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How to increase stakeholders' involvement while developing new governance model for urban logistic: Turin best practice

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Abstract

This paper reports and describes the desirable effects obtained by the definition, acceptance and deployment of an innovative governance model introduced in Turin (Italy) where an original and well performing stakeholders' engagement format was developed. A specific pilot has been implemented in order to stimulate – *in vivo* – the effects of the proposed new governance model. Pilot results did demonstrate that applying the new governance model, based on operational incentives rather than restrictions (*pull* rather than *push* measures), it was possible to achieve relevant and sound benefits for the community and an economic saving for each single logistic operator joining to the Recognition Scheme. On the base of such evidence, the City of Turin and Piedmont Region are considering to extend the governance model developed to neighbouring Municipalities. This will provide a fundamental base to build a homogeneous regional bottom-up Logistic Masterplan.

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Introduction

The European Union (EU) is characterised by relevant conurbations playing a central role for its economic development. In fact, 85% of the GDP produced in the EU originates from its cities where approximately 359 million of people - 72% of the total EU population - live. The transport sector is accountable for circa 23% of total CO₂ emitted and urban logistics produces around 6% of all transport GHG emissions. Cities are both origins and destinations for goods delivery. Transport and logistic-related activities account for 3% to 5% of urban land use. Furthermore, the

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inhabitants of historic city centres, characterising most European cities, suffer from the nuisance originated from freight traffic giving rise to its perception as a local problem.

City logistics (CL), as defined by Taniguchi et al. (1999), is “the process for totally optimizing the logistics and transport activities by private companies in urban areas while considering the traffic environment, the traffic congestion and energy consumption within the framework of a market economy”. CL aims at reducing the congestion caused by freight-related movement, optimising vehicle utilization, and reducing polluting emissions without penalizing social and economic activities within cities (Crainic et al. 2011). Stathopoulos et al. (2012) underline that inefficient freight movements also contribute to noise, and increases in logistics costs that often trickle down to final market prices. While freight transport (Lorries > 3.5 tons) constitutes about 10% of total traffic within urban areas (CEC, 2001), Awasthi and Proth (2006) postulate that this percentage is higher when considering delivery vans and cars too. A city with high freight traffic volumes, emissions and pollutants negatively influences socio-economic activities hinders the achievement of a sustainable development. CL operations constitute an extremely flexible type of activity adapting to the on-going deep changes in urban economy structure, demography, shopping and distribution behaviours, consumers’ and business’ demand. Policymakers have generally considered freight transport matters pertinent to the private sector and have eschewed intervening. Nevertheless, given that several market failures are present in CL operations a need for public intervention is evident. Considering the strong and frequent interactions among the relevant stakeholders one has to accurately account for and deal with the various participants’ point of view. Under this respect, developing a proper stakeholder engagement governance model is fundamental.

This paper reports and describes the desirable effects obtained by the definition, acceptance and deployment of an innovative governance model introduced in Turin (Italy) where – starting from the successful experience of Freight Quality Partnership (FQP) - an original and well performing stakeholders’ engagement format was developed. Turin’s transport policy is driven by sustainability objectives, as proven by active involvement of the city in several projects aiming to develop efficient urban mobility for both residents and city users. City of Turin prioritized transport policy objectives that can be summarized as follows: 1) increase economic efficiency; 2) ensure road safety and protect the environment; 3) develop local infrastructures and adequately preserve a well-defined urban structure. The collaborative strategies are enablers to create and expand semi-intangible attributes and to optimize the use of intangible attributes of a city. This was achieved by fostering stakeholders’ collaboration along with the efforts made in understanding the dynamic nature of the specific city complexities such as the socio-cultural values of residents, the local administrative and governance policies, as well as shippers’ and freight carriers’ activities. City of Turin has developed its model in compliancy with EU Transport Committee document "A call to action on urban logistics". In line with the above policy objectives, a Recognition Scheme (RS) along with an extensive exploitation of already installed ITS and land use controls were introduced. The recognition scheme is based on full sustainability from an environmental (adoption of low emission freight vehicles), economic (achievement of competitive market without public funding) and social (city center accessible for registered operators) perspective.

The article is organized as follow: in Section 2 European initiatives to encourage the adoption of sustainable *urban mobility plans have been reviewed*. Section 3 examines the Turin metropolitan area and conditions that led to the development and the implementation of a new governance model for collaborative logistics compliant with SUMP methodology. Section 4 analyses the SUMP and its relationship with the legislative framework in Italy. In Section 5 we study the pilot project designed by City of Turin in order to better evaluate the outcomes from the implementation of its innovative model of governance. The pilot results and outputs are described in section 6, while in Section 7 we discuss the lessons learnt from City of Turin experience. Section 8 concludes.

2. European initiatives

The EC White Paper on Transport published in 2001 (CEC, 2001) made little reference to CL. The document envisaged that the solutions generally proposed would, in principle, have the potential to considerably enhance CLs’ efficiency while recognizing that their dissemination and market impact took place at a deceivingly slow speed. A major motivation for this lies with the conflict of interest between different stakeholders and, in particular, between logistics operators and residents. However, shortly thereafter, a growing concern resulted in various initiatives and projects been initiated around the world (in 2003 the Organisation for Economic Co-operation and Development (OECD) published a report on urban freight transport and the EC launched EU Action 321 programme on urban goods

transport). In 2011 the White Paper on Transport COM(2011) published by the EC set the target of achieving essentially carbon free city logistic by 2030. The Commission's Communication in 2013 *Together towards a competitive and resource-efficient urban mobility* provides a helpful framework for urban mobility planning with a focus on urban logistics. The Commission, subsequently, released a Staff Working Document "A call to action on urban logistics" (COM, 2013) setting out the strategy that, along with the accompanying communication on SUMP, encourages to improve the efficiency of urban logistics at all levels. In 2014, the EC Urban Mobility Expert Group underlines the need to achieve CO₂-free city logistics by 2030 in particular focusing on the minor local policy makers' involvement. This lack of involvement in a highly imperfect market has not facilitated the implementation of socially beneficial and acceptable policy solutions. Despite the efforts made by EU cities and Member States, reducing urban freight transport emissions will require major additional efforts in the years ahead. Within this scenario, it is evident that not only appropriate agreements have to be made but rather a proactive and effective stakeholders' cooperation is essential for achieving a resilient development in urban areas.

It is safe to assume that their particular objectives and interests drive all stakeholders to be involved. Since they can be both private and public in nature, it is first needed to identify them, clearly understand their specific preferences, and acknowledge their strategic relevance. Next, one has to analyse, compare and selectively group the various objectives/interests in order to find shared and focused solutions. City logistics is characterised by several key stakeholders (i.e. shippers, residents, freight carriers, and local policy makers) connected by physical (e.g. goods, waste, emissions), financial, (money), and virtual (information) flows. In this scenario impacts and different types of collaborative-commerce, planning procedures that can be implemented in CL have to be clearly defined. Gartner Group (1999), describes collaborative-commerce as a "... dynamic collaboration among employees, business partners and customers throughout a trading community or market...".

Freight Quality Partnership (FQP) (Browne et al., 2007) is commonly conceived as a long-term agreement between freight stakeholders concerned with urban freight that regularly meet, on a formal or informal basis, to discuss (and sometimes find solutions to) problems occurring within a given urban area (Department for Transport, 2003a). FQPs in the UK represent an instrument for local policy makers, businesses, freight operators, environmental groups, the local community and other interested stakeholders to work together to purposely address specific freight transport problems. The UK experience was adopted as a starting point to develop of an innovative governance model capable of fostering an efficient CL system.

3. Turin metropolitan area

Turin's general policy and local development strategies focus on sustainability. This is also particularly true for the transport sector where targeted measures have been implemented according to a SUMP. In fact, the city of Turin has a long record of successful projects, aiming at fostering efficient urban mobility for residents and city users, dating back to the Fourth Framework Programme (1994-1998). Turin is the capital of Piedmont a region in North-west Italy, and its territory is crossed each year by consistent freight and passenger traffic flows.

Turin, a cultural and commercial centre, attracts a large number of people and goods, spreads for 130.01 Km², with a population of around 900,000 people soon to become the capital of the newly established Turin's Metropolitan Area (Law n. 56, April 7th 2014). Population density is 6,950 inhabitants/Km² ranking third in Italy following Naples and Milan (National Institute of Statistics, ISTAT, 2014).

Big real estate areas are located within its industrial zone thus increasing the volume of inbound and outbound goods flows. Six motorways, the main northeastern road corridors, run close. The French border and other neighbouring Regions are the main origins and destinations of intensive traffic flows. A major railway corridor, currently under development, connecting with Lyon is intended to accommodate the flows between Italy and France. The airport has an average of 3.5 million of passengers per year increasing at the rate of 8.6% yearly.

City of Turin Limited Traffic Zone (LTZ) is a 2.62-km² area characterised by high environmental and cultural value, consisting of a unique architecture, buildings and monuments of national and international importance. The city's road structure is based on the ancient roman camp grid system (square blocks) whose structure has maintained its peculiarities and physical characteristics unchanged across time. Around 52,000 residents live in the LTZ with a density of approximately 12,600-inhabitants/km² that is twice the city average. Before the implementation of the new governance model, no specific regulation for goods delivery in LTZ was in place. Gasoline/diesel powered commercial

vehicles Euro1/Euro3 compliant could access the area access from 7:30 am to 10:30 am.

Turin is characterised by one of the most extended ITS networks in Italy managed by a traffic supervisor located in the Traffic Operation Center. The ITS network includes: 330 controlled intersections (out of 650); more than 3,000 inductive loops for real-time traffic flow measurement; 36 above-ground sensors; 71 cameras on 23 intersections; Floating Car Data integration; enforcement system based on 2 speed control traps (positioned along 2 main urban roads); 36 electronic gates and 36 Variable Message Sign (VMS) providing real time access information; 26 roadside VMS, 20 parking VMS; 18 extra-urban VMS; 36 area VMS; 350 bus stop interactive VMS.

The motorization rate is about 63% with the following modal split: 53% private car, 19% public transport, 28% other (pedestrian, taxi, bike, etc.). Given this context, Turin's challenge was to develop and implement a new governance model for collaborative logistics compliant with Sustainable Urban Mobility Plans (SUMP) methodology (COM, 2013). The City sets as its main objectives to: *improve* traffic flow conditions, *increase* average speed, *reduce* pollution, congestion and emission, and stimulate a renewal of vehicles fleets leading to an improvement of efficiency in logistic operations.

4. The planning tools

4.1 The Sustainable Urban Mobility Plans

SUMP is a “Strategic plan designed to satisfy the mobility needs of people and businesses in cities and their surroundings for a better quality of life. It builds on existing planning practices and takes due consideration of integration, participation, and evaluation principles. (COM 2013)” This definition is, largely, general as it is intended for use all across Europe and, hence, in numerous and diverse country contexts but, at the same time, it is also broadly applicable and should bear a practical appeal to all Member States.

Sustainable mobility represents an alternative paradigm within which to investigate city complexity and strengthening the links between land use and transport. The need of more sustainable and integrative planning processes has been widely recognised by local, regional and national authorities across Europe as a fundamental prerequisite to achieve such complex objectives. This is particularly true for urban mobility given the persistent and deep interaction among all the stakeholders involved. SUMP obtained, at a European level, increasing attention and funding in recent years. In fact, the first action in the Action Plan on Urban Mobility (COM, 2009) is increasing the take-up of SUMP in Europe. Furthermore, the Council of the European Union “supports the development of Sustainable Urban Mobility Plans for cities and metropolitan areas [...] and encourages the development of incentives, such as expert assistance and information exchange, for the creation of such plans (Council of the European Union and European Parliament(2010a). Council conclusions on Action Plan on Urban Mobility. Press Release 3024th Council meeting Transport, Telecommunication and Energy, Presse 191 of the 24 June 2010, Luxemburg)”.

In March 2011, the European Commission released its White Paper titled “Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system” (COM, 2011, 0144 final). It calls for cities to follow a mixed strategy involving land-use planning, pricing schemes, efficient public transport services and infrastructure for non-motorised modes and charging/refuelling of clean vehicles to reduce congestion and emissions. It specifically encourages cities above 100,000 inhabitants to develop Urban Mobility Plans bringing all these elements together. The Transport White Paper asks for an examination of the possibility to make Urban Mobility Plans mandatory according to national standards on the base of EU guidelines. It also suggests to link regional development and cohesion funds to cities and regions that have submitted a current, independently validated Urban Mobility Performance and Sustainability Audit certificate. Finally, the Transport White Paper suggests evaluating the possible implementation of a European support framework to stimulate a progressive implementation of Urban Mobility Plans.

4.2 The legislative framework in Italy and Turin's SUMP

The Plan for Urban Sustainable Mobility (SUMP) is not mandatory in Italy, however, article 32 of law n° 340 in 2000 (Law 340/2000, art. 22) calls for long term (ten years), systematic and integrated planning instruments to be developed for urban mobility management. SUMP is identified as a fundamental planning tool for all municipalities or conurbations with a population over 100,000 inhabitants. SUMP is: “...an integrated project on urban mobility

including infrastructural measures on public and private transport ... as well as on demand management by using mobility managers network...”.

The SUMP in Turin, in line with Regional planning, has been developed within a medium-term strategy (10-15 years) defining guidelines, targets, and operational measures in order to reduce CO₂ emissions by more than 20% by 2020.

According to the above-mentioned approach, transport policy objectives can be identified as follows: 1) increase system and economic efficiency; 2) increase safety and environmental quality; 3) exploit infrastructure while preserving urban structure. The City of Turin did develop an integrated approach to urban logistics having clearly recognised its vital role in ameliorating mobility, sustainability city and liveability. Success factor for a new governance model is thus reaching and involving urban freight stakeholders – including logistics providers – within a collaborative logistics framework leading to mobile, sustainable and above all, liveable urban environment.

5. Collaborative logistics as enabler for sustainability

5.1 City of Turin approach

A collaborative strategy can be deployed by fostering stakeholders' collaboration while promoting the understanding of the dynamic nature of city complexity. City liveability and freight distribution efficiency cannot always be appropriately pursued via pure market competition that is, nevertheless, hard to put in place in a working environment characterised by many market failures. A system optimal performance needs collaborative approach for planning and operation. This can be characterised as the operational and institutional mechanisms defined and implemented with the aim of achieving successful collaboration among the stakeholders sharing same infrastructures. This is usually implemented in practice by developing dedicated subsystems, such as Business-to-Business (B2B), Business to Consumer (B2C), Consumer to Consumer (C2C), Consumer to Business (C2B), Government to Business (G2B), etc. The rise of Internet as a major platform of information exchange, in a pervasive information technology age, developed various subsystems within a larger framework called e-commerce or e-business or –as some prefer to call it– internet collaboration or e-collaboration.

The presence of a number of different stakeholders with different, and often contrasting, objectives increased the complexity of the picture. Intelligent Transport Systems (ITS), Information and Communication Technology (ICT), and Corporate Social Responsibility (CSR) are, as system enablers, at the base of Turin's approach. The basic idea is to induce a change in private sector's behaviour through a mix of pull measures and clear and noticeable non-monetary incentives skipping the easiest push driven approach (i.e. time windows restrictions, road charging, etc.). City of Turin, due to the outstanding economic recession period, did take the decision to help the development of cooperative freight transport even among operators that usually compete each other instead of setting more barriers to the logistics operational activities in LTZ.

In order to better evaluate the outcomes from the implementation of a such innovative model of governance, City of Turin designed a pilot project in the introducing the following pull measures: a) development of a dedicated recognition scheme; b) exploitation of existing ITS; c) share of existing infrastructures between passengers and goods transport. Among these, the Municipality Recognition Scheme (MRS) was in fact the enabler of an innovative governance model. The MRS is based on the sustainability concept from *environmental* (i.e. adoption of low emission freight vehicles), *economic* (i.e. fair competition without public funding) and *social* (i.e. city centre accessible for registered operators) side.

As said before the recognition scheme is a further implementation of Freight Quality Partnership scheme. There are currently ongoing several FQPs in place around the world and Lindholm & Browne (2013) have published a survey in 2013. The Authors analyse and compare each specific approach and the outcomes of various partnerships in different areas of the world with the intent of assessing similarities and discussing differences having, as a final aim, the identification of the best working approaches. The research investigates six freight partnerships in five cities highlighting that there is not a one-size-fits-all type of solution. Different cities have adopted alternative approaches accounting for their peculiar characteristics and prevailing problems. Nevertheless, there are some regularities and clear insights emerge as to what is needed construct a successful FQP and, implicitly, to what has to be avoided.

City of Turin did start the procedure leading to new governance model taking advantage of the outcomes from

previous experiences. Then, to get an active stakeholders involvement, Local Authority public officers dealing with the process have been committed to the project since the beginning because a strong and integrated engagement of all the participants into core strategic policy discussions was considered a fundamental pre-requisite for achieving the new governance model. This preliminary phase of key stakeholders identification was developed with the intent of sharing ideas and beliefs with interested key actors with respect to the possible problems, while looking for viable options to tackle them. This led to a road-map that guided the discussion starting from problem identification to the development and deployment of a CL cooperative layout. Common understanding about the need to reduce commercial vehicles' harmful emissions along with the acknowledgment that no specific funding were available to foster polluting vehicles replacement represented the starting point in the development of a new governance model.

The dedicated Task Force (TF), accommodated 20 different bodies/organisations, with specific preliminary face-to-face meetings to present the approach and discuss the possible mitigating measures while recording comments and feedbacks. This did allow City of Turin to early understand possible problems from each stakeholder point of view and motivations underlying the resistances in accepting measure objectives. Additionally adequate meeting time was dedicated to exchange opinions among participants with respect to model implementation and concerning the layout of the non-monetary compensatory measures (i.e. larger time windows to access city centre or dedicated parking lots). All stakeholders in the TF represent a permanent two-way channel between City of Turin and the logistics operators having the objective of signing a Freight Quality Partnership (FQP) agreement. FQP represents the formal act towards the adoption of a new governance regime for last mile logistics capable to reduce urban congestion and pollution from commercial vehicles. It includes clear and credible incentives for the recognised operators such as, for instance, extended LTZ time windows, free admission to the LTZ for two years and either reserved lanes and areas for loading/unloading operation. The FQP aims to endorse the commitment by signatories to support a voluntary and progressive fleet renewal in City of Turin.

The TF actively contributed to the finalization of the FQP. Each specific FQP content was reviewed during TF meetings in order to find a common ground among stakeholders accounting for different and conflicting interests. This process has been successfully completed in one year and each TF participant finally signed the FQP agreement and took the obligation to promote the application of the MRS within its specific sector/associated.

5.2 The methodological approach adopted

As already presented, City of Turin, along with TF members decided to test the applicability of FQP and MRS to a larger scale by starting from a limited and focused pilot. The approach to the pilot feasibility study was comprehensive and, subsequently, fully implemented the extremely innovative regulation to be applied to commercial vehicles. This iterative and inclusive process has been designed also accounting for the forthcoming establishment of the Turin Metropolitan Area, a new administrative body that will replace former Municipalities in a single stand-alone area. In fact, the Italian Government did decide, in terms of spending review, to reduce the number of Municipalities by merging them into few Metropolitan Areas on geographical base. City of Turin, among the first, did start such process so that the transition of the regulations from city based applicability to a metropolitan wide area is a sensitive process still to be fully investigated in term of timeframe and procedures to be followed. City of Turin aims to develop a well-defined methodology allowing for the optimisation of space use for both passenger and freight.

The stakeholders' involvement phase included four activities: 1) Identification and validation of TF members; 2) Training of TF; 3) Informing Citizens; 4) Formal signature of FQP agreement.

As said TF includes all the stakeholders that signed the FQP, including City of Turin, Piedmont Region and, among others, Italian Ministry of Infrastructure and Transport. The TF appointed in September 2012 is still operational and its strategic role in the field of logistics is expanding also to relevant complementary measures such as, for instance, service vehicles access regulation, and land use planning. City of Turin played a key role in promoting the framework agreement signed between Metropolitan Areas and Ministry of Infrastructure and Transportation supporting the synergies to be implemented favouring efficient and sustainable CL measures in both the short and long run.

All training activities were undertaken during TF meetings (i.e. training on the job methodology) as well as during bilateral meetings where professional experts were also present. The experts' role was to present, illustrate and discuss approaches and tools capable of favouring the exchange of information among stakeholders with the aim of stimulating a common consensus on the project deployment.

City of Turin experience proved that a given mobility strategy, to be successful, should respond to specific stakeholders' needs so to give local policy makers a clear priorities and facilitate design and implementation of problem solving measures.

6. Pilot implementation and results

6.1. Pilot implementation

City of Turin – once agreed with TF the objectives and the procedures to be adopted for the deployment of the pilot – did start its internal procedures modifying current regulations, horizontal and vertical signalling as well as training internal staffing for the implementation of the Municipality Recognition Scheme (MRS). Starting from the current regulation, overall access and transit LTZ were revised. Since the establishment, LTZ was active on weekdays (except Saturday) from 7.30 to 10.30. Within pilot project, the regulations have been updated, adapting it to current needs and with the aim of rationalizing the number of permits, standardize the different types in a single document, thus facilitating logistics professionals. LTZ physical measures (i.e. low speed areas, new pedestrian walkaway, etc.) brought significant positive effects on the territory, reducing road space for vehicles while giving the possibility to the citizens and city users to access most attractive shopping areas. The new regulation has been adopted in December 2014 and duly published in City of Turin website (<http://www.comune.torino.it/trasporti/archivio-news/approvata-la-delibera-che-rivede-la-disciplina-di-.shtml>).

The new permission scheme includes MRS, a specific procedure, that allows to identify logistics operators that are compliant either with mandatory regulation (i.e. insurance coverage, not subject to administrative detention, tax payments, revision of the vehicle in accordance with relevant legislation, etc.) and are available to replace the (pollutant) vehicle with a new Low Emission Vehicles (LEV) duly equipped with on board ITS devices. In order to be compliant with MRS, each commercial vehicle accessing LTZ has to fulfil the following:

- 3.5 tons LEVs or vehicles at least Euro 5 compliant (enlarged to 7.0 tons in case of Zero Emission Vehicles);
- Equipped with On Board Unit (OBU) able to communicate real time vehicle data (i.e. regarding the location of the vehicle, tracking & tracing, etc.) to a control centre.

City of Turin thus established new internal procedures for the release of the permits developing a web based interface (Travet) able to collect the requests from single, operators, checking the compliancy and verifying the possibility to release the permission for the vehicle. The web based front end is available since March 2015. The operators can upload relevant data by themselves or with the help of the stakeholders associations that have been available to support the process acting as distributed help desks. For the operators coming outside Turin, the Piedmont Region did set up a dedicated communication campaign targeted to reach all interested actors by mean of newsletter, newspapers articles and VMSs installed at the city borders.

The new ones have replaced the signalling (vertical) in order to achieve clear and quick understanding of the obligations and permissions to the registered and not registered operators. For what concerns the possibility of reserving a subnetwork of dedicated parking lots for loading and unloading activities to the registered operators only, are needed changes in the Highway code (CdS) regulation concerning the parking management (and enforcement) and this amendment is currently under discussion at Government level being already presented a Law Modification for the requested changes. Possible period for its release and approval can be in winter 2016.

The implemented compensation measures, in addition to the dedicated and reserved network of parking lots above described, are a mix of incentives (i.e. two years gratuity for LTZ permission) and specific on site interventions for which is requests a specific activity (i.e. the availability of reserved lanes).

The pilot did assess the applicability and potentially of specific ICT based solutions (such as those used for eco driving support, tracing & tracking, acceleration speed limitation, etc.) vis-à-vis local conditions to select the most promising solutions using a multi-criteria based approach. The pilot did allow City of Turin to constantly measure and report the sample vehicles fleet flows and CO₂ emissions in the City Center, to control authorized access for delivery vehicles in LTZ by mean of standard market ITS products.

For what concerns the on board equipment, the FQP calls for direct investments from operators being thus in the position to choose the preferred technical supplier under the following conditions:

- OBU not removable from the vehicle;
- Connection of the OBU with a standard commercial fleet management platform;
- Connection of the selected platform with Turin traffic control center.

In this framework, the pilot has been launched in collaboration with express courier associations. The technology proposed for the OBUs and wireless units is the most advanced in the industry using wireless communication modules GSM/UMTS last generation and primary producer, using GNSS modules of latest standard and leading market, wireless technology for short range communication between container and cab already used for applications "vehicle to vehicle" and "vehicle to infrastructure". The ex-ante data needed for the evaluation of the pilot are recorded in "business as usual" mode for a full month. Then MRS incentives (e.g. access to the reserved lanes, extended time frame to entering LTZ and availability of reserved network of loading/unloading bays) have been applied to the same sample fleet of vehicles in order to calculate the improvement of operational services.

6.2. Pilot results and outputs

It is important to underline again the peculiarity of Turin pilot is that FQP is based on voluntary change of behaviour rather than on compulsory obligations, encouraging virtuous behaviours of operators (i.e. joining the recognition scheme) without adopting regulatory constrains (i.e. access restriction and shorter time windows). The pilot phase started in December 2014 and was completed in April 2015. A total of 20 vehicles from DHL, UPS and TNT have been involved in the pilot. The pilot was focused on LTZ while integrating actions at Metropolitan level in order to facilitate the possible extension of the new governance model to neighbouring Municipalities. From the work undertaken so far, it is possible to draw a clear picture of ex-ante overall traffic flows entering in the LTZ as well as the share of commercial vehicles. Ex ante data collection in order to quantify the overall commercial traffic volumes entering LTZ, was undertaken by mean of ITS devices at selected on site installations in autumn 2014, during two sample weeks. Recorded daily average access of commercial vehicles was of 6,004 units. The week day with more access is Friday (6,666) while the weekday with less access is Tuesday (5,563) vehicles. For what concerns the time of the day, commercial flow has a typical trend with two peaks between 10-12 and 14-15.

Taking into consideration the vehicles ownership, Own Account (not professional logistics) are 3,100 units representing almost half of daily accesses. As for the age of the vehicles, there is a larger presence of commercial vehicles older than 10 years. From sample vehicles fleet data collection has been possible to record certified field data and, with these, calculate the following Key Performance Indicators:

Table 1. Turin pilot impacts

Key Performance Indicators	Values
Congestion reduction (numeric, average speed)	Increase of commercial vehicles average speed of about 20% leading to 31 km/h (estimated value on the basis of average kilometres covered by vehicles)
Emissions (CO ₂ , CO, NOx % or numeric reduction)	Saving of 1,8 kg/day CO ₂ per vehicle
Vehicle fuel efficiency fuel mix (numeric, Fuel used per vkm, per vehicle type and Percentage of fuel used by type)	Saving 1.10 litre of diesel per vehicle per day
Average delivery time	About 3.6 minutes for each delivery (based on 8 worked hour/ 133 average delivery per vehicle per day)
Average Km covered	Increase of average km covered of 32% allowing to do more deliveries with less vehicles (average covered km 105)

The results of the pilot shown, with certified data from OBUs, that applying the new governance model for CL is possible to achieve great benefits for the community and an economic saving for each single logistic operator joining to the MRS; extra savings have been calculate for each vehicle of about 20,000€/year. This would mean that in five years' time full fleet of commercial vehicles in Turin can be turned into ZEVs being fully compliant with EC goal of "zero emission urban logistics in year 2030" without public funding and without harming the competitive private market of urban deliveries.

7. A new governance model for a sustainable logistics: lessons learnt from city of Turin experience

City of Turin along with TF members experienced a shared process of design, implementation and validation of sustainable transport measures aiming to promote an efficient urban logistics system. Several regular meetings have taken place to exchange knowledge and information among stakeholders – following SUMP methodology – so that some preliminary conclusions and lessons could be drawn. The stakeholders' active involvement represents kernel approach adopted in Turin. Participatory culture and strong political support are preconditions for successful stakeholders' engagement. If politicians are committed and if they support an open dialogue with stakeholders, this helps necessary trustful environment among them since they will perceive that their voices will be listen and then they are more motivated to participate.

City of Turin did present a clear pathway at the beginning of the participatory process and this proved beneficial for all participants. The plan outlined main objectives and enabled a consensus formation among all parties involved. The plan and the agreed procedures also played an important role in managing the whole process. Underlying SUMP methodology, while providing a concrete application of the shared principles, guaranteed flexibility in order to adapt the new governance model to new circumstances and possible requests stakeholders might subsequently introduce. The TF exercise showed stakeholders' involvement increases when they are aware of the plan and consider themselves as an important factor in its definition and deployment. This also includes objectives, issues to be discussed, and timelines of consultations characterising and acknowledging their role with respect to the consideration of their proposals.

In this framework City of Turin got a detailed knowledge with respect to stakeholders' characteristics and interests (citizen included) while also identifying the options for motivating and getting them involved. It was important to identify in the early process stage, stronger and more influential stakeholders who could influence expert opinions and prevail over others. Trade Unions, in the case of Turin, acted as catalysts and propellers in implementing the Freight Quality Partnership agreement. From the meetings held was clear that stakeholders demand to be addressed in a direct and honest way. In fact, a key concern for any engagement process is to gain and maintain a high level of credibility and trustworthiness during the whole process. Making unrealistic promises will lead to a negative perception of the process. Stakeholders should be able to trust the proposed actions while local policy makers should clearly understand their views and expectations. Local Authority staff needs a professional support in planning and implementing stakeholders engagement, as often they are mostly characterised by an administrative background, rather than technical skill, so that it makes them not fully suitable in leading such a participatory processes.

Another crucial success factor is represented by the active participation of local Chamber of Commerce in the TF meetings acting as compensation room between private and public interests. Taking advantage of the experience made during this process, City of Turin SUMP radically evolved accommodating a radical change of urban freight distribution and, for the very first time, integrating CL in the overall masterplan having same relevance as passenger mobility. This enabled operators, accepting full traceability of the vehicle and migration towards LEVs fleet, to sensibly increase their average speed in urban delivery and, consequently, their productivity. Once the return on private investments required for accepting the changes in the governance model have been clearly presented to TF, the pilot project has turned into a permanent change of LTZ access regulation with the strong backing from all stakeholders.

The challenge of any behavioural change throughout a specific engagement process (within SUMP methodology) is to accurately design meetings in detail in order to enable people to get the message easily and avoid misunderstandings. Turin experience did show that stakeholders are more prepared to respond and become involved

if they are approached professionally. This implies providing a degree of sympathetic attitude, clear explanations, and a recognisable and consistent approach.

8. Conclusions

Congestion reduces transportation infrastructure efficiency and produces detrimental impact on travel time, reliability, air pollution, and fuel consumption not only for passengers but also for commercial transport. Congestion also has a particularly negative effect on urban logistics in terms of increasing nocive emissions and public space use so that urban transport policies are under the spotlight. City of Turin evidenced that there is a need to drastically reduce greenhouse gas emissions. Coping with congestion by widely extending road infrastructure is often not a valid option. Promoting independence from oil and creating modern infrastructure and multimodal mobility (including urban logistics) assisted by smart management and ITS is the challenge to be exploited. A transport system can be considered smart if it is capable of dealing with new situations — such as those concerning safety, traffic congestion, obstacles or modal integration — by linking all sources of data to produce valuable information for transport users and operators. This is true for passenger mobility but more has to be done for goods mobility, particularly in urban environment (e.g. there are in place more traceability and ICT for long-range shipper and deliveries). City of Turin challenge was the development a new governance model for CL in order to stimulate data and information sharing across private - even competing - logistics organisation while involving them into a participated process of dedicate mobility policies implementation.

The establishment of a dedicated Task Force was a key success factor for the measures and the finalisation of FQP. The involvement of local Chamber of Commerce did help stakeholders to trust the overall process. Along with such approach, enabling physical factor of Turin successful experience was the presence in place of a large ITS infrastructure network. It includes a number of gates, webcam and variable message signs all integrated in a dedicated TCC. This is at the same time an accelerator and a bottleneck for the transferability of Turin approach to other sites. In fact, it is an accelerator for ITS mature cities having already in place a similar extensive network but on the other side the costs for equipping the target area cannot be balanced with scale economies derived from a more efficient urban logistics system. Once again, the presence of this infrastructure, while enabling the deployment of the governance model, did allow extensive data collection for the ex-ante and ex-post analysis.

Such data have been merged with the ones recorded by OBUs installed on the registered vehicles in order to allow ongoing measures and continuous evaluation of the new governance model impacts in terms of air quality and congestion.

Having considered, from one side the presence of ITS and, on the other an appropriate engagement of stakeholders through TF, Turin experience evidenced that “human factor” play a crucial role in the successful implementation of advanced CL models. The early implementation of a limited and dedicated pilot in LTZ gave the chance to properly inform TF members about facts and real operational data pushing among logistics professionals the idea that correct use of the technologies is economically beneficial for commercial fleet operators and, in a larger extent for the citizens, for environmental and social domains.

Pilot results demonstrates that, applying the new governance model for urban logistics based on operational incentives rather than restrictions (pull measures rather than push measures), it is possible to achieve outstanding benefits for the community and economic savings for each single logistics operator joining to the MRS. About 20,000€year extra savings have been calculated for each vehicle. This would mean that in five years’ time full fleet of commercial vehicles in Turin can be turned into ZEVs being in this way fully compliant with EC goal of “zero emission urban logistics in year 2030”.

City of Turin experience did show how innovative concepts and business models of urban logistics can help to build more efficient, effective and sustainable urban transport and logistics networks. The mix of ICT tools and SUMP methodology can help to support and accelerate CL collaboration providing an integrated environment for detecting, exploring and implementing profitable synergy options on a very large scale. By applying fair and transparent gain sharing mechanisms, the synergy benefits can be redistributed among all partners in a collaborative logistics community (“win-win”).

In order to summarise the main outcomes, it can be evidenced the following:

- It is possible to setup innovative measures and approaches but the involvement of interested actors should be from the early stage of the process;
- The stakeholders have the possibility to act in their market segment as “project multipliers” as they have the chance to interact in a positive and effective way with the single operators they represent, talking the same language;
- The policy commitment has to be clear from the beginning and have to be shown in public events, on newspapers or/and by mean of innovative social media (i.e. Twitter, Facebook, LinkedIn, etc.);
- The full concertation process has to be supported by specific and targeted professionals and experts;
- The involvement of local Chamber of Commerce is a success factor of the agreement and represented a guarantee of long lasting regulations even after the changing of local political guidance;
- The establishment of a permanent TF gives the possibility to the involved key actors to monitor directly the implementation of the project creating a stable concertation environment leading to a success case;
- Starting from Turin experience, National regulation is under changing according to operational aspects that the stakeholders highlighted during the pilot as enabler of higher efficiency of the project in terms of impacts (i.e. exclusivity of parking spaces, possibility to remove not authorised vehicles from bay areas, etc.).

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List of Acronyms

- APfE - Action Plan for Energy
 B2B - Business to Business
 B2C - Business to Consumer
 C2B - Consumer to Business

C2C - Consumer to Consumer
CL – City Logistics
CO – Carbon monoxide
CO₂ - Carbon dioxide
CSR - Corporate Social Responsibility
EC – European Commission
EU – European Union
FQP – Freight Quality Partnership
G2B - Government to Business
GDP – Gross Domestic Product
GHG – Greenhouse Gas
ICT – Information and Communication Technology
ITS – Information Transport System
LTZ – Limited Traffic Zone
MRS - Municipality Recognition Scheme
OBU – On Board Unit
OECD – Organisation for Economic Co-operation and Development
SC – Supply Chain
SUMP – Sustainable Urban Mobility Plan
TCC – Traffic Control Centre
TF – Task Force
UK – United Kingdom
VMS – Variable Message Sign