regulations and management of public place. However, single innovative projects sporadically may happen. UFT still requires development and a comprehensive approach on this level. The cooperation with selected stakeholders usually takes place in the process of carrying out particular projects, but there is a lack of regular and long-term cooperation with UFT stakeholders e.g. in freight transport quality partnership or other forms of cooperation (e.g. forums).
4) Medium/high maturity level - the fourth level of the maturity - a local authority does not fulfil all requirements for medium level of maturity but at the same time fulfils some requirements for the high level of maturity. That means if a city is continuously improving the planning and implementing activities in the field of freight transport and will fulfil all requirements for the medium maturity level it can be classified to the high maturity level in the future.
5) High maturity level – the fifth level of the maturity - UFT is one of the key objectives of the city, especially in the sustainable development context. In the city structure there is a position dealing exclusively with the tasks carried out in favor of urban freight transport. The city regularly gathers the data on the freight transport in the city (e.g. the traffic congestion, the number of cargos carried in and out of the city, etc.) The cities on this maturity level have a broad experience in the implementation of UFT projects, they carry out various EU projects and share the so-called good practices. Freight transport decisions are made in the cooperation with UFT stakeholders. The local authorities usually cooperate closely with UFT stakeholders within a long-term partnership (e.g. as a freight quality partnership FQP).

The assessment of the city process maturity in the field of planning and carrying out tasks concerning freight transport should include a deep analysis of human, material and informational resources. Nevertheless, in the context of strategic management such an analysis may be conducted in a simplified way paying attention in particular to two vital aspects: the stage of urban freight transport inclusion into strategic planning in the city and the range of implemented UFT projects (Fig. 2). These two aspects to a great extent allow the grouping of cities according to their maturity levels. As a consequence of such a simplified approach it is possible to establish benchmarks, i.e. these cities which attained maturity in planning and implementing UFT tasks (or these which are close to the model city in maturity level – the city which has the highest scores for two categories: the level of inclusion of UFT in city strategic planning and range of implemented UFT projects). Additionally, determining the maturity level in UFT allows the identi-

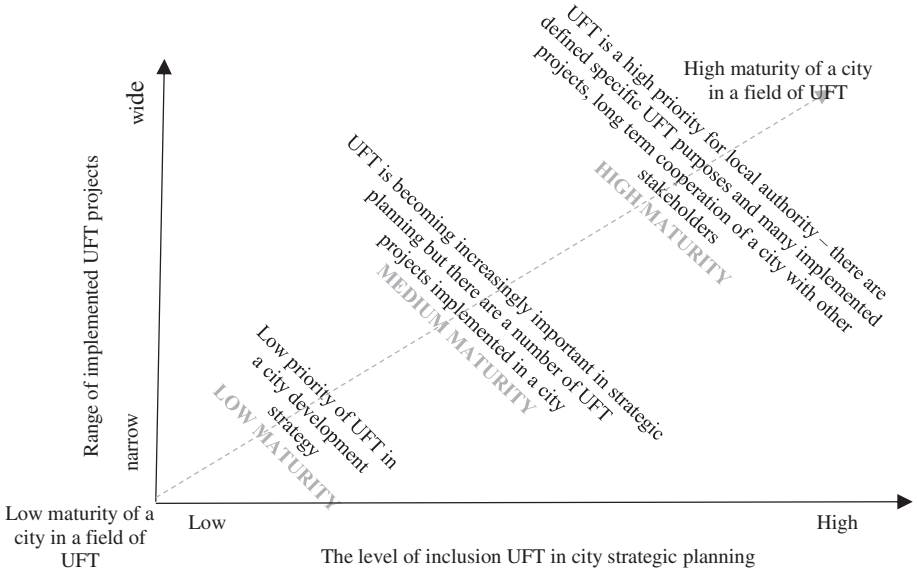

Fig. 2. Maturity levels of cities in the field of planning and carrying out activities in favor of urban freight transport.

fication of its strengths and weaknesses and indicates strategic actions which should be taken in order to achieve higher level of maturity. The examples of those actions have been presented in Table 2.

5. Research method

In the paper four stages to implement the study have been developed:

Stage 1. The development of research methodological foundations

In this stage the author has analyzed the domestic and foreign literature in the field of urban freight transport planning and city strategic planning. The research concerning the key factors of the success in the city logistics and conducted by the Delphi method constituted the basis of starting the research on the inclusion of UFT issues into city strategic planning (Kiba-Janiak, 2015). According to the research results, one of the key factors of the success is the necessity of including freight transport issues into city strategic planning.

Stage 2. Development of the research tool

The research tool has been developed on the basis of the relevant literature (Lindholm, 2012; Witkowski & Kiba-Janiak, 2014), knowledge and personal experience of the author and fulfilled the purpose of the research project financed by the National Science Center in Poland granted on the basis of the decision number DEC-2013/09/B/HS4/01284. The purpose of the survey was to obtain information from

Table 2
Strategic activities in relation to cities' maturity levels in the field of planning and carrying out activities in favor of UFT.
Source: Own work.

City's maturity levels in the field of UFT	Strategic activities which should be implemented
Low maturity	1. Creating a job (or employing a person who will be responsible) in order to carry out tasks concerning urban freight transport 2. The identification of UFT stakeholders and cooperation with them 3. The identification of stakeholders' needs in UFT and joint setting of priorities in this field 4. Single projects regarding UFT meeting the most important needs of selected UFT stakeholders (mainly low-cost projects) are implemented. 5. Inclusion objectives concerning UFT in city strategic plans and the transportation plan 6. Elaborating detailed UFT actions in the city transportation plan or drawing up a freight transport plan for the city 7. Constant self-improvement by participation in various conferences, symposiums, workshops and the exchange of the so-called good practices
Low/medium maturity	At this level of maturity selected activities (which are required) from both low and medium maturity levels should be implemented in order to improve cities in the field of planning and carrying out urban freight transport
Medium maturity	1. Stronger emphasis on tasks carried out in favor of UFT in organizational structure of the city 2. Establishing close cooperation with UFT stakeholders while implementing projects 3. The identification of stakeholders' needs in UFT and joint setting priorities in this field 4. Limited number of projects regarding UFT (for example concerning logistics infrastructure, the organization of collective deliveries) meeting the needs of UFT stakeholders are implemented. 5. Elaborating detailed UFT actions in the city transportation plan or drawing up a freight transport plan for the city
Medium/high maturity	At this level of maturity selected activities (which are required) from both medium and high maturity levels should be implemented in order to improve cities in the field of planning and carrying out urban freight transport
High maturity	1. Establishing long-term cooperation with UFT stakeholders in FQP or other forms of partnership 2. Constant updating of transportation plans, the identification of changing expectations of stakeholders, looking for new sources of financing and innovative solutions in the field of UFT 3. A significant range of UFT projects is implemented in a comprehensive manner and updated according to changing needs of different groups of UFT stakeholders. 4. Monitoring these solutions which have been already implemented and improving those which are out-of-date and implementing the new ones. 5. Constant self-improvement by participation in international projects, sharing knowledge with other cities, exchanging the so-called good practices

European capital cities about the approach to passenger and freight transport in a city, especially about the implemented projects as well as data concerning the involvement of stakeholders in the implementation of individual projects. The survey consisted of four parts (A, B, C and D) and contained open as well as closed questions, with the possibility of adding contributors' own answers. In the introductory part of the questionnaire, directed to the transport planning departments, respondents were asked to list all strategic documents in the city, including those which concern urban passenger and freight transport. Part A of the survey was also directed at the local authorities' representatives responsible for city logistics. The respondents were asked to identify and assess the Key Success Factors for city logistics. Part B was directed at the experts from transport planning department. In this part the questions were focused on the inclusion of urban freight transport in long-term plans and in the city organizational structure. Respondents were asked about existing regulations (or lack of them) concerning the collection of the data on urban freight transport. Part C was directed at the experts involved in freight transport in the city. Respondents indicated types of UFT projects which were implemented in the city. For the needs of the research seventeen types of projects have been identified. They were classified into five UFT areas: “Infrastructure”, “Land use management”, “Access condition”, “Innovation & ideas” and “Promotion and dissemination of ecological freight transport”. Part D was directed at representatives of public transport departments. The respondents were asked to provide information about the implemented projects in the area of collective and individual transport. In this paper, due to the narrow area of the research such as urban freight transport, results from two particular parts of the survey: B and C were used. The questionnaire was discussed via e-mail with five experts. The main criterion on selecting experts was their knowledge and experience in the field of city logistics. With all experts, representing such countries as the UK, Australia, Holland and Poland, direct consultations were held. Each expert has obtained the draft of the questionnaire on the basis of which some proposals for improvements were offered (such as UFT measures' ordering, reconstructions of questions, etc.).

Stage 3. Gathering and analyzing the study results

The research was conducted from 17th May 2015 to 15th March 2016. This extended period of the study was determined by difficulties which arose during the collection of the completed questionnaires. The questionnaires were sent via e-mail to mayors of 28 EU capital cities and to the employees of the division “Mobilität und Planung” in the City Hall of Zurich. There were two reasons for which the mayors of EU capital cities were selected as the contact points in the study. First of all, the questionnaire was interdisciplinary (it also included questions related to public transport) and required involvement of various departments. Secondly, in the various European cities there are many different departments, which are responsible for freight transport. It was also difficult to find information on the department responsible for freight transport in the websites of some cities. Therefore, the questionnaire was sent to the mayor, who was able to distribute it among employees. Direct interviews were conducted with two representatives of the City Halls in Warsaw and Berlin. However, the offer of a direct interview was proposed to all the representatives of studied cities. The request to return completed questionnaires was sent five times via e-mail. As a result, twelve completed questionnaires have been obtained. The research results have been elaborated in Excel spread sheet. Additionally, strategic plans and transportation plans of cities have been analyzed.

Stage 4. Drawing up city process maturity in planning and implementing actions in the field of urban freight transport

In order to evaluate city process maturity concerning planning and implementing actions in the field of urban freight transport two categories of evaluation have been identified: “the level of inclusion of UFT in city strategic planning” and “range of UFT areas where projects were implemented”. The choice of criteria for the identified categories of evaluation was the result of the limited access to the data. The following criteria were included into the first category “the level of inclusion UFT in city strategic planning”:

A – “The time when the local authority began planning city traffic in order to protect the environment”. This criterion indicates that the local authorities are aware of the environmental threats posed by road transport. The sooner the local authorities started to include environmental protection aspects in the field of road traffic, the greater the possibility that in a given city more actions concerning this matter were taken. Respondents had to choose one of a number of answers and the following scores were matched to each answer: “Over 20 years ago”– 7 scores; “Over 10 years to 20 years” – 6 scores; “Over 5 years to 10 years” – 5 scores; “Over 2 years to 5 years” – 4 scores; “Up to 2 years” – 3 scores; “Local authority has not carried out but is planning to do so in the coming year” – 2 scores and “Local authority has not carried out and is not planning to do so in the coming year” – 1 score; it is a maximized criterion.

B – “The time when the local authority began to involve freight transport into long-term city plans”. The criterion identifies the level of experience and the awareness of the local authorities concerning the essence of freight transport inclusion in long-term city plans. Respondents had to choose from among the same answers as in the case of the previous criterion (A); it is a maximized criterion.

C – “The development by the local authority of a complex plan, which includes passenger and freight transport”. This criterion allows the identification of those cities which have a comprehensive transportation plan including both passenger and freight transport. In the case of this criterion respondents had to choose one of a number of answers: “yes” – 1 score; “No, but local authority is planning to do so in the coming year” – 0,5 score and “No, and local authority is not planning to do so in the coming year” – 0 scores; it is a maximized criterion.

D – “The development of a freight transport plan by a local authority”. This criterion allows the identification of those cities which drew up freight transport plans. Respondents had to choose one answer out of the same set of answers as in the case of the previous criterion (C); it is a maximized criterion.

E – “The range of local authority cooperation with stakeholders”. As far as this criterion is concerned, respondents indicated stakeholders (experts) with whom they cooperate on the improvement of UFT. Respondents could choose any number of answers and additionally point out their own one. This criterion shows how local authorities are open on the needs of other stakeholders of urban freight transport and their willingness to joint solution of problems in this field. Among stakeholders/experts mentioned in the questionnaire there were the following: “academics”, “other cities”, “other public institutions”, “private trade companies”, “transport companies”, “associations” and “others”. The maximum number of scores (for the cooperation with a given group of stakeholders there was one score) which could be given to respondents was 7, it is a maximized criterion.

F – “The regulation on data collecting in the field of freight transport in a city”. The lack of access to the data on freight transport in the city is one of the most frequent problems in many European cities. The access to the data concerning the flow of cargo in the city is an indicator to create long-term objectives in the field of UFT. Therefore, also this criterion has also been included into the evaluation of city process maturity in planning and implementing actions concerning UFT. In the case of this criterion respondents had to choose one of the following answers: “Every day” – 8 scores; “Every month” – 7 scores; “Every three month” – 6 scores; “Every year” – 5 scores; “Every second year” – 4 scores; “Every five years” – 3 scores; “Less frequently” – 2 scores and “No” – 1 score, it is a maximized criterion.

G – “The long term partnership of local authority with UFT stakeholders”. This criterion allows those cities which have introduced a long-term partnership with UFT stakeholders to be identified such as freight quality partnership, etc. In the case of this criterion respondents had to choose from two answers: “yes”– 1 score; “No” – 0 score.

In order to obtain the final results the respondents were asked to

give their scores to each criterion for both categories. For the first category "the level of inclusion UFT in city strategic planning" all criteria have been normalized with the use of zero unitarization method (ZUM) (Kukuła, 2012) with the use of the formula:

$$x_i' = \frac{x_i - x_{min}}{R} \quad (1)$$

where:

x_i – the number of scores given to the particular criteria (i = A, B… n).

R – range, the difference between the maximum and minimum.

After normalization of criteria for each city (object) the synthetic measure - z_j has been calculated from the criteria A, B, C, D, E, F and G for the first category "the level of inclusion UFT in city strategic planning". As a consequence, the results on the scale from 0 to 1 have been obtained. The synthetic measure for each city was calculated (Cheba, 2011) based on the following formula:

$$z_j = \frac{1}{K} \sum_{i=1}^{K} x_i' \quad (2)$$

where:

z_j – *the* value of a taxonomic measure for *j*- object (city),

K – *the* number of features examined.

In the second category "range of UFT areas where projects were implemented" seventeen criteria have been identified within the framework of five UFT areas:

1. "Infrastructure": "Building city distribution center (for collective delivery to the city center by Light Freight Vehicles – LFVs or other means)"; "Infrastructure access to freight transport and/or manufacture companies located outside the city center"; "The use of public infrastructure (trams, underground) for the purpose of cargo delivery".
2. "Land use management": "Land allocation for city logistics operation (trucks' unloading/loading)"; "Relocation of freight generators (logistics and industrial activities, hypermarkets) according to urban renewal"; "Urban space planning taking into account freight road transport".
3. "Access condition": "Spatial restrictions according to the weight and volume of freight vehicles", "Introduction of loading and unloading zones for delivery vehicles"; "Time restrictions – introduction of time windows for freight transport", "Low emission zones".
4. "Innovation & ideas": "Introduction of electric vehicles in urban freight transport"; "Introduction of night delivery for urban freight transport"; "Introduction of cargo-cycles in urban freight transport"; "Introduction of collective delivery to the city center".
5. "Promotion and dissemination of ecological freight transport": "Introduction of city logistics forum (or other idea) dedicated to ecological freight transport"; "Encouragement of transport companies to use of alternative fuels (biodiesel, hydrogen, natural gas, vegetable oil, other biomass sources)"; "Introduction of a partnership for quality of freight transport in a city".

The respondents were asked to identify how many different types of UFT projects have been implemented. For each identified project type one score was given. The total number of scores which could be obtained was 17. In order to obtain the final results the data obtained in this category were normalized with the use of zero unitarization method (ZUM) (Kukuła, 2012) with the use of the formula:

$$p_i' = \frac{p_i - p_{min}}{R} \quad (3)$$

where:

p_i – the range of the areas (i) where UFT projects were implemented in a city.

R – range, the difference between the maximum and minimum.

In order to classify cities to one of the maturity levels the author has identified the model city in the field. The model city can be defined as the city, which obtained the highest number of scores in two analyzed categories: "inclusion of UFT in city strategic planning" and "range of implemented UFT projects". In this way for the model city variables: z_i, $p_i = 1$. The idea of introducing the model city in this paper arose from the limited sample of the studied cities on the basis of it being difficult to assess if the city with the greater number of scores represents the highest level of maturity generally or is the best against the other studied cities. Therefore, while presenting the model city one can observe the distance between the model city and the best city in terms of maturity level. Study results, observation and conducted interviews with the representatives of transport departments in Berlin and Warsaw showed that the greatest distance between the best developed city in the field of UFT and the model city is for the category "range of implemented UFT projects". Therefore, for this category the thresholds between maturity levels were lower than for the category "inclusion UFT in city strategic planning". In the paper the following thresholds for maturity levels have been proposed:

- I group of cities with low maturity level, for which $z_i < 0{,}4$ and $p_i < 0{,}3$
- II group of cities with low/medium maturity level, for which $z_i < 0{,}4$ and $p_i \geq 0{,}3$ or $p_i < 0{,}3$ and $z_i \geq 0{,}4$
- III group of cities with medium maturity level, for which $0{,}4 \leq z_i < 0{,}7$ and $0{,}3 \leq p_i < 0{,}6$
- IV group of cities with medium/high maturity level, for which $z_i \geq 0{,}7$ and $0{,}3 \leq p_i < 0{,}6$ or $p_i \geq 0{,}6$ and $0{,}4 \leq z_i < 0{,}7$
- V group of cities with high maturity level, for which $z_i \geq 0{,}7$ *and* $p_i \geq 0{,}6$.

The main purpose of such a classification is to indicate the cities with the highest (V group) and the lowest (I group) level of maturity in terms of planning and implementing activities in the field of freight transport and investigate the distance is between the best studied city and the model city. The thresholds presented above also include an exception when one variable is very low (for example $p_i = 0{,}2$) and the other very high (for example $z_i = 7$). In this situation a city could be classified to the group IV. One should bear in mind that the proposed thresholds are only suggestions and each city should be analyzed thoroughly in relation to each criterion.

6. Study results

Due to the research conducted by Kiba-Janiak (2015) it appears that among key success factors for city logistics there are those which are connected with strategic actions concerning both the planning and the implementation stage. Among them one may identify the following: "Including targets for environmentally friendly UFT in the city development strategy", "The inclusion of departments or workplaces responsible for freight transport in the organizational structure of a local authority", "Long-term cooperation among UFT stakeholders", "experts involvement" and "The involvement of representatives of local government for the implementation of activities in the field of UFT" (Kiba-Janiak, 2015). These first four success factors are mainly connected with long-term planning, while the last one deals with the participation of local authority in the implementation of the planned UFT actions/projects. The results of conducted research have shown that the inclusion of freight transport in long-term city plans is very important for local authorities. However, the experience of local authorities in planning and implementing UFT measures varies considerably in studied cities.

In order to assess the cities' maturity levels in the field of planning and carrying out activities in favor of urban freight transport two categories of evaluation have been identified: "the level of inclusion UFT in city strategic planning" and "range of UFT areas where projects

were implemented". Due to various groups of stakeholders influencing the success of implementation of UFT projects the method described in this paper has excluded ex post analysis of realized projects (such as exploitation of undertaken activities and the assessment of their efficiency).

In order to evaluate the inclusion stage of urban freight transport into city strategic planning the following criteria have been classified (thoroughly described in Section 6): "A. The time when the local authority began planning city traffic in order to protect the environment", "B. The time when the local authority began to involve freight transport in long-term city plans", "C. The development by a local authority of a complex plan, which includes passenger and freight transport", "D. The development of a freight transport plan by a local authority", "E. The extend of local authority cooperation with stakeholders", "F. A long term partnership with UFT stakeholders" and "G. The regulation on data collecting in the field of freight transport in a city".

For the second category, the cities were assessed in terms of the scope of implemented UFT projects. In the study seventeen types of projects within five UFT areas were identified (comprehensively described in Section 6): "Infrastructure", "Land use management", "Access condition", "Innovation and ideas" and "Promotion and dissemination of ecological freight transport".

For each implemented type of project was given one score was given for the local authority. Additionally, respondents had the opportunity of listing other types of UFT projects not mentioned in the questionnaire. Unfortunately, none of the respondents indicated other projects. Therefore, the maximum number of scores, possible to obtain, for implemented projects was 17 (this number of scores was presented only by the model city). The obtained results for the criterion p_i – "The range of UFT areas where projects were implemented" have been normalized as well. After normalization the results for the measure p_i on a scale from 0 to 1 have also been obtained. The normalized data as well as synthetic measure z_i for the assessment of urban freight transport in a strategic city planning and p_i - the range of UFT areas where projects were implemented - have been presented in Table 3.

The model city - C0 fulfils all requirements for high maturity level in terms of planning and implementing activities related to UFT. According to the study seven analyzed cities (C5-Berlin, C3-Dublin, C1-Vienna, C2-Helsinki, C8-Zurich, C6-Warsaw and C11-Paris) began planning to organize city traffic in order to reduce the degradation of the environment over 20 years ago. At the same time only three out of the above mentioned cities such as C5-Berlin, C1-Vienna and C6-Warsaw began to involve freight transport into long-term city plans. The other cities started focusing on urban freight plans 10 to 20 years ago (C2-Helsinki, C8-Zurich and C11-Paris) and 5 to 10 years ago (C3-Dublin). C10-Athens obtained the worst scores in this field, which began planning to organize city traffic in order to reduce the degradation of the environment just two years before the survey was conducted. The city had not also carried out the freight transport into city strategic planning as well as not developing freight transport plan. However, the city since 2015 has been involved into Novelog project and has been working on improving this area.

Apart from the fact that several cities have already introduced freight transport into city strategic planning, a small number of them have developed separately freight transport plans. Among those cities are C5-Berlin, C3-Dublin, C2-Helsinki, C9-Budapest and C11-Paris. In addition, C1-Vienna has also developed a freight transport plan, which is included in a coherent document thoroughly describing long term goals for both passenger and freight transport.

According to Lindholm and Browne (2013) in urban freight transport planning cooperation among stakeholders plays a significant role. Analyzed cities cooperate mainly with academicians (10 responses), other public institutions (9 responses), transport companies (8 responses) and other cities (8 responses). Only four studied cities such as C5-Berlin, C3-Dublin, C7-Lisbon and C11-Paris cooperate with private trade companies. However, Lisbon cooperates with UFT stakeholders only during the implementation of specific measures. Only Paris has introduced long term partnership with stakeholders, which is called "Charter for sustainable urban logistics". This kind of cooperation seems enormously important while implementing long term solutions in term of UFT.

One of the most important problems in almost all analyzed cities is the lack of formal regulations on collecting data on UFT. Nine analyzed local authorities do not regularly collect data in this field. Only C2-Helsinki, C8-Zurich and C11-Paris collect data every five years. The lack

Table 3
Normalized data on strategic planning and implementing projects in the field of UFT in selected cities.

Cities	The time when the local authority began planning city traffic in order to protect the environment	The time when the local authority began to involve freight transport into long-term city plans	The development by local authority of a coherent plan, which includes passenger and freight transport	The development of a freight transport plan by a local authority	The range of local authority cooperation with stakeholders	The regulation on data collecting in the field freight transport in a city	The long term Partnership of local authority with UFT stakeholders	The level of inclusion of UFT in city strategic planning (synthetic measure - z_i)	The range of UFT areas where projects were implemented - p_i
	A	B	C	D	E	F	G	z_i	p_i
C0-Model city	1	1	1	1	1	1	1	1,0	1,0
C1-Vienna	1,0	1,0	1	1	0,4	0	0	0,6	0,7
C2-Helsinki	1,0	0,7	1	1	0,8	1	0	0,7	0,6
C3-Dublin	1,0	0,7	1	0,5	0,6	0	0	0,5	0,2
C4-Riga	0,7	0,7	1	0	0,2	0	0	0,4	0,0
C5-Berlin	1,0	1,0	1	1	1	0	0	0,7	0,7
C6-Warsaw	1,0	1,0	1	0	0,8	0	0	0,5	0,2
C7-Lisbon	0,7	0,3	0	0	0,6	0	0	0,3	0,2
C8-Zurich	1,0	0,7	1	0,5	0,4	1	0	0,6	0,4
C9-Budapest	0,0	0,0	1	1	0,0	0	0	0,4	0,4
C10-Athens	0,0	0,0	1	1	0,4	0	0	0,3	0,1
C11-Paris	1,0	0,8	1	1	1,0	1	1	0,8	0,6
C12-Tallinn	0,8	0,8	1	1	0,8	0	0	0,6	0,1
Mean								0,57	0,40
Median								0,6	0,4
Standard deviation								0,21	0,29

of standards in this field causes many difficulties in analyzing problems in the area of UFT and implementing the UFT projects (measures) which have been tailored to the city.

The study conducted by the author shows that there is a considerable disparity among European cities taking into account the scope of the implemented UFT projects. The widest range of implemented types of projects in analyzed cities has been obtained in C5-Berlin (12) and C1-Vienna (12). Those cities implemented UTF projects in the same 9 areas, such as: introducing loading and unloading zones for delivery vehicles, introducing electric vehicles and cargo cycling in urban freight transport, building city distribution centers for collective delivery to the city center. Those cities have not introduced projects in areas such as: the use of public infrastructure for the purpose of cargo delivery and introduction of collective delivery to the city center. There are a small number of projects which differentiate those two cities. For example in Vienna night delivery for UFT has been introduced but not in Berlin. At the same time in Berlin a forum was launched dedicated to ecological freight transport and in Vienna it was not. Among cities which implemented the lowest number of solution regarding UTF were: C3-Dublin, C7-Lisbon, C10-Athens, C6-Warsaw, C12-Tallinn and C4-Riga. The solutions, which were implemented in those cities concerned mainly low-cost project such as spatial and access restrictions to a city center. Only Dublin has introduced the project related to the infrastructure access to freight transport and/or manufacture companies located outside the city center known as “Dublin Port Tunnel” which enables HGVs exit the port without going through the city center. The narrowest range of implemented project types has been obtained in Riga where none of the UFT projects was implemented. It can be observed that Riga as a city was not involved in any UFT projects, which does not rule out the possibility that some significant private UFT projects were implemented. The options expressed by the respondents in Riga, a conclusion can be drawn, that the involvement of the representatives of local governments in the implementation of solutions regarding city logistics seems to be not such a significant success factor for city logistics. This might be due to the fact that Riga is a city which only relatively recently joined the European Union and is still at its developing stage.

Fig. 3 presents the results concerning process maturity of studied cities in the field of planning and implementing urban freight transport. “The level of inclusion of UFT in city strategic planning” – z_i has been presented on the X axis, while “The range of UFT areas where projects were implemented” - p_i has been depicted by the Y axis.

As a result of the conducted analysis the cities were classified into five levels of process maturity in the field of planning and carrying out actions in favor of urban freight transport. Cities that have received the results for measures: $z_i < 0{,}40$ and $p_i < 0{,}3$ were classified to the level: low maturity, while the cities, whose measures were: $z_i \geq 0{,}7$ and $p_i \geq 0{,}6$ were classified to the level: high maturity. The cities, for which $0{,}4 \leq z_i < 0{,}7$ *and* $0{,}3 \leq p_i < 0{,}6$ were categorized into the level: medium maturity. The other cities were classified to the low/medium (when $z_i < 0{,}4$ and $pi \geq 0{,}3$ or $pi < 0{,}3$ and $z_i \geq 0{,}4$) or medium/high maturity level (when $z_i \geq 0{,}7$ and $0{,}3 \leq p_i < 0{,}6$ or $pi \geq 0{,}6$ and $0{,}4 \leq z_i < 0{,}7$ - see Section 5). There are three cities which were classified to the low level of maturity: C7-Lisbon, C10-Athens and C4-Riga. Riga has not implemented any type of UFT projects so far therefore for the category “Range of UFT areas where projects were implemented” obtained 0 scores. However, for the category “The level of inclusion of UFT in a city strategic planning” the score obtained by this city was almost 0,4 (0,38). Despite the fact that the city has started implementing freight transport into a long-term city strategy earlier than Lisbon and Budapest, in this city not a single UFT project has been implemented to date. Nevertheless, the city may gain knowledge and experience from other cities which are on the second or third maturity level in the field of planning and implementing activities within the frames of urban freight transport.

There are three cities which were classified to the low/medium level of maturity, namely: C6 – Warsaw ($z_i = 0{,}5$, $p_i = 0{,}2$), C3-Dublin ($z_i = 0{,}5$, $p_i = 0{,}2$) and C12-Tallinn ($z_i = 0{,}5$, $p_i = 0{,}2$). All these three cities are much better developed in the area of inclusion of freight transport in strategic planning than in implementing UFT projects. To the medium level of maturity two cities were classified: C8-Zurich ($z_i = 0{,}6$, $p_i = 0{,}4$) and C9-Budapest ($z_i = 0{,}4$, $p_i = 0{,}4$). There is one city which was classified to the medium/high level of maturity – C1-Vienna ($z_i = 0{,}6$, $p_i = 0{,}7$). This city has obtained a slightly lower score for the category “The level of inclusion UFT in a city strategic planning”. In the last and the best group of maturity three cities were classified: C2-Helsinki ($z_i = 0{,}7$, $p_i = 0{,}6$), C5-Berlin ($z_i = 0{,}7$, $p_i = 0{,}7$) and C11-Paris ($z_i = 0{,}8$, $p_i = 0{,}6$). According to the study results Paris seems to be slightly better developed than Berlin in the field of inclusion UFT in a city strategic planning (one of the differences in this field is that Paris has launched the long-term partnership with UFT stakeholders which Berlin does not have). On the other hand Berlin introduced in the city slightly greater number of UFT projects (Berlin has implemented UFT projects in 12 areas, while Paris in 10). The cities with the low and medium level of maturity require actions to be taken up in favor of the development of urban freight transport and especially establishing a close and ongoing cooperation with other UFT stakeholders. Cities such as Helsinki, Berlin and Paris also require continuous improvement in order to be closer to the model city. They can learn from each other and exchange “good practices” and their experiences.

Thus, it can also be assumed that Berlin and Paris that received the highest ratings in the study, can be considered as a benchmark for other

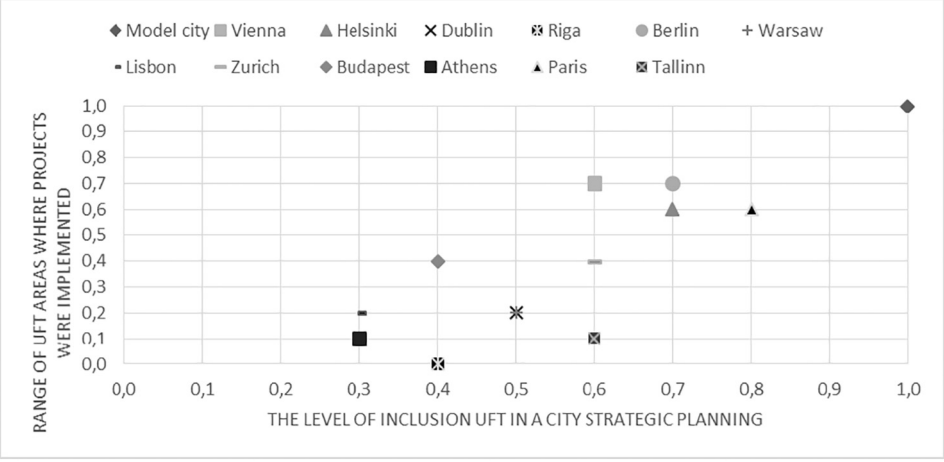

Fig. 3. City maturity levels in terms of planning and implementing activities in the field of freight transport.

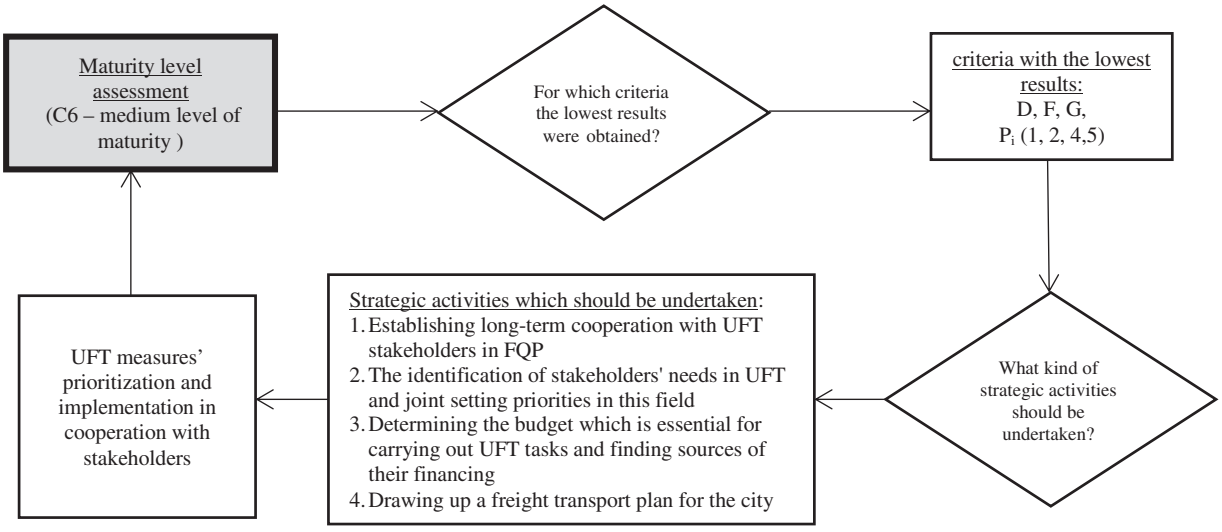

Fig. 4. The procedure for identification of strategic activities in relation to maturity level assessment of a city (on an example of Warsaw – C6).

cities in the field of planning and implementing urban freight transport actions. One must also keep in mind that also the cities which are in the high maturity phase should constantly improve their knowledge and competences so that the solutions which have been already implemented were up-to-date and customized to changing needs of urban freight transport stakeholders.

The assessment of city maturity level in terms of planning and implementing activities in the area of freight transport enables not only comparisons between cities or with the benchmark city but also the identification of strengths and weaknesses of the particular city. On the basis of the assessment of criteria a city can indicate strategic actions which should be taken in order to achieve a higher level of maturity (as presented in Table 2). The procedure for the identification of strategic activities in relation to a sample city (C6-Warsaw) has been presented in Fig. 4.

When the level of maturity in terms of planning and implementing activities in the area of freight transport has been assessed the list of criteria with the lowest results should be identified. For the city of Warsaw the criteria with the lowest results were: D. "The development of a freight transport plan by a local authority", F. "The regulation on data collecting in the field freight transport in a city", G. "The long term Partnership of local authority with UFT stakeholders" and P_i - types of projects which were not implemented: 1. "Infrastructure", 2. "Land use management", 4. "Innovation and Ideas" and 5. "Promotion and dissemination of ecological freight transport". On the basis of Table 1 for each criterion with the low assessment the strategic activity should be undertaken. In this examples among them are: establishing a close cooperation with various UFT stakeholders, the identification of stakeholders' needs in UFT and joint setting priorities in this field or drawing up a freight transport plan for the city, etc. The next step is the UFT measures' prioritization and implementation in cooperation with stakeholders. When the city undertakes strategic activities the procedure starts again from the maturity level assessment. It enables continuous improvement of the city in the area of strategic planning and implementing activities in the field of UFT.

7. Conclusion

This article presents the author's concept of city process maturity in reference to planning and implementing urban freight transport activities. It is understood as a state which gradually changes by means of the collection of properties reflecting the capacity and the involvement of the local authorities, which allows the planning and implement UFT tasks. Thus, the model is confined only to the data regarding the stage of planning and implementation, whereas the stage of control, which involves also the assessment of the success of the implemented projects (ex posts) was omitted. Firstly, the success of the implemented projects regarding city logistics is influenced by many factors. Some of them depend on the decisions made by local governments such as the development of strategic plans regarding urban freight transport, cooperation with other stakeholders, regular collection and analysis of UFT data. The other groups of factors are those which do not depend on a local authority's decisions. Among them are for example: legal regulations at the national/European level; the access to modern technologies in the region, the inclination of the residents/enterprises to modify communication behaviors, the city budget and also, what seems significantly important, the multiplicity of expectations and involvements of various UFT stakeholders (residents, shippers, receivers, transport companies, etc.). Each of those stakeholders represents different opinions, different aims and expresses their own individual expectations with regard to urban freight transport, which are not always consistent with the expectations of other stakeholders. Thus, the success of projects is not only dependent on the maturity of local governments but actually on the maturity of all UFT stakeholders. The introduced model in the paper allows the classification of cities as those, which are characterized by a higher level of maturity regarding planning of freight transport in a city and with regard to the scope of the implemented project.

What distinguishes this concept is a holistic and quantitative approach to the assessment of planning and implementing strategic activities in the field of urban freight transport. According to this concept such a maturity of cities may be determined as: low maturity where freight transport is a low priority for local authorities especially in a strategic planning ($z_i < 0{,}4$) and the number of projects carried out in this field is marginal (usually implemented projects (if they were implemented) concern regulatory solutions connected with the time or spatial limits for delivery vans in particular places of the city; $p_i < 0{,}3$); low/medium maturity of a city where $z_i < 0{,}4$ and $pi \geq 0{,}3$ or $pi < 0{,}3$ and $z_i \geq 0{,}4$); medium maturity – local authorities start to notice a UFT problem, the number of implemented projects is much higher, although this field needs many improvements, medium/high maturity of a city where $z_i \geq 0{,}7$ and $0{,}3 \leq p_i < 0{,}6$ or $pi \geq 0{,}6$ and $0{,}4 \leq z_i < 0{,}7$; and high maturity – cities are fully aware of the consequences resulting from UFT, they try to implement various types of projects improving UFT efficiency ($p_i \geq 0{,}6$) and they represent a holistic approach to the inclusion of UFT in a strategic planning in cooperation with other stakeholders ($z_i \geq 0{,}7$). Nevertheless, on the highest level of the city development there may be a situation that some

solutions may turn out to be out-of-date or unsatisfactory for stakeholders. Therefore, also on this level constant developments and improvements are needed.

In the empirical part of this paper the original results of the survey research and interviews conducted among the representatives of local authorities in the chosen European capital cities have been presented. As a result of survey research the information on the inclusion of freight transport into long-term plans of the city and the implementation of UFT projects has been obtained. The research shows that on 12 studied local authorities only five have freight transport plans (including one city which does not have a separate plan but detailed objectives concerning this field are taken into consideration in the city transportation plan). Another four cities intend to draw up these plans in the next year. The cities which drew up freight transport plans have also the highest number of implemented UFT projects (with the exception of Budapest, which relatively recently developed a freight transport plan). Therefore, one can conclude that in these cities in which transportation plans were drawn up over ten year ago, the widest range of various UFT projects was implemented - from low cost ones, such as limitations of access to particular zones in the city for delivery vans to those which need enormous capital investments, such as the construction of the distribution center. However, among the majority of studied cities low-cost projects prevailed: “spatial restrictions according to the weight and volume of freight vehicles”, “the introduction of loading and unloading zones for delivery vehicles”, “Time restrictions – the introduction of time windows for freight transport”, “Infrastructure access to freight transport and/or manufacture companies located outside the city center” and “Urban space planning taking into account freight road transport”. “A long term partnership” (Charter for sustainable urban logistics) was only created in Paris although other cities (Berlin and Helsinki) classified into high maturity level indicated the wide range of cooperation with various stakeholders. It was also interesting to observe that cities classified to the high maturity level differed from each other. For example Berlin has received the highest scores for the synthetic measure p_i (the level of inclusion UFT in a city strategic planning) while Paris obtained the highest scores for the synthetic measure z_i (the range of UFT areas where projects were implemented). These cities may constitute benchmarks for other cities in planning and implementing activities in the area of UFT. However, according to the maturity concept introduced in the paper these cities remain behind the model city, which is a city with the highest number of scores for two categories. Bearing in mind this information cities and criteria for which studied cities have the greatest distance to the model cities they could undertake some improvements in these areas. The cities classified to the high maturity level could also in terms of further improvement exchange “good practices” and knowledge with each other. However, it should be borne in mind that the sample of respondents did not include London or Amsterdam which is experienced as far as urban freight transport is concerned. Those cities probably would be also classified to the group of the cities with high maturity in the field of urban freight transport planning and implementing.

The research presented in this article constitutes the original contribution into scientific sphere and practical concerning urban freight transport. The research results presented in this article cannot be generalized on the whole population of European cities due to the unrepresentative research sample nevertheless they constitute quite essential knowledge for the scientific community and for local authorities as far as planning and implementing UFT actions are concerned. The proposed quantitative method of the assessment of a city maturity level in the field of planning and carrying out actions in urban freight transport may be a practical tool for local authorities willing to self-improve and develop in this field. Such a tool may help to identify benchmark cities which attained process maturity in the field of planning and implementing UFT projects and which constitute a reference model for the cities on lower maturity level. Due to the fact, that there is insufficient access to many data on urban freight transport the criteria developed in the model are limited. In the further study the range of the criteria, related especially to the environmental and efficiency aspects, can be extended.

Acknowledgements

The author wishes to acknowledge all respondents and mayors of the studied cities, for their time and extremely valuable support in this scientific study. Special gratitude is directed to my colleagues for valuable and fruitful discussion on the questionnaire and the paper. I would like especially to acknowledge: Michael Browne, Russell Thompson, Jarosław Witkowski, Katarzyna Cheba, Marzena Kramarz and Stanisław Iwan.

The paper is a part of the research project which is being financed by the National Science Centre of Poland granted on the basis of the decision number DEC-2013/09/B/HS4/01284.

References

www.ec.europa.eu, 14.09.2015.

Allen, J., Browne, M., & Holguín-Veras, J. (2015). Sustainability strategies for city logistics. In A. McKinnon, M. Browne, M. Piecyk, & A. Whiteing (Eds.), *Green Logistics. Improving the environmental sustainability of logistics* (pp. 293–319). Kogan Page Limited.

Auksztol, J., & Chomuszko, M. (2012). *Process organization modeling*. Warszawa: PWN.

Ballantyne, E. E. F., Lindholm, M., & Whiteing, A. (2013). A comparative study of urban freight transport planning: Addressing stakeholder needs. *Journal of Transport Geography*, *32*, 93–101. http://dx.doi.org/10.1016/j.jtrangeo.2013.08.013.

Berlin Municipality (2015). *An interview with an employee in Senatsverwaltung für Stadtentwicklung und Umwelt Referat, Grundsatzangelegenheiten der Verkehrspolitik, Verkehrsentwicklungsplanung*.

Brajer-Marczak, R. (2015). Process maturity of enterprises in order to improve processes from the perspective of the organization's ability. *Scientific Papers of Wroclaw University of Economics, No. 375, 2015, Wroclaw* (pp. 264–274). . http://dx.doi.org/10.15611/pn.2015.376.18.

Cheba, K. (2011). Analysis of development trends of standard of living for medium-sized cities in Poland. *Ekonometria*. (pp. 137–146).

Chrissis, M. B., Konrad, M., & Shrum, S. (2011). *CMMI for development, guidelines for process integration and product improvement* (3rd ed.). Pearson Education, Inc.

Colonna, P., Berloco, N., & Circella, G. (2012). The interaction between land use and transport planning: A methodological issue. *SIIV - 5th International Congress - Sustainability of Road Infrastructures, Procedia - Social and Behavioral Sciences. 53. SIIV - 5th International Congress - Sustainability of Road Infrastructures, Procedia - Social and Behavioral Sciences* (pp. 84–95). . http://dx.doi.org/10.1016/j.sbspro.2012.09.862.

Commission Communication (2001). *A sustainable Europe for a better world: A European Union strategy for sustainable development' (Commission proposal to the Gothenburg European Council) [COM(2001) 264 final], Brussels. 2001*.

Crainic, T. G., Gendreau, M., & Potvin, J.-Y. (2009). Intelligent freight-transportation systems: Assessment and the contribution of operations research. *Transportation Research Part C*, *17*(541–557), 547. http://dx.doi.org/10.1016/j.trc.2008.07.002.

Cuenca, L., Boza, A., Alemany, M. M. E., & Trienekens, J. J. M. (2013). Structural elements of coordination mechanisms in collaborative planning processes and their assessment through maturity models: Application to a ceramic tile company. *Computers in Industry 64* (pp. 898–911). Elsevier. http://dx.doi.org/10.1016/j.compind.2013.06.019.

Dablanc, L. (2007). Goods transport in large European cities: Difficult to organize, difficult to modernize. *Transportation Research Part A*, 280–285. http://dx.doi.org/10.1016/j.tra.2006.05.005.

European Commission (2007a). *Green Paper Towards a new culture for urban mobility, Commission of The European Communities, Brussels, 25.9.2007 COM(2007) 551 final*.

European Commission (2007b). *Freight Transport Action Plan, Not published in the Official Journal, Communication of 18 October 2007 from the Commission: Freight Transport Logistics COM (2007) 607*.

European Commission (2009). *A sustainable future for transport: Towards an integrated, technology-led and user-friendly system*. Brussels: Directorate General for Energy and Transport.

European Commission (2011). *White Paper, roadmap to a single European transport area – Towards a competitive and resource efficient transport system, Brussels, 28.3.2011 COM (2011) 144 final*.

European Commission (2013a). *Communication from the Commission to the European Parliament, Together towards competitive and resource-efficient urban mobility, the Council, the European Economic and Social Committee and the Committee of the Regions, COM(2013) 913 final, Brussels*.

European Commission (2013b). *Special Eurobarometer, 2013, attitudes of Europeans towards urban mobility, Brussels. 406*.

European Commission (2015). *Action plan on urban mobility, communication from the Commission to the European Parliament, the Council, the European economic and Social Committee and the Committee of the Regions*.

European Commission (2016). *A European strategy for low-emission mobility, communication from the Commission to the European Parliament, the Council, the European economic and*

Social Committee and the Committee of the Regions, European Commission {SWD(2016) 244 final}, COM(2016) 501 final, Brussels, 20.7.2016.

European Council (2006). *Review of the EU Sustainable Development Strategy - Renewed Strategy (2006): DOC 10917/06*.

European Environment Agency (2009). Transport at a crossroads, TERM 2008: Indicators tracking transport and environment in the European Union. *EEA Report No 3/2009*.

European Parliament (2010). Directive 2010/40/EU of the European Parliament and of the Council of 7 July 2010 on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport. *Official Journal of the European Union, L 207*, 1–13.

European Parliament Resolution (2007). *On the community strategy to reduce CO_2 emissions from passenger cars and light commercial vehicles, 2007/2119(INI)*.

Hatten, K. J., & Rosenthal, S. R. (1999). Managing the process – centred enterprise. *Long Range Planning*, *32*(3), 293–310. http://dx.doi.org/10.1016/S0024-6301(99)00034-5.

Iwan, S., & Kijewska, K. (2014). The integrated approach to adaptation of good practices in urban logistics based on the Szczecin example. *8th International Conference on City Logistics, Procedia - Social and Behavioral Sciences 125* (pp. 212–225). . http://dx.doi.org/10.1016/j.sbspro.2014.01.1468.

Kania, K. (2013). *Reinforcing the management of business processes in an organization using maturity models and ICT*. Katowice: Katowice University of Economics.

Kiba-Janiak, M. (2015). Importance of logistics in city development strategy. *Logistyka*, *1/2015*.

Kluth, A., Jäger, J., Schatz, A., & Bauernhans, T. (2014). Method for a systematic evaluation of advanced complexity management maturity. *Robust Manufacturing Conference (RoMaC 2014), Procedia CIRP 19* (pp. 69–74). Elsevier. http://dx.doi.org/10.1016/j.procir.2014.05.041.

Kramarz, W. (2015). The problem of maturity process in the supply chain. *Scientific Papers PSL* (pp. 193–205). Organization and Management.

Kukuła, K. (2012). In B. Borkowski, & K. Kukuła (Eds.), *Proposal to build a ranking with the use of characteristics and qualities. Quantitative methods in economic research, red.* Warszawa: Szkoła Główna Gospodarstwa Wiejskiego, Wydział Zastosowań Informatyki i Matematyki, Katedra Ekonometrii i Statystyki, Tom XIII/1.

Lindholm, M. (2010). A sustainable perspective on urban freight transport: Factors affecting local authorities in the planning procedures. *The Sixth International Conference on City Logistics, Procedia Social and Behavioral Sciences. 2. The Sixth International Conference on City Logistics, Procedia Social and Behavioral Sciences* (pp. 6205–6216). . http://dx.doi.org/10.1016/j.sbspro.2010.04.031.

Lindholm, M. (2012). How local authority decision makers address freight transport in the urban area. *Procedia - Social and Behavioral Sciences. 39. Procedia - Social and Behavioral Sciences* (pp. 134–145). Elsevier. http://dx.doi.org/10.1016/j.sbspro.2012.03.096.

Lindholm, M., & Ballantyne, E. F. (2015). Introducing elements of due diligence in sustainable urban freight transport planning. In E. Taniguchi, & R. Thompson (Eds.), *The 9th International Conference on City Logistics, Tenerife 17–19 June 2015* (pp. 72–86). . http://dx.doi.org/10.1016/j.trpro.2016.02.048.

Lindholm, M., & Behrends, S. (2012). Challenges in urban freight transport planning – A review in the Baltic Sea region. *Journal of Transport Geography*, *22*, 129–136. http://dx.doi.org/10.1016/j.jtrangeo.2012.01.001.

Lindholm, M., & Blinge, M. (2014). Assessing knowledge and awareness of the sustainable urban freight transport among Swedish local authority policy lanners. *Transport Policy*, *32*, 124–131. http://dx.doi.org/10.1016/j.tranpol.2014.01.004.

Lindholm, M., & Browne, M. (2013). Local authority cooperation with urban freight stakeholders: A comparison of partnership approaches. *European Journal of Transport and Infrastructure Research*, *13*(1), 20–38.

Object Management Group (2008). Business Process Maturity Model (BPMM), OMG Document Number: formal/2008-06-0, Standard document. URL http://www.omg.org/spec/BPMM/1.0/PDF.

Rohloff, M. (2011). Advances in business process management implementation based on a maturity assessment and best practice exchange. *Inf Syst E-Bus Manage*, *9*, 383–403. http://dx.doi.org/10.1007/s10257-010-0137-1.

Ruescha, M., Hegia, P., Haefelib, U., Mattib, D., Schultzc, B., & Rütschec, P. (2012). Sustainable goods supply and transport in conurbations: Freight strategies and guidelines, Procedia - Social and Behavioral Sciences 39. *Selection and/or peer-review under responsibility of 7th International Conference on City Logistics* (pp. 116–133). Elsevier Ltd. http://dx.doi.org/10.1016/j.sbspro.2012.03.095.

Scheel von, H., Rosing von, G., Skurzak, K., & Hove, M. (2015). *BPM and maturity models, the complete business handbook*. Elsevierhttp://dx.doi.org/10.1016/B978-0-12-799959-3.00019-7.

Swamy, S., & Baindur, D. (2014). Managing urban freight transport in an expanding city — Case study of Ahmedabad. *Research in Transportation Business & Management*, *11*, 5–14. http://dx.doi.org/10.1016/j.rtbm.2014.06.010.

Taniguchi, E., Imanishi, Y., Barber, R., James, J., & Debauche, W. (2014). Public Sector Governance to Implement Freight Vehicle Transport Management, 8th International Conference on City Logistics. *Procedia - Social and Behavioral Sciences*, *125*, 345–357. http://dx.doi.org/10.1016/j.sbspro.2012.03.095.

Wendler, R. (2014). The maturity of maturity model research: A systematic mapping study. *Information and Software Technology*, *54*, 1317–1339.

Witkowski, J., & Kiba-Janiak, M. (2014). The role of local governments in the development of city logistics. *Procedia - Social and Behavioral Sciences. 125. Procedia - Social and Behavioral Sciences* (pp. 373–385). Elsevier. http://dx.doi.org/10.1016/j.sbspro.2014.01.1481.