EVALUATION FOR URBAN FREIGHT TRANSPORT (UFT) PROJECTS

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Abstract

The aim of this paper is to optimize the adaptation of best practices in the field of Urban Freight Transport (UFT). This was possible based on the results obtained by engineering school, EIGSI La Rochelle, in several European projects (eg CIVITAS program, TRAILBLAZER) and French projects(CGOODS, COLIS URBAINS, PRODIGE) and experience learned from organizations and associations dealing with this subject.

During these projects, EIGSI has participated firstly to develop an approach that allows building DSPs (Delivery & Service Plans) at the municipality level and secondly to evaluate the impacts and the transferability to other similar cities. DSPs describe coherent and holistic sets of actions intending to optimise Urban Freight for one or several organisation. They are materialised by key strategy documents outlining how a public or private sector organisation deals with its need to generate freight transport efficiently, safely and in a sustainable way. The actions included in DSP can affect the distribution itself, the maintenance of the fleet, the supply of goods, the interoperability of information systems, etc.

The developed approach has been tested and validated in several projects which have included different European cities' contexts like La Rochelle, Sutton, Preston, Borlange, etc.

This paper describes the evaluation framework applied in the cities partners of the TRAILBLAZER project in order to determine the parameters most appropriate for impact evaluation of DSP actions in the context of emerging countries, especially its use in the context of two Moroccan cities.

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1. Introduction

The situation today in most of the cities is characterized by the growing awareness of the troubles caused by urban freight transport (UFT). The conflict between the increase of the goods flows and limitations of the urban environment has resulted in significant problems associated with UFT. These include traffic congestion, local air pollution, greenhouse gas (GHG) emissions, noise disturbance, and safety.

Several projects in Europe (Trailblazer, CityMove, CityLog, Bestufs1&2, Mosca, Fleat, Civitas initiative, etc) and elsewhere have pointed out key urban freight transport problems and have experimented various solutions. Achievements were more or less successful but experience and knowledge on bad/good practices are being constructed from all the lessons taught. Among the successful solutions, Delivery and Servicing Plans (DSPs) proved to provide a good framework for implementing a set of complementary UFT improvement's measures.

The objective of the TRAILBLAZER project (TRansport And Innovation Logistics By Local Authorities with a Zest for Efficiency and Realisation, www.trailblazer.eu) was to transfer knowledge and experience on city logistics from the group of experienced organisations (Trailblazers) to the Pathfinders, a group of 4 less experienced authorities. To achieve this goal, several actions (measures) were defined by pathfinder cities, encompassed in local DSPs. These DSPs have been implemented and the process was analysed through evaluation procedures developed at local level according to a general framework.

1.1. Concept of DSP

DSPs describe coherent and holistic sets of actions intending to optimise Urban Freight for one or several organisation(s). They are materialised by key strategy documents outlining how a public or private sector organisation deals with its need to generate freight transport efficiently, safely and in a sustainable way (Trailblazer, 2013). DSPs are designed to cut CO_2 emissions, congestion, collisions and overall freight costs by reducing delivery and collection journeys an ensuring use of safe and loading facilities (Brown, 2012).

The potential measures contained in a DSP can be classified in two categories:

- The measures related to procurement concerning the number of suppliers, use of local suppliers, consolidating suppliers and centralised online ordering system;
- The measures relating to operational efficiency concerning the management of deliveries (online delivery system, out of hour's deliveries and servicing), road trip efficiency and waste management.

These measures involve several stakeholders and address multiple beneficiaries, public and private institutions. Organisations can work together with their suppliers and sub-contractors to secure operational benefits through effective management of deliveries and servicing. The success of DSPs lies on the coherence between several actions designed and implemented according to an homogeneous framework based on the integration of UFT in city transport strategy.
DSPs implementation follows a standard process, from the definition of the measures based on the analysis of the situation and benchmark of possible improvements to the elaboration of planning and definition and resources then the set up of improvements and their adaptation according to the remarks, evolutions of the stakeholders. This implementation must contain an evaluation process which helps to measure the real impact of the actions and to determine the required adaptations.

1.2. Examples of DSP implementation

Different successful implemented DSP measures can be identified in European cities: Sutton (United Kingdom) - Implementation of a DSP for the London Borough of Sutton; Borlänge (Sweden) - Consolidation of deliveries to four Swedish municipalities with a new logistic model for the transportation of food; Bordeaux (France) – An urban consolidation Centre just outside of Bordeaux city centre, etc…According to the results and experiences of different cities, a well-managed methodology including several key factors must be considered to achieve successful implementation of city logistics projects

In the context of TRAILBLAZER project, the four Pathfinders cities : Eskilstuna (Sweden), Växjö (Sweden), Vercelli (Italy) and Zagreb (Croatia) have defined and implemented their DSPs. The main objective of TRAILBLAZER was to achieve a 10% reduction in energy used and reduce transport related emissions in urban freight transport.

The DSP actions were implemented in areas of different scales: in historical city centre, in a discrete geographical area of mixed use i.e. an area-wide DSP. The area chosen may also have specific issues affecting freight, delivery and servicing activity e.g. preserving the fabric of a historic city centre, poor air quality, modal conflicts e.g. trams, cycle lanes etc. An area-wide DSP will have greater complexity than smaller scale DSPs, which reflect the defining characteristics of the location.

The Municipality of Eskilstuna was seeking to implement a DSP focused on the deliveries of food to the municipal kitchens, as part of a reorganisation of their procurement process. The purpose of this project was to highlight the costs of goods and services from suppliers to end customer, and try new solutions / requirements for the organization of transport.

The Municipality of Växjö had implemented a consolidation centre for deliveries to its Social Care, Education and other municipality activities. This consolidation centre had decoupled the costs of "last mile‟ transport of goods from the procurement and transport to the consolidation centre. The responsibility for the transport of goods from the centre to the final destination now belongs to the municipality. To simplify the delivery planning, the municipality has purchased a web-based support system which provides information to the consolidation centre when an order is placed with a supplier.

The Municipality of Vercelli wanted to reduce the environmental impact of freight traffic through the implementation of different measures in the city and especially in the historical city centre. The measures have affected the access in Limited Traffic Zone, time and parking restrictions for delivery bays. Their ultimate aim was to implement an Urban Consolidation Centre to deliver and collect goods in the historic centre, using low emission vehicles.

The DSP in the Municipality of Zagreb covered an area along the main access road to the city centre of approximately 1.8 km. This area hosted a mix of retail and offices activities, with around 326 business units. The street was a mixture of one-way and two-way traffic. To further complicate freight delivery and servicing activities there were tram lines beside each carriageway. The DSP actions in Zagreb had included the traffic management in the target area.

2. Evaluation

Evaluation is defined as a "systematic and objective assessment of an on-going completed project, programme or policy, its design implementation and results" (OCDE, 2010). Evaluation is an essential tool in decision-making as it makes possible to measure, compare and identify the impacts of a specific project (Graindorge, 2012).

Evaluation of transport projects is usually split in two aspects:

- The "impact evaluation" includes the evaluation of a wide range of technical, social, economic and other impacts of the actions undertaken by the partners.
- The "process evaluation" concerns the evaluation of the processes of planning and implementation including the roles of information, communication and participation. These aims of the process evaluation are to identify the forces and weaknesses, the barriers and facilitators which have been encountered during the planning and the implementation of the actions.

In many mobility projects, evaluation processes encountered several difficulties due to various factors like evaluation culture in the municipalities, availbality and quality of data or amount of resources allocated to these processes;:

Evaluation process for UFT projects faces specific challenges coming from the variety of stakeholders with contradictory objectives, the confidentiality of some data for private companies, the diversity of external influences which may affect the analysis; the heterogeneousness of practices according to the nature of the goods, the city's topology, economy and/or culture.
Currently, there is no single, established evaluation method for UFT projects that easily supports robust, transparent and rigorous porcess although the trends are towards harmonization of those methods.

In TRAILBLAZER, both aspects of the evaluation, impact and process, were built in a common framework approach to ensure a consistent quality of cross-site outputs and to overcome the expected difficulties.

2.1 Framework for impact evaluation

The evaluation framework is developed from the objectives which points out the key impacts that can be associated and the more specific indicators that can be used to assess achievement. A clear framework, agreed among the key stakeholders at the end of the planning stage of the project, is essential in order to carry out monitoring and evaluation systematically.

The evaluation framework includes three elements:

- Indicators to evaluate and compare,
- Data source,
- Assessment methods.

The evaluation framework establishes clear procedures for baseline, business-as-usual and ex-post evaluation.

"Baseline" is the situation at the beginning of the implementation of the measure. All the information collected from this evaluation can be used to design and to fix the objectives of the new project.

Business-as-usual (BAU) scenario is the scenario without measure implementation. Possible ways to estimate the „business-as-usual‟ situation include forecasting from historical data, or monitoring a parallel site with the same characteristics without applying the project measures to it. In transport projects, this latter scenario is often very expensive and not always very precise or appropriate.

The ex-post or ‘after’ evaluation provides a final set of measurements for evaluation, which will include comparisons with all the before and business-as-usual measurements and will allow interpretation of the results.

2.1.1 Evaluation indicators

Indicators represent a situation or a time evolution relating to a particular concern. They can be quantitative or qualitative and can measure in absolute or relative terms. The definition of indicators needs to take in account three basic requirements (Dziekan, 2013):

- They must clearly reflect the performance or impact of the measure.
- They must match the objectives
- They are capable of reliable assessment using the experimental tools and measurements choose methods.

Table 1 gives some examples of the evaluating indicators used in TRAILBLAZER (Table 1).

Objectives	Evaluation Area	Impacts	Indicator's name	Indicator's description	Data/Units
Improving the delivery of goods	Transport	Freight traffic	Goods vehicle movements	Total number of vehicle/day in target area	Quantitative/ number
		Vehicles	Type of vehicles	Number of different categories of vehicles	Quantitative/ number
		Kilometres	Kilometres per delivery	Average distance travelled per delivery	Quantitative/ Km
			Total kilometres	Total distance travel in demo area	Quantitative/ Vehicles x km,
			Running time	Total running time in demo area	Quantitative / Hours
			Empty running	The percentage of total vehicle-kilometres which are run empty	Quantitative/% of km,
		Load	Delivered tonnage daily	Delivered tonnage daily	Quantitative/ tonnes
			Number of stops	Number of stops during the delivery round	Quantitative/ number
			Delivery frequency	Number of deliveries/ week	Quantitative/ number
			Load factor	The ratio of the actual average load to total vehicle freight capacity	Quantitative/%
Reduction in fuel used	Energy	Fuel Consumption	Fuel consumption	Total litres of fuel consumed	Quantitative/ litters
Reduction in greenhouse gas emissions	Environment	Emissions	CO_2 emissions	Total tonnes of CO_2/year	Quantitative/ tonnes
Improved parking and accessibility regulation	Parking service	Parking in Limited Traffic Zone	Parking spaces	Number of parking spaces	Quantitative/ number
			Vehicle driving & loading/unloading facility	Driver expectations	Qualitative/ number
	Accessibility	Accessibility in Limited Traffic Zone	Permissions	Number of permissions per year	Quantitative/ number
			Exceptions	Number of space-time exceptions per year	Quantitative/ number
Increase the satisfaction of citizens	Acceptance	Awareness	Acceptance level	Attitude of current acceptance with the changes induced by the improvements	Qualitative/ number

For each city, indicators are determined according to the general strategy and objectives and to the specificity of the action. The most important is to be able to compare the "before", "business as usual" and "after" status of the indicators.

2.1.2 Data source

In UFT projects, the data may be collected from many sources like:
- Field collected;
- Databases: statistics (offices, Europe, national, local…), decision aid records (policy makers, businesses, research, consultant…);
- Documents (media, reports, cases studies, traffic studies etc.);
- Experiments (simulation);
- Discussions with representatives during workshops.

The data collected by evaluators themselves represent primary data and statistic data, collected by others, are secondary data (Dziekan, 2013).

There is a large variety of methods for collecting UFT primary data: observation, surveys and interviews: with freight transport company managers, with establishment managers (consignees/ shippers), with drivers, using on-board new technology (roadside camera data, satellite tracking, radio frequency identification (RFID) etc.).

2.1.3 Assessment methods

There is a wide range of different evaluation methods, with different traditions and preferences to be found among the European Member States. Assessment approaches of UFT projects or policies are classified according their approach and evaluation criteria.

Approach of evaluation:
- Survey based approach (Anderson, 2005);
- Simulation based approach: Systems dynamics is a simulation modelling approach for predicting the behaviour of complex systems;
- Intelligent agents model (Boussier, 2011;Teo, 2012) ;
- Meta-heuristic based approach;
- Hybrid approach (Awashi, 2012).

Survey based approach is used in the most of the practical application of UFT projects, others relying on theoretical models.

To evaluate the indicators of the Table 1, it is necessary to use three types of primary data sources: commercial establishment, drivers and freight transport operators.

Commercial, Offices Establishment survey: to collect data about total goods vehicle trips to/ from particular establishments, and variation by time, day and month. This survey can also be used to capture data about type of goods delivered/ collected; quantity of deliveries; quality of deliveries (damage and delay); time taken to load / unload; and frequencies. This survey can be conducted by face-to-face, telephone or self-completion.

Freight operator survey: to collect data about the pattern of the companies' goods vehicle activities in the urban area: total tonnes transported, total distance travel, number of vehicles. Allows opportunity to obtain data about the entire fleet rather than a single vehicle or round as in vehicle trip diary.

Driver survey: to collect data about the driver's overall trip pattern, information about the loading/ unloading/ servicing activity in the street including time taken, loading/ parking locations, number of stops. This survey is usually conducted by face- to- face at establishments receiving collections/deliveries, with driver intercepted after carrying out before they drive away.

Evaluation criteria

- Monetary assessment ((Haezendonck, 2007): Cost-benefit analysis (CBA), Cost effectiveness analysis (CEA), Economic-effects analysis (EEA);
- Multi-criteria assessment (MCA) (Macharis, 2012): provides a framework to evaluate different transport options with several quantitative and qualitative criteria and can be used when some impacts cannot be converted to a monetary basis; MCA is a well acknowledged technique for the assessment of sustainability at neighbourhood level, CBA is mainly used for infrastructure projects (where public expenses are expected), and policies (Beria, 2012).
- Qualitative Assessment (HEATCO Project, 2006): The effects are classified into one or several ranked categories (ordinal scale) based on well-defined standard criteria for each of the categories;
- Quantitative Measurements: (HEATCO Project, 2006): The effects are estimated in physical units or numbers (cardinal scale), but in contrast to the multi-criteria analysis (MCA) no specific weights are assigned to allow an aggregation of the effects to a single criterion.

2.2 Approach to measuring the energy efficiency and emissions

The specific and strategic objectives of TRAILBLAZER were to contribute to the EU 2020 targets on energy efficiency and renewable energy sources. The targets within the project duration concerned the reduction of greenhouse gas emissions and primary energy saving.

According to those targets, two major indicators were taken in consideration in this project: energy consumption and CO_2 emission.

McKinnon (McKinnon, 2009) makes a distinction between two approaches to measuring CO_2 emissions: input-based measures, output-based measures.

- *Input-based measures:* these are derived from estimates of the fuel / energy purchased by / supplied to companies in particular sectors. These are essentially 'top-down' measures.
- *Output-based measures:* these are derived from estimates of the actual amount of work done and the energy consumed per unit of output. The 'output' of freight transport operations is generally measured by tonne-kms and energy consumption by litres of fuel or kilowatt-hours of electricity used per tonne-km.

Input-based estimates do not accurately measure CO_2 emissions from freight transport. For this reason, the output-based measures were used for TRAILBLAZER.

The computation for emissions and energy consumption was realised according to the following rules.

2.2.1 GHG Emissions calculation

For each particular fuel type, emissions can be calculated using table 2 (emissions from quantity of fuel used), table 3 (emissions according to distance travelled for vans and light commercial vehicles) and table 4 (emissions from electricity used).

Table 2: Emission calculation from quantity of fuel used

Fuel used	*Total units used*	*Units*		*kg CO_2eg per unit*	*Total kg CO2*
Petrol		litres	x	2,3	
Diesel		litres	x	2,63	
Natural Gas		kg	x	2,09	
Liquid Petroleum Gas		litres	x	1,49	
Heavy fuel oil (HFO)		litres	x	3,177	
TOTAL				(1)	

(1) Sources: Defra 2010
Notes: kgCO2eq - Kg CO2 equivalent

Table 3: Emission calculation from distance travelled for vans and light commercial vehicles

Type of van	*Total km travelled*		*Conversion factor*	*Total kg CO2 per km*
Petrol (average) up to 3.5 t		x	0.24 (1)	
Diesel (average) up to 3.5t		x	0.25 (1)	

(1) Sources: Defra 2010

Conversion factors for electricity are different for each country. It depends on the sources of electricity e.g. nuclear, coal, water etc.

Table 4: Conversion factors for electricity use

	Nuclear energy in electricity production in 2007[(1)]	Energy equivalent conversion factor	Carbon equivalent	CO_2 equivalent
Electricity produced	%	goe/kWh [(2)]	gCeq/kWh [(3)]	gCO_2eq/kWh [(4)]
in France	78	223	23	84
in UK	16	114	124	455
Germany	22	124	141	517
Sweden	45	164	12	44
Croatia	0	86	93	340[5]
Italy	0	86	139	510

[(1)] Source: Banque Mondiale: http://donnees.banquemondiale.org/indicateur/EG.ELC.NUCL.ZS
[(2)] Obtained by multiplying the % of nuclear with the 'international conventions' on conversion factors (nuclear conversion factor is 261 goe/kWh and other primary energy sources 86 goe/kWh) AIE 2006
[(3)] Source: "Bilan Carbone - guide des facteurs d'émissions version 5.0, ADEME 2007, p 34
[(4)]1gCeq = 3.67 gCO2eq (ADEME 2007)
[(5)] http://www.sunearthtools.com/dp/tools/CO2-emissions-calculator.php#txtCO2_3
Notes: **gCeq** - Gram carbon equivalent, **$kgCO_2eq$** - Kg CO_2 equivalent

2.2.2 Energy consumption

All energy consumption was converted into 'grams of oil equivalent' (goe) or tonnes of oil equivalent'(toe) (Table 5). Grams of oil equivalent are a unit for measuring energy, and are the amount of energy that would be produced by burning one gram of crude oil. Conversion into grams of oil equivalent allows comparison of energy use between different energy sources.

Table 5: Standard conversion factor for energy

	kwh	goe	Toe	GJ
kwh	1	85.96 [(1)]	85.96×10^{-6}	0.0036
goe	11630×10^{6}	1	10^{-6}	41.868×10^{6}
toe	11630 [(1)]	10^{6}	1	41.868
GJ	277.8 [(1)]	0.02388×10^{-6}	0.02388	1

[(1)] Source: Carbon Trust. Energy and carbon conversions 2009

The standard conversion factor for energy was used to calculate the energy consumption per type of fuel used. Table 6 gives an example of the conversion factor used in United Kingdom.

Table 6: UK conversion factors for energy, fuel consumption and emissions

		Energy conversion factors						
Fuels	litre	m^3	= kg	= kWh	MJ/litre	= GJ	= goe
Diesel	1		0.8312	10.551	38	0.0380	907
Petrol	1		0.7385	9.477	34.1	0.0341	815

Heavy fuel oil	1		0.9737	11.765	42.4	0.0424	1,012
Natural Gas		1		11	39.6	0.0396	946
Sources Nr			(1)	(2)	(1)	(3)	(3)

(1) Sources: DTI 2007; (2) Sources: Defra 2005; (3) Sources: DTI 2007 and Defra 2005
Notes: **goe** - Gram oil equivalent

3. Results

Within the Trailblazer project, Vercelli had implemented and developed the first delivery system in the city centre focused on access and parking management of vans. The new system of controlled access in the project area combined with the camera control reduced the number of vehicles in the area by about 19%.

The management of the delivery bays, the creation of new ones, and the reorganization of others improve the delivery process in the target zone. The results from fuel consumption and emission calculation show the positive impacts of the DSP measures on the environment. This resulted in energy saving and reduction of pollutant emissions by about 13%.

The impacts of the Trailblazer project on food consolidation were increased in Växjö by introducing the e-purchasing system which allows a better coordination of goods. The Municipality was able to decrease the number of deliveries by about 50% per week and as a result to reduce the number of kilometres travelled. Dry goods are now delivered only once a week and fresh food three to four times a week, whereas previously there were more than five deliveries each day. There is an optimised delivery plan with predetermined routes, so the units know in advance when to expect deliveries and can plan their work and resources, and also save a lot of staff time. The project has demonstrated 53 % saving in fuel used to make Municipality deliveries and 87% saving of CO_2 emissions. Those figures were amplified with the utilisation of green fuel and less polluting freight vehicles.

The evaluation in Zagreb has used two complementary data for the calculation of fuel consumption and CO_2 emissions: observation data for a global picture of the freight traffic and questionnaire distributed to the principal actors of the freight activities. From the collected data, it was possible to demonstrate 30% improvement of goods traffic flows, 3.4 % reduction in the CO_2 emissions and 6% reduction in the fuel used which can be attributed to the DSP implementation.

In the context of Trailblazer project, Eskilstuna conducted feasibility for the consolidation of supplies and their co-ordinated study and presented the results to senior politicians.

The coordination of supplies in Eskilstuna assumed that the amount of released CO_2 will decrease by 43% simply by reducing the number of deliveries. If the requirements in contracts placed on vehicles with Euro 5 will reduce CO_2 by another 20%. Total reducing emissions will be 54%. With the introduction of biogas, the CO_2 emissions will reduce by 50%. Globally, the estimated reduction is about 69% in CO_2 emissions with the coordinated system. With the implementation of coordination system, the number of deliveries to the kitchens will be reduced to 2 deliveries per week. The reduction in fuel used consist of shorter distances overall, smaller vehicles with lower fuel consumption and shift to non-fossil fuels (gas).

The results concerning the annual savings in primary energy and greenhouse gases of the DSP implementation by the four European cities is summarized in the below table 7. The methodology and calculations behind these figures can be found in the Final Evaluation Report (Trailblazer, 2013).

Table 7: Common performance indicators

Common Performance indicator	Planned target	Actual achievement	Comment on performance
Primary energy savings (toe/year)	10% fuel saving	5,130.52	Target achieved overall: Eskilstuna - 50% (estimated); Växjö - 51% ; Vercelli - 13%; Zagreb - 6%
Reduction GHG emissions (t CO_2e/year)	10%	100,779.81	Target achieved overall: Eskilstuna- 69% (estimated); Växjö - 87% ; Vercelli - 13%; Zagreb – 3.4%

4. Lessons learned and recommendations

4.1 Lessons learned

TRAILBLAZER experimentations confirmed many issues which have already been identified in other UFT implementations. The focus on DSPs and environmental impacts brought in some new aspects and the evaluation methodology for city logistics was comforted.

4.1.1 Environmental impacts

Undoubtedly city logistics improvements reduce GHG emissions. Evaluations in all TRAILBLAZER cities showed these impacts although they were quite different actions in the DSPs set up by the cities

It was difficult to compare these actions and to determine the best ones for many reasons such as :

- the cities' context in general and more specifically regarding urban freight organisations as well as the types of areas in which the experimentations were conducted
- the relatively short demonstration time which did not allow to get enough data for such comparison

Although such actions are beneficial regarding environment, it remains quite difficult to forecast detailed quantified improvements and to associate reliable estimation to a specific type of action.

However, comparison of BAU (Business as usual) and actual data or even up-scaled ones, are consistent since they refer to a specific situation in a given city

4.1.2 Evaluation process

Globally the difficulties in the evaluation identified in the section 2 were verified in the TRAILBLAZER project. Although evaluation teams prepared mitigation actions to overcome such problems, they had to face and to adapt to each site adequate response to the city context and its evaluation approach in.

- developing awareness and training of local actors
- convincing stakeholders, particularly private companies to share data
- optimising the resource and methodology allocated to evaluation tasks, especially for data collection

In the context of Trailblazer project, evaluation has been conducted differently in the four sites according to local context, experience and availability of data.

Växjö has a dedicated department for the evaluation of environmental impacts. For them the evaluation is an everyday task and their comments and experiences were very useful for the evaluation. Data collection was easy in Växjö where a specific contract was signed with freight operators. The data about the fuel used, kilometres travelled in the demonstration zone and tonnes transported has been sent to the local authorities monthly.

In Zagreb, the collaboration between the city of Zagreb and University allowed the involvement of the groups of students for the survey data and for collection of the observed traffic data in target area with less financial means. The observation data was useful for the project global picture of the measure.

The questionnaires completed face to face with the drivers and freight operators were more qualitative that those sent by e-mail (e.g. Vercelli and Zagreb).

In some cities, like Eskilstuna, evaluation took more time than forecasted because strategic approach developed in this city involved a large number of stakeholders with different interests. In the other cities, the learning process contributes to increase the participation of actors in the collection of data. In Zagreb the number of answers to the questionnaires for "after evaluation", was 18% higher than in "before evaluation" for the same sample. In Municipality of Vercelli the learning process contributes to create a public group which participated to the identification and implementation of the useful measures for the city in order to reduce traffic.

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4.2 Recommendations for transferability

By essence, TRAILBLAZER was a transferability project between some experienced cities and the 4 pathfinders' cities. Concerning this aspect, the findings may be synthetised along 5 themes:

- Managerial position
- Monitoring
- Economy
- Information systems
- Deployment of solutions

4.2.1 Managerial position

For UFT improvements, political involvement must be different from the one set up for passengers transport. Although there are quite diverse organisations among the countries for passengers transport, city logistics require similar positioning from Local authorities or, at least a common basis for the principles of the organisation and cooperation with the stakeholders. Up to now, urban freight has been transported by private organisations in all cities, then similar methodologies, like DSPs, may be conducted in all cities ; differences may happen from the sizes, the culture of cities but political position may be determined accordingly the various examples which have been illustrated in several cities.

4.2.2 Monitoring

Monitoring is essential for the management of such complex system as is city logistics and designed according to the political positioning. Evaluation is one part of this process which needs to be tuned to the local context.
This adaptation is linked to the precision of the data which can be collected from the ground. This must be regarded as a continuous improvement processs. Generally, at the beginning only basic data can be gathered on the flows, th behaviour of drivers or retailers and so on.
Then an evolutive policy must be developed to accompany the development of solutions based on a larger number of collected data.

For instance basic indicators related to tonnes transported, total distance travelled and fuels used are relevant to estimate the GHG emissions from freight activities.
According to the availability of the data, the GHG emissions might be analysed at different levels of precision:

- First level using data about the fuel used.
- Second level using data about distance travel and vehicles' efficiency (e.g. litters/100km)
- Third level showing data on distance travelled and vehicle loading.

If primary data, collected at local level is not available, it is possible to use the statistic from national data, secondary data. The level of precision in this context is low, but this information can be useful for local authorities to start a continuous improvement cycle on this topics

4.2.3 Economy

As the last part of many supply chains, city logistics is strongly connected to economy and must bring some profitability. This is sometimes difficult to achieve or even contradictory with cities strategies on integrated transport.

This is the reason why, among other impacts, environmental ones need to be taken into account. Evaluations like in TRAILBLAZER need to be completed with a costs-benefits analysis. This analysis can cover different perspectives: benefice and cost for society, financial viability for private and public operators. Such approaches bring new points of views on global economy and basis for discussions with stakeholders. New types of cooperation and sharing the costs may be determined through such holistic approach

4.2.4 Information systems

As mentioned above, monitoring relies on the quality of data as well as of information systems.
Specific city logistics information systems must also be developed in order to facilitate the deliveries, to increase the awareness of drivers and freight operators, to optimise the flows. Software like routing systems exist, information on traffic flows is available in some cities, etc.
Considering the diversity of stakeholders; the main difficulty is the interoperability between the various software. Special attention must be paid in order to ensure the compatibility of data exchanges, the interpretation of information, the edition and transmission of data. Adequate information is the key point for sustainable success. Several levels of information might be installed, according to the resources and facilities of each stakeholders , they have to fit in a framework covering all information aspects of goods flows

4.2.5 Deployment of solutions

Globally, the solutions for improving UFT need to be simple, clear although embedded in a larger framework in order to ensure the coherence with the mobility strategy of the city.
Strategies for the implementation of solutions are often balancing between two extremes : focusing on a small number of actions over the city or experimenting a large variety over a restricted area. Both approaches have their pro and cons and sometimes it is well advised to mix them. For instance optimising the organisation and utilisation of delivery bays can be expanded over the whole city although access control for deliveries or even UCC services can be set up for specific areas at the same time in the same city.
Restricted areas should be chosen for two purposes ; either they are very specific (nature of flows, access,….) or they are representative of other parts of the city and can be considered as test zones for further upscaling. It is easier to experiment brand new actions in restricted areas where stakeholders can be well informed and play their participating roles.

5. Conclusions and perspectives

Many cities in emerging countries are facing new challenges for the integration of mobility resources as a keystone for strategic development. This is a real opportunity to encompass city logistics in such approach although it might appear as less

important at first glance. However, the share of freight transport in several bad effects in city life (congestion, environment, safety…) must be taken into account and new practices set up at the same time as passengers transport improvements. Among the impacts, it is quite important to consider that the majority of city logistics operators are professional ; making them change their behavior towards city flows and driving practices will directly influence (and train) all users of mobility facilities, and particularly streets, parking areas, etc.
It is also important to keep accessibility of goods and merchandises in the city centers to citizens. They represent a strong element of the city centers life which brings liveliness, security and economic development in the heart or main social areas of a city.

As mentioned above, deployment of new comportments should be progressive, beginning with basic or fundamental actions like waste collecting or respect of parking or access control regulations.

The cities in Morocco, like the European cities are confronted with rapid urban growth, most often combined with expanding urbanization and high level of congestion, which is source of pollution.
In most Moroccan cities, there is a lack of effective institutions for monitoring and evaluating the impacts of the local municipality actions in urban freight transport. There's lack of data and indicators for evaluation. For this reason, a special investigation approach on UFT has been launched in 2014 all over the country and more specifically in Casablanca. Like in many countries, freight flows grew quite empirically in cities according to the "mobility culture" and adding to the well known difficulties of traffic flows.
Many specificities must be considered, certainly leading to tuned and progressive solutions, among which

- The large number of very small retailers, located all over the city and requiring small but frequent deliveries. The frequency is often linked to the payment modes of the purchases which cannot allow larger ones. A specific attention should be paid to touristic areas (ex medinas) which concentrate particular goods flows
- The multitude of independent drivers, owning their own small vehicles working as middlemen between retailers and lorry drivers bringing goods in cities
- The lack of control on traffic regulations
- The difficulties to deliver the city centers supermarkets or large shops ; in many cases they do not benefit of real delivery areas inside the buildings or nearby
- The wild development of wholesale areas, sprawling randomly over streets and places

Several "technical" solutions will be designed and developed for Casablanca in the framework of the study lead by AMDL (Agence Marocaine de Développement de la

Logistique). Regarding the discussions in this paper, the success of the future solutions will require :

- The implementation of a strong evaluation team able to build an evolutionary reference book for this process, beginning with only few data available then enlarging them as the process grows
- The awareness, training of the various stakeholders, especially those belonging to small organisations who represent à very important vector for changing the behaviors for all traffic users in the city.

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