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# Adaptative approach to implementing good practices to support environmentally friendly urban freight transport management

Stanisław Iwan*

*Maritime University of Szczecin, Faculty of Economics and Transport Engineering, ul. Poboznego 11, 70-515 Szczecin, Poland*

**Abstract**

The fast growth of cities combined with the growing needs of city users, including freight carriers, residents, shippers, trade associations, in turn leads to significant problems with transport coordination and achieving its highest possible efficiency (having taken into account efficient use of loading space, limiting the fleet operation costs, ensuring fast deliveries, etc.). These factors result in the need to search for methods that enable effective implementation of solutions aimed at streamlining and optimising urban freight transport management. All implementation processes may be completed based on three major approaches: developing completely new solutions from scratch – creation, direct copying of practically proven solutions – transfer and transferring practically proven solutions while making changes that mainly depend on the implementation environment – adaptation. The adaptation of good practice makes it possible to avoid mistakes and also to indicate to stakeholders the potential benefits experienced by the cities that have already been using good practice. This paper is focused on a methodology for efficient implementation of urban freight transport (UFT) measures based on the adaptation approach.


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*Keywords:* urban freight transport; city logistics; UFT management; adaptative approach; adaptation; good practices implementation;

## 1. Introduction

According to World Band data, currently about 75% of the population in the European Union are living in cities (data.worldbank.org/indicator). It is predicted that by 2050 the number of people living in European urban areas will

* Corresponding author. Tel.: +48-91-48-09-675; fax: +48-91-48-09-648.
*E-mail address:* s.iwan@am.szczecin.pl


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increase to 84% (European… 2012). The fast growth of cities is combined with the growing needs of city users, including freight carriers, residents, shippers, trade associations, etc. Moreover, due to the increasing popularity of e-commerce a considerable portion of goods deliveries are made directly to individual customers (Iwan 2013). This in turn leads to significant problems with transport coordination and achieving its highest possible efficiency (having taken into account efficient use of loading space, limiting the fleet operation costs, ensuring fast deliveries, etc.).

The increasing growth of urban freight traffic has substantially affected the quality of life of urban residents. It influences the city environment by increasing the noise, pollution, congestion, number of accidents, use of non-renewable fossil fuels as well as the reduction of the greenfield sites and open spaces as a result of transport infrastructure development. Additionally, the increasing amounts of waste products, such as tyres, oil and other materials are the result of the utilization of traditional delivering and transport systems.

The above mentioned aspects become particularly significant in the context of implementing solutions that make it possible to limit the negative impact of freight transport on urban environment. However, solutions of this kind often require additional investment (e.g. purchasing vehicles fuelled with alternative sources of energy), or are connected with imposing restrictions and limitations that hinder transport activities (e.g. establishing restricted traffic zones). For that reason, they are often unfavourably approached by stakeholders representing the business sector which is mainly concerned about decreasing delivery costs.

Urban freight transport management may be viewed from three major perspectives which, taking into consideration the functioning of the urban structure as a whole, may refer to the particular levels of the management pyramid (Fig. 1):

- the perspective of individual freight transport market participants, which focuses on ad-hoc measures that are usually taken over a short-term horizon, and are focused on meeting the individual needs of single UFT stakeholders;
- the perspective of integrated measures taken by groups of stakeholders who aim at developing more effective methods of transport and deliveries over a longer time horizon, taking into account diversified needs and many a time divergent priorities (e.g. initiatives connected with organising consolidated deliveries or delivery vehicles sharing);
- the perspective of a city as a whole, which should refer to the measures that integrate any other initiatives taken on lower levels and indicate far-reaching areas of development and the policy for the city's transport system management.

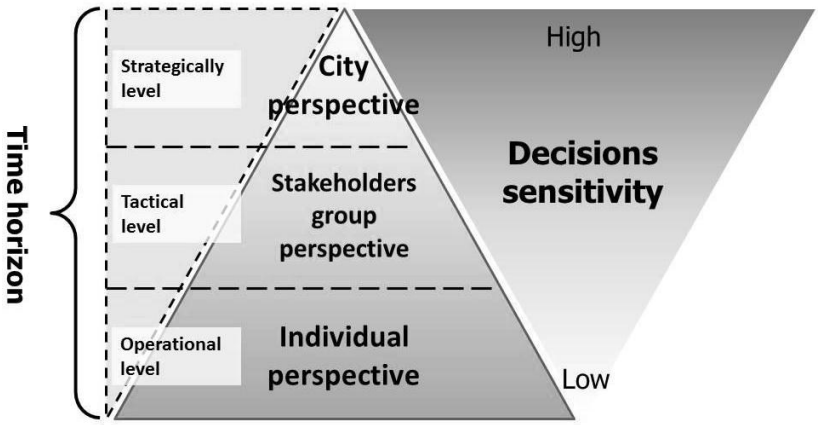



Fig. 1. Three UFT management perspectives. Source: own work.

The latter perspective falls within the competence of the first-level self-government units (in Poland, pursuant to Art. 164 of the Constitution of the Republic of Poland, such units are communes/municipalities), who should initiate

the activities. Especially given that the most important role of the local authorities in the city logistics system is to solve the conflicts between other stakeholders, whilst ensuring the sustainable development of the city (Witkowski, Kiba-Janiak 2014). It is necessary to provide the middle ground for all stakeholder groups and to work out measures that can be accepted by everyone. In the contemplated context, this means meeting the growing needs of all city users, i.e. providing the well-being factors to its inhabitants (shopping, relaxation, work, health care, quality of accommodation, security), businesses functioning within its area (qualified workers, resources, market, business environment) and visitors coming to the city (accessibility of tourist attractions, cultural events, hotels, etc.). Initiatives supporting the functioning of urban freight transport on this decision level should be in the form of integrated activities. This issue should be approached from four major perspectives (Iwan 2013):

- integration of subsystems, their functions and processes that take place within them – this perspective constitutes the major challenge to urban freight transport systems. The vast majority of solutions implemented in the area focuses on combining many aspects of city functioning;
- integration of stakeholders, needs and expectations. Due to the fact that expectations of various stakeholders of urban freight transport may be, and often are, significantly diversified, it is necessary to search for solutions that make it possible to work out a compromise;
- integration of implemented solutions in order to obtain a synergy effect. When the implementation of urban freight transport solutions is seen as a whole, many a time implementation planning is based not on single actions, but on packages of solutions. This approach makes it possible to obtain a synergy effect and achieve much better results, and also makes it possible to satisfy diversified needs of the stakeholders;
- integration of data and knowledge resources flows, which are necessary for the correct functioning of the system and the implementation of the planned tasks.

It is dependent on a number of factors impacting the final effects. Nevertheless, the key role is played here by the active participation of parties interested and engaged in deliveries made within urban space. Including them in the evaluation of the implementation processes and providing partnership framework for cooperation, helps to see clearly how the processes proceed and to what extent the current results are consistent with the planned outcomes (stakeholders' expectations). It is even more important, because without their subsequent engagement in the development and maintenance of the implemented solutions, the measures taken may in time prove ineffective and soon be deprived of their social and economic values.

These factors, as well as the continuing migration processes (growing populations of cities) and demographic developments (connected mainly with society ageing) result in the need to search for methods and techniques that enable effective implementation of solutions aimed at streamlining and optimising urban freight transport. Proper implementation of good practices makes it possible to avoid mistakes and also to indicate to stakeholders the potential benefits experienced by the cities that have already been using good practice. That improves the chances for effective implementation while taking into account the wide range of stakeholders. In recent years a lot of interesting initiatives in this area were realized, like BESTUFS/BESTUFS II (www.bestufs.net), TRAILBLAZER (www.trailblazer.eu), START (www.start-project.eu), SUGAR (www.sugarlogistics.eu), C-LIEGE (www.c-liege.eu), CITYMOVE (www.citymoveproject.eu), CITYLOG (www.city-log.eu), TURBOLOG (www.turblog.eu). A major part of the activities proposed by them, are based on the adaptive approach, which enables the preparation of new implementations of good practices that have already been tried and tested in other urban conditions and contexts, as they carry a significantly lower risk of failure (based on the principle of knowledge sharing and learning from mistakes made by others).

In the light of the assumptions shown above, the main goal of this paper is to propose a methodology that makes it possible to implement good practices in the area of urban freight transport on the basis of adaptative approach, where the implementation process is improved when the stakeholders are considerably satisfied, taking into account their specific nature, disparate goals and diverse approach to the adaptive processes themselves.

Achieving a high level of usefulness of the implemented solutions is therefore determined by complementary synergistic actions, with the underlying, possibly full implementation of the resultant bundle of goals of all stakeholders groups. The presented methodology focuses on involving the stakeholders in all stages of the

implementation process and on emphasising their decisive importance for its effectiveness and also maybe even first and foremost for the subsequent use of the solutions. The methodology proposes a number of originally developed tools that make it possible to assess the solutions complementarity and implementations planning in a way that enables it to achieve a synergy effect.

## 2. The idea of the adaptation approach

All implementation processes may be completed based on three major approaches:

- developing completely new solutions from scratch – creation,
- direct copying of practically proven solutions – transfer,
- transferring practically proven solutions while making changes that mainly depend on the implementation environment – adaptation.

In the case of creation, using models and sample solutions may be helpful, whereas in the case of a transfer or adaptation it constitutes the basis of an implementation procedure and a significant part of activities is focused on searching for appropriate models. Transfer concentrates on the direct copying of the models, without any modifications or adjustments. In the case of the adaptation approach, it is the adjustment processes that play an important part, as they involve making changes to the solution being implemented and consist in adapting it to the specific environment in which it will operate. Also, they adapt the implementation environment itself to the implementation conditions and use requirements resulting from the characteristics of the solution. Adaptation of the environment in which the given solution is to function focuses first and foremost on functional changes, mainly regarding changes within the scope of the tasks and in the way of performing them, and on structural changes, which are connected with adding, removing, or replacing the elements of the organisational structure or modification of their interconnections (Jasiński 2008).

According to the results of the research done by experts from Harvard Business School, four basic ways of organization learning were identified (Bogan, English 2006):

- learning from others – a strategy of gaining knowledge consisting in analysing other people's experience (e.g. colleagues from the same organisation or people and organizations from outside their own corporation and business sector);
- simulation – this strategy aims at creating models that help organisations foresee what will happen after initiating a new program, implementing a new technology or launching a new product or service on the market;
- prototyping – it is meant to create a new product, service or pilot program on a small scale in a controlled environment in order to assess, before starting mass production and launching sales, how the real market reacts to it (apart from manufacturing a testing batch of the product, prototyping also involves pilot programs and launching testing batches of the product on the market);
- real life learning – this strategy involves testing the actual full implementation, included in the normal process of production or service rendering.

Analysing the recent proliferation of European projects focused on the implementation of solutions in the area of urban logistics, we can notice compliance with the above mentioned strategies and some convergence regarding the generally adopted approach. The measures taken under the projects are most often based on the transfer and adaptation of practically proven solutions. Making use of good practices has become one of the basic implementation methods. Also, this very approach is promoted in the documents indicating the areas of development for transport systems in Europe. That was emphasised, inter alia, in "Action Plan on Urban Mobility", published by the European Commission (Commission… 2009). The approach, based on the adaptation of good practice was employed in the implementation of urban logistics projects such as, inter alia, BESTUFS/BESTUFS II (www.bestufs.net), TRAILBLAZER (www.trailblazer.eu), SUGAR (www.sugarlogistics.eu). A good example of such a project is also the C-LIEGE project (www.c-liege.eu), implemented under the Intelligent Energy – Europe programme, one of the few projects of this kind involving a Polish city (namely Szczecin).

Here it must be stressed that any and all activities in the area of implementing and developing urban freight transport solutions should be based on several basic assumptions:

- taking into account the qualitative perspective and, as much as it is possible, the quantitative perspective on the issues of freight transport and deliveries in urban environment, including:
  - modelling the goods flows and individualisation of general features of freight transport (taking into account generating the points of flow, the specifics of the activities that generate them, and also the volumes of traffic and goods flow within various logistic chains);
  - identification of actions generating goods transport;
  - specifying formal operating procedures;
- providing methods and tools to enable the specification of priorities in solutions implementation;
- supporting the search for solutions that may be implemented over a short or medium time horizon;
- measuring the impact of given solutions on urban environment (identification of limitations and failures, indicating connections with other phenomena concerning mobility).

## 3. Stages of urban logistics solutions implementation based on the adaptation approach

Within the framework of many projects, attempts were made to formalise the process of UFT solutions implementation. Presented below is an original research methodology.

The whole process has been divided into 11 stages, some of which are completed in parallel, and some may be initiated no sooner than after completing the other ones. All the stages along with their interdependencies are shown in Fig. 2. They include the following activities:

- analysis and assessment of the current situation regarding freight transport functioning in the city – this stage initiates the solution implementation process and focuses on the current analysis of the situation in the city and its environment. This can be done based on generally available statistical data and results of analyses made so far, as well as own research work focused on concrete problems;
- identification of key stakeholders – this task should be completed at a very early stage of the works. The assumption underlying the proposed model is engaging stakeholders in practically all further activities. It is important that this stage should be implemented in parallel with the stage “identification of needs and priorities”, as selection of stakeholders to a large degree depends on the adopted goals and expected results (the dependency is shown by the dotted line linking both stages in the diagram);
- engaging and activating the stakeholders – proper engagement of stakeholders and ensuring their continuous involvement in the undertaking is a major factor helping to achieve expected results, and further on sustaining the implemented solutions. Experience gathered in the course of some projects shows that even well-thought measures and correct implementation processes do not guarantee a final success if stakeholders have not been engaged (first and foremost the users – shippers, shop owners, inhabitants etc.), and that may lead to failure and the project withdrawal;
- identification of needs, goals and priorities – appropriate formulation of the needs, defining the goals and specifying priorities is a difficult task, requiring a thorough consideration of the results of analyses made so far. Obtaining reliable and constructive opinions of the stakeholders and taking into account the local, regional and national policies, as well as areas of development in the city or the region, as indicated in the strategic documents. It is important that the set goals should be simple, unambiguous and realistic;
- analysis of a good practices catalogue – two approaches may be applied here: preparing an own catalogue of solutions or using ready-made catalogues delivered by other projects. The latter seems to be much simpler and, what is the most important, definitely less time-consuming and less costly;
- selecting the solutions to be implemented – this is the key moment in the procedure, decisive for subsequent results. Making an incorrect selection of solutions will lead to a significant risk of failure. The selection made must be goal-oriented and take into account the actual implementation capabilities, and what is more, it is usually assumed that the selection concerns a set of solutions rather than a single solution;

- specifying the implementation resources and needs – this task is a substantial challenge to entities initiating a project, as stakeholders often expect them to possess appropriate resources and funds. It is worth emphasising the meaning of building the awareness of the project goals and its relevance for all the parties engaged. Only then it is possible to involve stakeholders also in the process of securing the implementation resources (that regards in particular business partners for whom the key factor decisive for engaging their energy and funds in any undertaking is the potential profit, it must be remembered that those partners will always be concerned about maximising the revenues or minimising the costs);
- developing an implementation plan – preparing a good implementation plan is a prerequisite for the correct carrying out of the subsequent implementation phases. The proposed method focuses on identifying dependencies between the solutions to be implemented, specifying their complementarity and achieving a synergistic effect;
- adaptation, development and sustaining the solutions – this stage consists of so to speak three functionally interconnected tasks and is continuous in its nature. It is carried out practically throughout the project life cycle;
- monitoring and evaluation – in the proposed method, monitoring and evaluation of progress is based on current analysis of critical success factors and the degree to which they are fulfilled;
- dissemination of the results – this stage, although it may seem of little relevance, plays an important part both in the further development of the project and in sustaining effectiveness of implemented solutions. Also, it ensures the successfulness of further activities taken. It is a mistake to ignore it. In the same way it is a mistake to engage stakeholders only at some selected stages of project implementation.

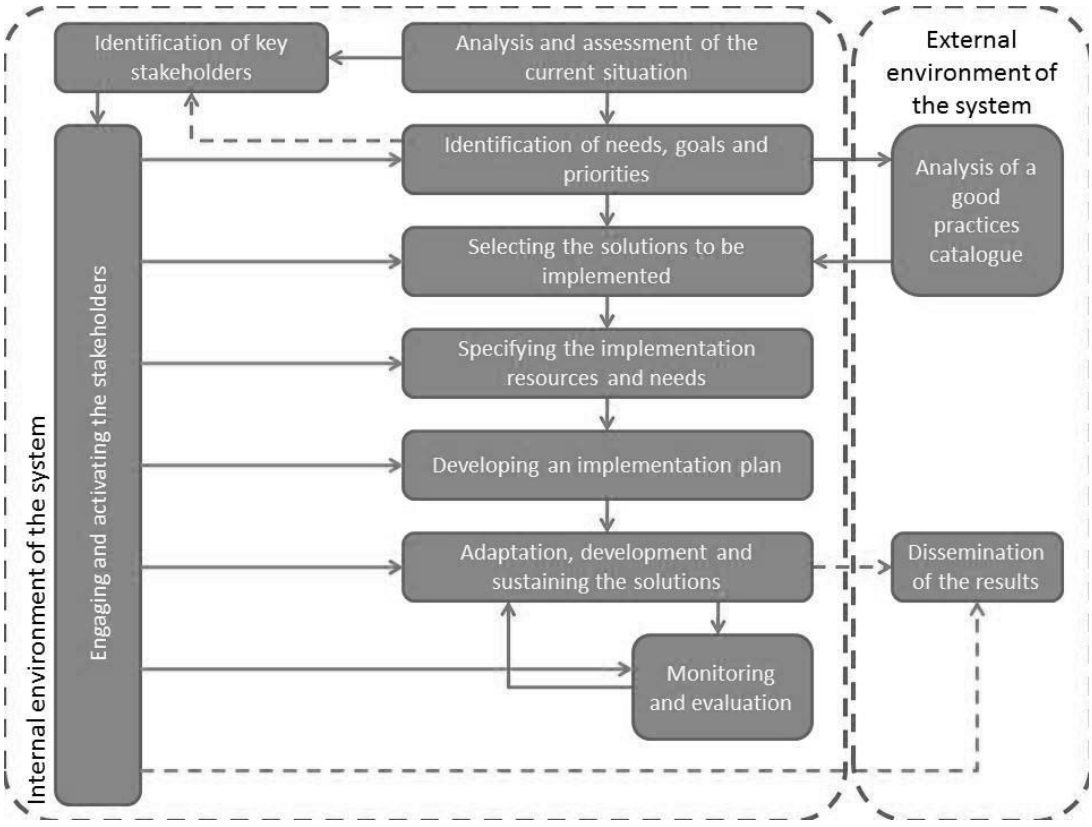



Fig. 2. The methodology of UFT good practices implementation based on adaptative approach. Source: own work.

The main initiator of implementation activities and their major disposer should be the city administrators, who via the city policies and focusing on ensuring the well-being factors for possibly all city users should provide a platform

for communication and searching for consensus. A good solution and at the same time the basis for the effective running of the implementation process applying the presented method is establishing a Freight Quality Partnership, which, being a collectively working organisation, offers considerable chances of working out compromise solutions.

*3.1. City analysis in the context of urban freight transport*

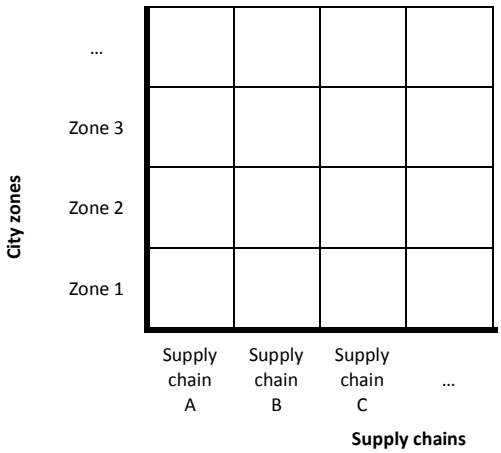
Urban freight transport is part of a complex system comprising a considerable number of various participants (logistic services providers, senders, recipients, municipalities and regional authorities, city inhabitants and visitors, etc.), numerous limitations (e.g. regulations regarding the traffic and customers' needs), fragmentation of goods flows, which decreases the transport effectiveness, pivotal connections in supply chains (reloading, contacts with customers, last kilometre deliveries), and also the risk of conflicts between expectations of particular stakeholders (e.g. inhabitants and shippers). The problems require that a well-thought out approach to implementation decision making should be applied. A prerequisite for a correctly implemented process of urban freight transport optimisation and rationalisation is an ex ante, in-depth analysis of the current situation and condition of a given urban system, a well performed assessment of obtained results and correct identification of goals for future actions. It is worth noticing that in general the problems connected with freight transport encountered by various cities are of similar nature, however, the specificity of the cities themselves hinders making any quick comparisons, whereas it is necessary to apply a highly detailed assessment to enable the development of recommended solutions that are implementable in a given city.

A full analysis of the city focusing on implementable solutions to improve urban freight transport functioning should include three basic tasks:

- analysis of the city structure,
- analysis of the infrastructure existing in the city,
- analysis of the goods flows generated within the city.

An interesting tool that is worth using at this stage is Zones-Supply Chains Matrix proposed in the methodology developed for the purposes of the CityPorts project (Panebianco, Zanarini 2005). It divides the city into zones characterised by possibly homogeneous urban and economic structure, identifying the key supply chains found within them – see Table 1.

Table 1. The matrix of Zones/ Supply chains. Source: Panebianco, Zanarini 2005.




The first step in preparing the matrix is dividing the urban space into zones defined as the city fragments characterised by a homogeneous structure and urban & economic specificity. Dividing the city into zones should not

be tantamount to its administrative division or be directly related to it. The discriminants to be used to stake out the individual zones should be the descriptive parameters (Panebianco, Zanarini 2005):

- general features of the city in terms of urban planning (population density, specificity of development, the architectural layout, the actual architecture, etc.);
- infrastructural specificity (mainly the road network topology, congestion level, availability of car parks);
- economic description (inter alia, density, profile and area of production, commercial and craft activities);
- regulations referring to administrative measures to regulate the city traffic (mainly access restrictions in specified city areas, regulations regarding parking spaces, restrictions regarding the vehicles that do not comply with some specified conditions, etc.).

Also, the city's physiognomy aspects may be considered, taking into account the five basic elements of its appearance and the corresponding landscape characteristic features, bearing in mind that they play here a supplementary and auxiliary role, making it easier to identify some characteristic zones of the city (Chmielewski 2001):

- districts:
  - city centre,
  - green areas,
  - housing estates,
  - industrial quarters,
  - single-family housing,
  - dispersed housing;
- borders and edges:
  - rivers,
  - embankments,
  - railway lines,
  - traffic arteries;
- roads and paths:
  - traffic arteries,
  - city roads,
  - footpaths,
  - cycling paths;
- nodes and knots:
  - functional,
  - symbolic;
- landmarks and dominants:
  - historical monuments,
  - high-rise buildings,
  - public buildings,
  - city symbols,
  - memorial sites,
  - other functional elements.

An important determinant for dividing the city into zones is its size. In Poland, in accordance with the division applied by the Central Statistical Office of Poland, seven classes of cities are distinguished according to the population size (Cities… 2012):

- towns:
  - class I – under 5,000
  - class II – 5,000 - 10,000

  - class III – 10,000 - 20,000
- medium-size cities:
  - class IV – 20,000 - 50,000
  - class V – 50,000 - 100,000
- big cities:
  - class VI – 100,000 - 200,000
  - class VII – 200,000 and over

For the purposes of this analysis it is enough to apply the basic level of the classification (towns, medium-size cities and big cities), with the emphasis on conurbations with a population exceeding one million, and on metropolitan areas. The significance of a city size is shown mainly in the aspect of the homogeneity of its functional parts.

The next step in the matrix development is specifying the supply chains functioning within the city. This task seems to be more difficult in practice due to the ambiguous perception of goods flow in a logistic chain by various groups of stakeholders. In order to ensure their correct identification, it is possible to apply the criteria (Panebianco, Zanarini 2005):

- including logistic parameters (e.g. delivery frequency, applied types of freight units);
- technological and organisational parameters (inter alia the vehicle typology, time intervals in which deliveries are made);
- logistic processes optimisation level (e.g. efficient use of cargo space);
- specificity of logistic processes management (first and foremost, determining who directs what goods flows and to whom, and how they are distributed in time and space);
- shippers typology;
- types of logistic nodes, taking into account senders and recipients of cargoes (producers, forwarders, wholesalers, retailers);
- secondary flows (e.g. goods that have not been received, reverse logistics transport);
- additional aspects of contacting customers (most often customers are approached during cargo delivery, however, in some cases this may be a selected transport process, most often it concerns servicing or assembly services).

The adopted perspective should not result in excessive fragmentation of the analysed reality. This regards both the division into zones as well as distinguishing any individual supply chains. On the one hand, it is necessary to correctly identify the homogeneous structures of the city, but on the other hand any excessive fragmentation will lead to considerable complications in research organisation. For the same reasons, excessive atomisation of analysed transport processes should be avoided. These aspects are to a large degree influenced by the nature of the city, its size, functions, and even its historic past which is manifested by the structure of the street networks and city development specificity.

In this context, particular attention should be paid to the functions of the city and assume that each of them may generate a demand for goods or participate in the transport market on the supply side, thus becoming a goods flows inductor. The basic functions of the city may therefore be referred directly to the designated zones and delimitate them on that basis.

The areas of the matrix which show considerably greater impact of the particular supply chains on the zones define the most pivotal areas of the city, which should be taken into account when developing the implementation plans for solutions aimed at optimising urban freight transport.

Figure 3 shows the major city zones in Szczecin, indicated on the basis of the approach mentioned above.


Fig. 3. The major city zones in Szczecin. Source: own work.

Three of the zones presented in Fig. 3 (City Centre, Port Area and Housing estates – West) are taken to the account in the table 2, which shows the part of the Zones/Supply chains matrix for Szczecin. The coloured cells indicate the level of the impact of given supply chain in the given zone: dark grey – big impact, grey – small impact, white – no impact.

Table 2. Sample filling in the matrix of Zones/ Supply chains for Szczecin. Source: own work.

| City zones | Deliveries to shops | E-commerce | Transit | Hotels and services |
|---|---|---|---|---|
| City centre | | | | |
| Port Area | | | | |
| Housing estates - West | | | | |

Supply chains

Another good way for analysing the current situation is the widely used SWOT method, which enables quite accurate assessment of the city's transport condition. Combining both methods may result in obtaining very interesting and reliable findings.

The basic problem found in the case of the aforementioned method is the lack of data and problems with acquiring them. The research necessary for the method to be applied should include first and foremost (Panebianco, Zanarini 2005):

- analysis of flows generators, defined as the forms of business activity that involve loading and unloading operations;
- analysis of the locally operating businesses and transport branches so as to determine precisely the goods flows within the city;
- analysis of shippers, made via interviews performed in main access points to the city, which will make it possible to specify the structure of transport entering and leaving the urban area;
- analysis of the traffic, which will make it possible to specify the way the traffic flows are organised within the area of the road infrastructure.

The assessment of the current situation of the city with regard to the functioning of the freight transport and distribution system is often subjective, and the area planned to be covered by the project is often determined a priori, taking into account the strategic assumptions of the city, its development plans, policies etc. Therefore, the presented method may serve to support the analysis of urban freight transport functioning, nevertheless it can only be used in its supporting capacity.

Based on the results of the performed analysis, it is necessary to identify stakeholders whose engagement in the project is a prerequisite for its success.

### *3.2. Effective involvement of urban logistics stakeholders*

Urban freight transport systems are characterised by considerable heterogeneity which determines the adaptability of a given city to implement solutions supporting the systems functions and affects the level of their usefulness for the whole city organism. This heterogeneity results mainly from the diversity of major freight transport stakeholders in the city as well as their expectations and preferences regarding goods transport and delivery. Due to that, the main effector for successful implementation of this kind of solutions is engaging the interested parties in all the stages of the implementation process and searching for compromise with regard to the diverse problems and needs voiced by them. The active approach of the city administrators to the problems of freight transport organisation may contribute to activating various groups of stakeholders and enable dynamic cooperation that will make it possible to reach consensus.

It is important to properly select the stakeholder groups and see that they are (as much as possible) fully represented. It should also be borne in mind that their assessments are often subjective in nature, and it always concentrates on aspects vital for the given group, reflecting its specificity (especially with regard to the key goals and needs). Nevertheless, sustainable growth proposals should be considered at all times, and realistic possibilities of synergy effect generation should be assessed.

The goal implementation degree (including the key, i.e. significant level of stakeholders satisfaction), which is the prerequisite to achieving a planned level of the implemented solutions usefulness, is determined mainly by synergistic complementary actions, based on the possibly full implementation of the resultant bundle of goals of individual stakeholders. It must be kept in mind that it is the unique features of the city's logistic system that determine its adaptability to the implementation of good practices and the level of their usefulness for the whole city organism. This is a manifestation of the city's homomorphism which results from, inter alia, the diversity of major stakeholders and their expectations and preferences regarding freight transport and delivery organisation.

The idea of good practices is connected with a risk that the cutting edge solutions will be uncritically copied without paying attention to the homomorphic aspect of the city system. Additionally, often no heed is paid to the fact

that deliveries in cities are considerably different in terms of functioning and organisation from those made outside the built-up area.

Due to the considerable heterogeneity of the urban environment, a lack of a wide range of evaluations and no consideration for the multi-faceted nature, the results will be biased and incompatible with the real expectations of the parties engaged in freight transport functioning and organisation. Applying an on-going assessment of the city's level of adaptability to good practices being implemented makes it possible to react quickly to any emerging difficulties and appropriately focus on the adjustment processes which enable the full and effective implementation and subsequent effective use of the solutions (in accordance with the adopted goals, adequately to the stakeholders' needs).

The city's active approach to the freight transport system organisation must aim at working out a consensus by different stakeholder groups. The city should also be the main initiator and the major disposer of the solutions to be implemented, and also ensure supervision of the implementation processes on a current basis. It is advisable to establish in the city administration structure a dedicated function of the so called City Logistics Manager, whose overarching goal will be the supervision of freight transport functioning in the city, identifying any problems and initiating measures aimed at improving the quality of transport processes.

From the city's perspective, it is important to provide answers to several basic questions:

- Which of the major problems of urban freight transport should be addressed?
- What are the previous experience and the current conditions for implementing innovative solutions?
- Who are the major stakeholders and what their specific expectations and possibilities are?

They may play four basic roles in the urban freight transport system (Lepori, Banzi, Konstantinopoulou 2010):

- want it – these are transport market players who want the system to constrain the problems connected with road traffic and its impact on the environment, who want it to provide information services on the trips and facilities for freight transport operators, and to improve the living conditions of the city residents and users. This group mainly includes local authorities, residents, organisations and associations representing the city's interests, but also retailers, shop owners and developers;
- make it – these are mainly suppliers of hardware and software necessary for the system development, vehicle manufacturers, system integrators, providers of innovative loading/ unloading solutions or freight units, urban developers, etc.;
- use it – this class of users includes two categories: primary and secondary. The primary users use the outcomes of the system operation, these are e.g. retailers, shippers, forwarders, drivers. The secondary users control the system and provide, among other things, the major part of the input data. These are e.g. traffic control operators, cargo dispatchers, distribution centres managers;
- rule it – these are usually local authorities, responsible for the issuing of regulations (e.g. with regard to designating environmental zones, traffic restrictions, time windows, using the dedicated traffic lanes, parking spaces or infrastructure).

The major stage of searching for a consensus and formulating a bundle of compromise goals is an in-depth analysis of the problems reported by stakeholders, taking into account aspects like:

- specificity of the problems voiced by the individual groups of stakeholders,
- cause-and-effect relationships between them,
- the way the individual stakeholders perceive the problems voiced by others,
- sources of knowledge on the existing problems and their specificity,
- the time period when the problem occurs,
- reasons for failing to solve the problem earlier.

The way to reconcile diverse and often conflicting expectations of the stakeholders of urban freight transport and also an effective tool for their involvement in the development process can be Freight Quality Partnership (FQP),

which involves a large representative group of the participants and users, and sets shared objectives reached by consensus, and takes the responsibility for their implementation. The main task of FQP is to ensure the sustainable development of urban freight transport, while maintaining the expectations of the various stakeholders and reconciling them with the overall strategic objectives of the city or region. This form of partnership usually involves local government, representatives of business, logistics operators, transport companies, organizations dealing with the environmental protection, local communities and other stakeholders involved directly or indirectly in the operation of freight transport in cities. The overall objective of the cooperation between the partners is to develop knowledge and understanding of the problems of this sector, the promotion of best practices and effective solutions that meet the needs of individual stakeholders in terms of the availability of goods and services and the environmental and social conditions, as well as initiating projects aimed at eliminating the difficulties and problems of transportation and improving the overall quality of the transport operations.

### *3.3. Proper selection of solutions to be adapted*

The vital stage in the process of implementing good practices applying the adaptation approach is the selection of solutions which may be implemented taking into account the local requirements, adopted goals and available resources. To that end, it is advisable to use a well prepared catalogue of good practices, which will form the starting point for any further works. It is not easy to prepare this kind of catalogue on one's own, as it requires in-depth, long-term analyses of the undertakings implemented over several or even more years. Such a task is extremely time-consuming and costly. It moreover requires the building up of a team of properly qualified and independent experts who are capable of proper classification and evaluation of solutions, without being biased or having a subjective perception in the context of the planned implementations. Initiators of implementation projects, and especially local authorities, are usually unable to ensure appropriate resources. On the other hand, making such efforts seems to be pointless in the light of the practical achievements of recent years. Many catalogues of this kind have already been developed under various projects and they are usually freely available to the public.

The first studies of this kind include the catalogues prepared under the BESTUFS I project and its follow-up – BESTUFS II, with the particular emphasis on "BESTUFS. Good Practice Guide on Urban Freight Transport" (Allen, Thorne, Browne 2007). An interesting report was also developed under the SUGAR project completed in February 2012. The catalogue contains descriptions of 44 good practices along with the analysis of their transferability (Dablanc 2011). A catalogue with an extensive database of good practices was also developed under the C-LIEGE project.

The C-LIEGE good practices database includes 98 well described urban logistics solutions, and additionally, the document "Elicitation of the Good Practices on Urban Freight Transport" (Torrentellé, Tsamboulas, Moraiti 2012) contains more detailed descriptions of selected solutions and the research methodology. Important tools for potential stakeholders (mainly local or regional authorities responsible for initiating implementation projects) are the documents "Definition of suitable set of actions/measures for an efficient and energy saving organization of goods transport and delivery in urban areas", which describes and classifies 45 kinds of good practices along with practical examples (Bourn, MacDonald 2012) and "C-LIEGE toolbox for the establishment of the City Logistics Manager", presenting the assumptions for establishing a new function to integrate many tasks in the area of transport organisation and freight distribution in the city – the City Logistics Manager (Lucietti 2012).

The selection of the solutions to be implemented should be based on exchanging the experience and expertise between all the interested parties. Applying brainstorming and the heuristic approach makes it possible to search for consensus and to reach compromise solutions more quickly. It is important that no major stakeholder group is omitted in the process. This will help avoid any later difficulties in the course of implementation and in the course of practical application of the solutions. It is also important that each representative is able to present their stance and participate in the discussion. Moreover, it is necessary to ensure proper documentation of the individual meetings and provide summaries and conclusions, so that the stakeholders are kept aware of participating in the whole process and feel responsible for the planned project.

When making the selection, one of the key success factors should be borne in mind, namely the transferability defined as the degree of possibility to transfer a given solution to another place, adjusting it to different requirements

and adapting to the needs of a different urban environment. There are seven major conditions for an effective transfer (Dablanc 2011):

- taking into account the economic standing of the city and any changes in the situation;
- running an analysis before the project implementation (ex-ante analysis);
- taking into account the global supply chains and transport chains (not only those which will be subject to reorganisation in connection with the implemented solutions);
- detecting and eliminating biases regarding the choices to be made;
- identifying the conditions of the project scale;
- specifying the projects which may provide various types of innovations;
- implementation of recurring, regular research applying appropriate indicators, which will make it possible to make comparisons between the ex-ante and ex post situations and will enable the impact of the implemented measures.

One of the major problems connected with selecting solutions to be implemented in the future is choosing from among many available proposals those that meet the needs of a given city and are compatible with the adopted goals of the implementation project. Browsing the whole catalogue (or a few catalogues) of good practices and thorough analysis of each proposal found these require much time and in practice are hardly useful. This concerns in particular a situation where proposals are analysed during working meetings with stakeholders. The practical experience shows that it is not advisable to expect from stakeholders that they intensively analyse numerous examples. More often than not, they want a clear presentation of preselected options that they can concentrate on and analyse them thoroughly in the context of expected results. It is therefore worthwhile making a preselection which will also make it possible to eliminate the proposals which surely diverge from their demands and are not compliant with the adopted goals.

In making a preselection of solutions, it is advised to take a regressive approach, in accordance with which we start with the results planned to be achieved, and then go through the impacts generated by the individual classes of solutions. In the end indicating the ones that to the largest extent are able to meet the stakeholders' expectations. The method comprises the following stages:

- specifying the relationship between the goals and the areas of impact;
- determining impact indicators for all areas of impact,
- hierarchization of impact areas as per the calculated indicators;
- negative selection of the solutions according to their impact on the individual areas,
- selecting the solutions characterised by the highest degree of filling in the impact areas taken into consideration as a result of the goal analysis.

The set goals resulting from the earlier stages of the works may be categorised as per the corresponding impact areas, covering (Tab. 3):

- environmental impact (air pollution, noise level) – EI;
- demand for energy (fuel consumption) – DE;
- economic aspects (mainly the costs of logistic operations for producers, wholesalers, retailers, customers) – EA;
- safety and security – S;
- transport effectiveness (transport optimisation, improved cost effectiveness) – TE;
- land use and impact on the planning processes – LU.

Table 3. The matrix of the goals' impacts. Source: own work.

| Adopted goals | Areas of impact | | | | | |
|---|---|---|---|---|---|---|
| | EI | DE | EA | S | TE | LU |
| Goal 1 | | | | | | |
| Goal 2 | | | | | | |
| … | | | | | | |
| *Total impact:* | | | | | | |

By means of Table 3, each defined goal should be related to the corresponding areas, using the evaluation made by the individual stakeholders by way of assigning the binary values (0 or 1) to the individual goals and the corresponding (in their opinion) areas. In the summary of the table, the value of the impact indicator is determined, which sums up the stakeholders' responses.

At the same time, a reference to good practice contained in the catalogue of solutions, to the above six impact areas is necessary. When preparing an own catalogue, it is necessary to take them into account in describing the individual proposals. Based on the value of the total impact for each of the mentioned impact areas it is possible to select and hierarchize the solutions (the process diagram is shown in Fig. 4). Firstly, the solutions having an impact on the areas not reflected in the goals should be eliminated. Then, taking into account the hierarchy resulting from the values of the individual impact indicators, the solutions should be chosen in such a way so that they as much as possible cover the areas of impact.

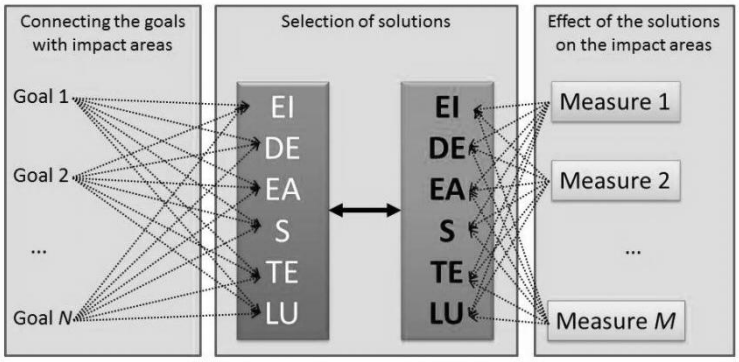



Fig. 4. Selection of the solutions. Source: own work.

In the course of selecting the solutions it is also important to pay attention to three vital factors: (Lindner, Lückenkötter 2012):

- innovation level;
- implementability, comprising four elements:
  - dependence on political decisions – the influence that officials' decisions have on the implementation of a given solution, often resulting from legislative, strategic, political etc. conditions;
  - dependence on the scope of cooperation – the importance of the cooperation between the stakeholders for achieving the implementation success. This factor specifies to what extent the cooperation determines achievement of the planned results;
  - dependence on time – specifying to what extent the implementation success depends on time, i.e. time necessary for an effective implementation (more often than not, large and complex projects require a much longer time horizon);
  - dependence on financial resources – specifying to what extent financial resources determine the project's success, or, in other words, specifying the project's sensitivity to the funding;
- environmental impact – which is important mainly in the context of taking into consideration the sustainable growth factors.

Evaluation of the solutions concentrates on two main aspects:

- assessing the degree of the implementation process effectiveness (on-going analysis) – carried out during the process, aimed at ensuring the correctness of the course of the process and enabling early reaction in case of any irregularities;

- assessing the degree of the implemented solutions effectiveness (ex-post analysis) – usually carried out based on the analysis of indicators formulated at the earlier stages and in relation to the planned results.

### *3.4. Adaptability of the city being the environment of the urban logistics solutions implementation*

Adaptability, defined as the process of continuous adjusting of an organisation to the changing environment conditions, nowadays has been gaining particular importance. The change dynamics which result from, inter alia, technological progress, globalisation and the growing importance of knowledge as a resource, have made adaptability skills necessary for achieving and maintaining a competitive market position. It is also a factor that determines urban development.

Adaptation processes that require good practice implementation must to a large extent focus on the implementation environment and account for introducing changes that enable a possibly full implementation that caters for the expectations of possibly the most numerous group of stakeholders. A city's adaptability to urban freight transport (UFT) good practices depends on the specificity of implemented solutions, and particularly important is whether they represent the hard or soft measure category. This determines the scope of changes that must be introduced in the functioning and the structure of the urban environment (e.g. infrastructural changes in the case of most hard solutions). Apart from this, the changes also depend on internal factors such as the city's morphology, its specificity, the structure of freight transport and the impact of the surrounding areas and their interrelations (mainly with regard to the region). Nevertheless, the basic factor determining the adaptation processes is the stakeholders' expectations and needs, and the resulting objectives that are set for the implementation of good practice. Due to its homomorphism, each city requires a tailored approach in that regard.

The assessment of the adaptive measures taken by the city in connection with implementing the specified good practices makes it possible to track the implementation process on a current basis and to identify any irregularities and deficiencies that may occur in the process. Therefore, it is an on-going analysis which should be carried out cyclically throughout the process implementation.

Evaluating a city's adaptability in relation to implemented UFT good practices should focus on examining the effectiveness of the implementation process and take into account the assessments made by stakeholders. The starting point for the examination should be the aforementioned Critical Success Factors that are the criteria for evaluating the phenomena taking place in the environment and the organisation.

## 4. Conclusions

Due to the complexity of urban freight transport and the multitude of factors influencing its functioning and effective management, it is not possible to simply transfer good practices. The approach that enables an effective implementation is the one based on adapting processes both in relation to the implemented good practices themselves as well as the implementation environment. The main effector of the implementation processes quality is the proper engagement of stakeholders at all the stages of the implementation process.

The adaptability of a city to UFT good practices implementation is determined first and foremost by its specificity and diverse expectations of major stakeholders (city authorities, inhabitants, visitors, tourists, but also the business sector including both the entities functioning within the city and the ones rendering services to them). The elements of key importance are preferences in the area of transport organisation and the perception of its effectiveness, resulting from the adopted goals. Thus, the usefulness of various solutions in this regard may be perceived differently, and the individual stakeholder groups often adapt points of view that are opposed to one another. A vital factor that impedes UFT good practices adaptation is hindered access to data, information and expertise. The problems with data acquisition, results first and foremost from the complexity of the UFT system itself, as well as the considerable fragmentation of its main sources, and also the dislocation in terms of time and space.

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