

M07.02 – Executive summary

Brescia is a medium sized city (about 190'000 inhabitants) characterized by a valuable historical centre and a wide metropolitan area.

When CIVITAS started, the main topics related to city logistic and freight distribution organisation under discussion in Brescia were:

- *the logistic pole localization (Urban Distribution Centre)*: since from a planning point of view the logistic pole localization should serve both the metropolitan and the urban areas;
- *the new organisation of freight distribution in the historical centre*: the access to the city centre was managed through a Limited Traffic Zone (LTZ) – residents, Local Public Transports (buses and taxi) and several authorized people could enter it. The LTZ was characterized by different time bands (Z1 -the core- with no access 24 hours a day; Z2, with open access from 4 pm to 8 am) to allow the freight distribution in the city centre where about 500 commercial activities are located.

Thanks to this measure a Urban Logistics Plan has been elaborated for analysing the “state of art” of freight distribution in Europe and in some Italian cities, proposing solutions for Urban Distribution Centre location and several management actions in order to reorganize freight distribution in the city. In particular, for the historical centre new time windows and restriction have been foreseen. Pedestrianisation of main historical squares – with a substantial reorganisation of freight movement – has been carried out to reach a high environmental quality in the heart of the city.

In order to monitor the measure outputs, during its implementation, information on weighting factor and number of accesses to the historic centre has been collected. The data helped to understand if the operators rationalized their deliveries, by optimizing the use of their vehicles capacity and reducing their accesses to the historical city centre. As a measure outcome, the number of delivery vans decreased by 18%, trucks by 14.5% and articulated lorries by 2.5%.; while the weighting factor increased by 12%.

These results were related to the restricted time windows and to the pedestrianization, both implemented step by step, in the city centre by the Municipality. The transport companies had to reduce the journeys for the deliveries to respect the time restrictions to enter the centre and they had to increase the weighting factor, exploiting more the vehicles at their disposal, to satisfy the traders deliveries. The reduction and the reorganization of load/unload slot influenced the choice of vehicles used and the weighting factor.

In addition, by the data collected through the LTZ cameras, it was remarked that the pedestrianization and the restrictive measures also contributed to the reduction of the private cars accesses (- 9,2%).

Concerning the stakeholder acceptance of the distribution centre, it has been assessed through a survey spread among the most important commercial operators in Brescia (15 companies). The results proved that during Civitas operators had a constant interest in the distribution centre development.

A. Introduction

A1 Objectives

The measure objectives are:

(KK) High level / longer term:

- To improve the quality of life of the citizens reducing freight movement in particular in the city centre;
- To improve conditions in relation to pollution due to delivery of freights.

(LL) Strategic level:

- To regulate the freight urban distribution (according to town planning policies) increasing the weighting factor and reducing pollutant freight means of transport trough the reduction of delivery time and using new sustainable means of transport.

(MM) Measure level:

- (1) To define the Logistical Urban Plan;
- (2) To introduce restrictive measures in order to optimise weighting factor in the city centre, as a first step for the future actuation of the Logistical Urban Plan contents (the measure aims to increase by 60% of the weighting factor and to reduce by 20% of the commercial traffic flow in the rush hour);

A2 Description

Brescia is a medium sized city (about 190.000 inhabitants) characterized by a valuable historical centre and a wide metropolitan area.

Since mid eighties a discussion on city logistic and freight distribution organisation has been carried out among politicians without finding an agreement that could lead to a solution to be implemented, the main topics under discussion were:

- *the logistic pole localization (Urban Distribution Centre)*; from a planning point of view the logistic pole localization should have had to serve both the metropolitan and the urban areas, this led to a wider number of stakeholders involved in localization choice with subsequent problems.

The delay in taking such decision was no longer acceptable for the city of Brescia; therefore an Urban Logistics Plan was elaborated during Civitas. It contains the analysis of the "state of art" in Europe and in some Italian cities. During Civitas the case of Brescia was analysed and the project proposal led to the feasibility study for Brescia urban distribution centre.

- *the new organisation of freight distribution in the historical centre*; the access to the city centre is managed trough a Limited Traffic Zone (LTZ) –residents, Local Public Transports (buses and taxi) and several authorized people can enter it. As a matter of fact only few pedestrian area are available, with a general low quality of the environment.

The LTZs were divided into two zones characterized by different time bands to allow the freight distribution in the city centre where about 500 commercial activities are located.

- Z1 -the core- with no access 24 on 24 hours;

- Z2, with open access from 4 pm to 8 am.

The historical city centre of Brescia is going to be renewed because the new metro line (start up foreseen by 2013) allows to stop busses from running through it and also the pedestrianization of the main historical squares in the city. In order to reach a high quality of the historical urban environment a reorganisation of freight distribution time window and of freight itself is absolutely necessary.

During Civitas a more rational urban freight distribution was introduced to optimize the weighting factor of deliveries through pedestrianization and restrictions in several parts of the historical centre. As a matter of fact new rules as specific time windows to enter the city centre, new weight limits and new delivery spots were introduced together with the progressive pedestrianization (figure 1) of Paolo VI Square, Corso Mameli and Loggia Square (first step), continuing with Corso Zanardelli and Via X Giornate (after the conclusion of the works for the underground, second step).

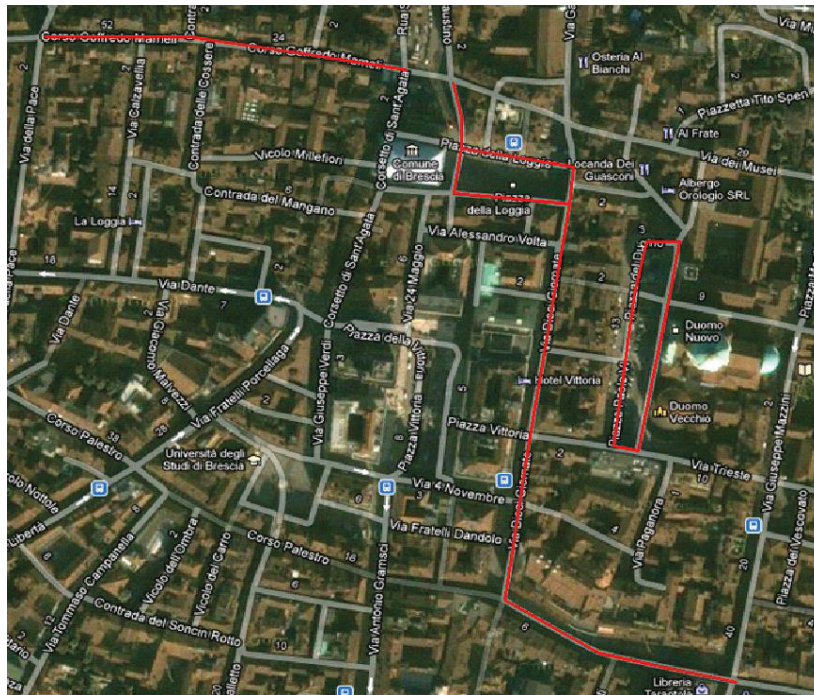


Fig.1: Pedestrianization project in the city centre of Brescia

The restrictive measure and the pedestrianization can be considered as preparatory steps for a general reorganisation of the freight distribution together with the freight distribution centre that will start next November.

B. Measure implementation

B1 Innovative aspects

- New conceptual approach
- Targeting specific user groups
- New policy instrument.

The innovative aspects of the measure are:

- **Innovative aspect 1 (New conceptual approach)** – The rearrangement of the urban freight distribution is an important challenge for a city and must be planned not only through the adoption of local policies (such as the Urban Logistic Plan), but it has to be faced also at a territorial level (Province and Region). This is the reason why the involvement of several stakeholders was crucial for the design and the implementation of the local policies regarding the freight distribution.
- **Innovative aspect 2 (Targeting specific user groups)** – One of the tangible outputs of the measure consisted in the approval of restrictive measures (through a municipal decree) addressed to the freight distribution organization in the historical city centre. The freight distribution operators regularly loaded/unloaded their freight in the city centre and the restriction consisted in changing the opening/closing time for the access to the historic centre. Therefore a targeted group of stakeholders was involved by the Municipality to increase awareness and acceptance about the Municipality choices regarding freight distribution and to discuss the future urban freight distribution pole.
- **Innovative aspect 3 (New policy instrument)** – The freight traffic in urban areas was about the 25% of the total circulating vehicles. A more effective system, based on a rational distribution/packing waste gathering management could contribute to the improvement of the general quality of life in the city centre (also in terms of air pollution, traffic congestion and noise pollution). This was one of the main topics developed in the Logistical Urban Plan that was developed before the adoption of time restrictive measures. For Brescia, this approach was innovative, as it gave a systemic vision of the urban freight movements in the city.

B2 Research and Technology Development

Research activities mainly regarded the elaboration of the Urban Logistic Plan, that consisted in

- ✓ survey about urban freight distribution (benchmarking on the European and Italian state of the art);
- ✓ specific surveys about Brescia, including traffic flow analysis, updating of the O/D matrix for the city centre, analysis of weighting factors, etc., survey about the main commercial operators and the delivery area in LTZ;
- ✓ project proposal of the best position for the location of the Urban Distribution Centre (UDC). The UDC organisation concerned: main functions, relations between storage and delivery, management and technological architecture;
- ✓ monitoring, marketing, financial plan (break even point), expected outcomes/social benefits.

The above mentioned survey was made by Interporto (an external society) that put a series of questions to the most important freight distribution companies in Brescia. Through these collected

information (related, for example, to the historic centre accesses, the time bands to enter the historic centre, the used vehicles, the weighting factor), it was possible to have data to develop the restrictive measures.

The study on the Urban Distribution Centre was focused on accessibility problems in relation to the existing mobility infrastructures - kind of traffic flow was analysed together with road geometry and design - . Among the suitable areas in the west side of the city, near the highway (exit “ Brescia Ovest”) the Ex-Ortomercato Area was chosen, as some existing buildings could be rented for the UDC. The new UDC will start by November 2012.

B3 Situation before CIVITAS

Brescia is a medium sized city characterized by a metropolitan area and an historical centre that dates back to the Roman times.

The access to the city centre is regulated with Limited Traffic Zone (LTZ) with a restricted access to residents, LPT busses, taxis and delivery services. For the latter it is divided into two zones (see the figure 2) characterized by different time bands to enter the historic centre:

- Z1 -the core- with no access 24 on 24 hours,
- Z2, with open access from 4 pm to 8 am.



Fig.2: Limited traffic zone (LTZ) in historic centre of Brescia: Z1 were the yellow coloured areas, Z2 the blue ones.

The freight distribution system running downtown in Brescia was based on the autonomous delivery of the goods carried out by private couriers. Within the city centre, several load/unload parking zones were dedicated to the couriers and the only limitation consisted in specific time bands, regulated by the LTZ cameras. Thanks to the participation to the Civitas Project, it was possible to undertake in-depth studies of a re-organization of the freight distribution, towards more efficient management schemes based also on a future logistic pole (Urban Distribution Centre)..

The issue of freight movements was developed involving stakeholders, in particular for the city centre couriers and the shopkeepers. The reorganization of downtown freight distribution was carried out during pedestrianisation of the main squares of the city (Piazza del Duomo and Piazza della Loggia). Both actions reorganization of downtown freight distribution and the pedestrianisation of the main squares are related to requalification of the historical city centre. The former foresees a better environment and the changing of the time bands, restrictions and reorganization of freight parking slots and can be considered preparatory for the future Urban Distribution Centre start up; the latter is related to the start up of the metrobus by 2013 that will allow the removal of several buses from the city centre.

B4 Actual implementation of the measure

The measure was implemented in the following stages:

Stage 1: Elaboration of the Urban Logistic Plan (from October 2008 to November 2010) – The Plan consisted in in-depth analysis of the phenomenon of freight distribution and in economic feasibility studies of the solution proposed for Brescia, that was the realization of an Urban Freight Distribution Centre (which worked as shown in figure 2 reported below).

In particular, the investigated aspects were the following:

- *analysis of the weighting factor;*
- *review of major traders;*
- *localization of load/unload areas for freights in the historic centre (ZTL);*
- *project proposal, including also the definition and the possible localization of the Urban Freight Distribution Centre.*

The main goal of this closer examination was to outline the state of art of the freight movements in Europe and in some Italian cities also to find out the best solution for the delivery/collection of goods in terms of efficiency (reducing altogether external/internal costs of the management of the logistic services), punctuality and precision through a new project proposal.



Fig.3: Urban Freight Distribution Centre system

Feasibility study of the Urban freight distribution foresaw:

- *a survey about delivery areas in LTZ;*
- *analysis of the commercial vehicles traffic flows in the city centre (LTZ) to evaluate the impact of freight movement;*
- *benchmarking analysis: best practices in Italy and in Europe (Vicenza, Padova, Ferrara, Genova, Siena, Brema, Basilea, Utrecht, Zurich, etc...), also identifying critical situations and best practices in city logistic and restrictive measures implementation. The introduction of restrictive measures leads to advantages in terms of pollution reduction, traffic reductions and increase in weighting factor.*
- *preliminary design and location of the UDC (urban distribution centre)*
- *in-depth studies about the scheme of the main functions of UDC,*
- *the relationship between storage and delivery functions of UDC;*
- *proposals for UDC management, considering also the necessary technological development.*

The reorganisation of the freight distribution in the historical centre of Brescia- foreseen in the Logistical Urban Plan developed during Civitas - has provided the possibility for the couriers, to deliver their goods to a logistic platform close to the city centre.

The distribution of the goods from the freight distribution centre to the commercial activities in the city centre will be carried out using low-environmental impacts vehicles.

The UDC technological development has foreseen an operative management platform equipped with GPS devices for the fleet control and for the real time load tracking and tracing.

The UDC can be potentially exploited also for other activities,, such as shopkeepers' home deliveries and the "reverse logistic" (gathering of the package waste).

Stage 2: Preparation of the restrictive measures (from March 2010 to March 2011) – *The elaboration of the Municipal Decree, that introduced the new restrictive measures for urban freight distribution in the city centre was carried out from spring 2011 taking into consideration the information deriving from the Urban Logistic Plan.*

In particular time bands and accessibility to several places were changed. The restrictive measures mentioned above regarded private cars and the freight distribution vehicles. The Decree did not concern freight distribution fleet.

Stage 3: Operational launch of the measure and system running (from April 2011 to October 2012) – During this stage, the Municipal Decree was officially approved. Dissemination campaign in order to inform citizens about the restrictive measures were carried out. After that date the restrictions were in force and regulated by the LTZ control cameras. This decree integrated the activities related to the restrictive measures with the pedestrianization of the city centre of Brescia.

The topic of reorganization of freight distribution was publicly discussed during an organized round table “Non motorized mobility and historic centres: the case of Brescia” (during the XVIII International Conference “Living and walking in cities - Sustainable mobility and road safety” on the 17th June 2011).

Pedestrianization actions were implemented in phases.

For example Paolo VI Square (i.e Piazza del Duomo) was pedestrianised starting in April 2011.

The first phase concerned in the elimination of parking spaces in the central and south side of the square, in flower pots introduction, in bollards with automatic system to restrict the access only to selected users, in goods delivery spot definition (specifically 5 delivery stalls in the north side and 1 in the south side).

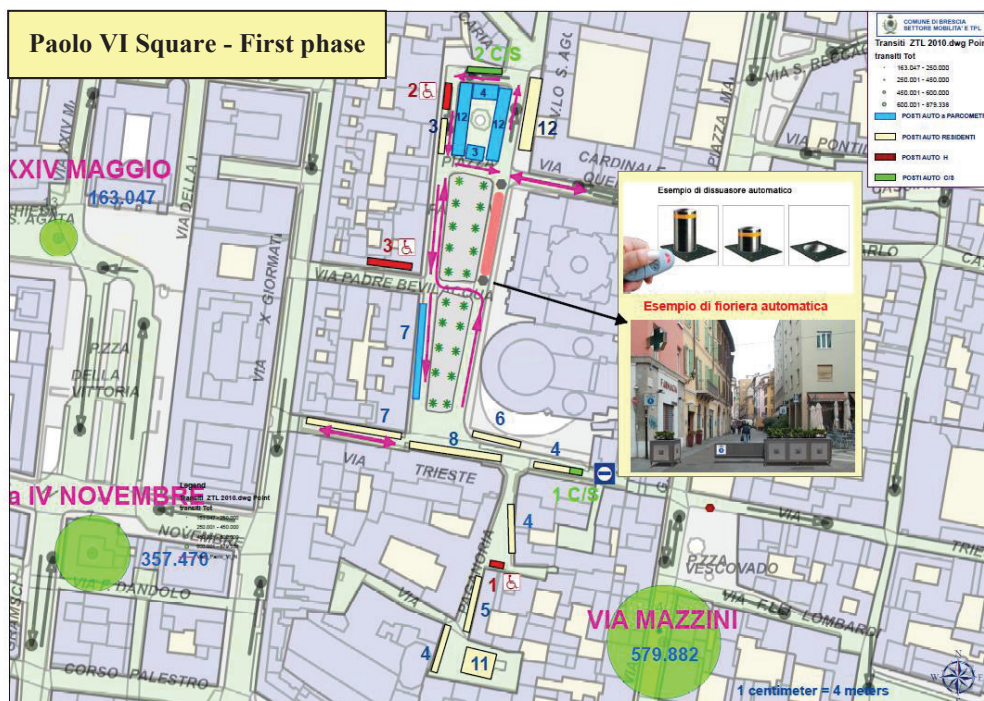


Fig.3: First phase of the restrictive measures implementation in Paolo VI Square

The second phase (see fig.4 reported below) - July 2011 - regarded the central and southern part of the square:

- 7 parking places were removed.
- 7 freight parking slots were located between via X Giornate and Paolo VI Square (close to via Trieste) and they were monitored till November 2011, to understand the interferences with pedestrians traffic flows.
- 3 parking spaces reserved to disabled people were introduced in via Bevilacqua (northern area) by reducing parking meter slots.
- access to the Dome and to the theatre was allowed during events.

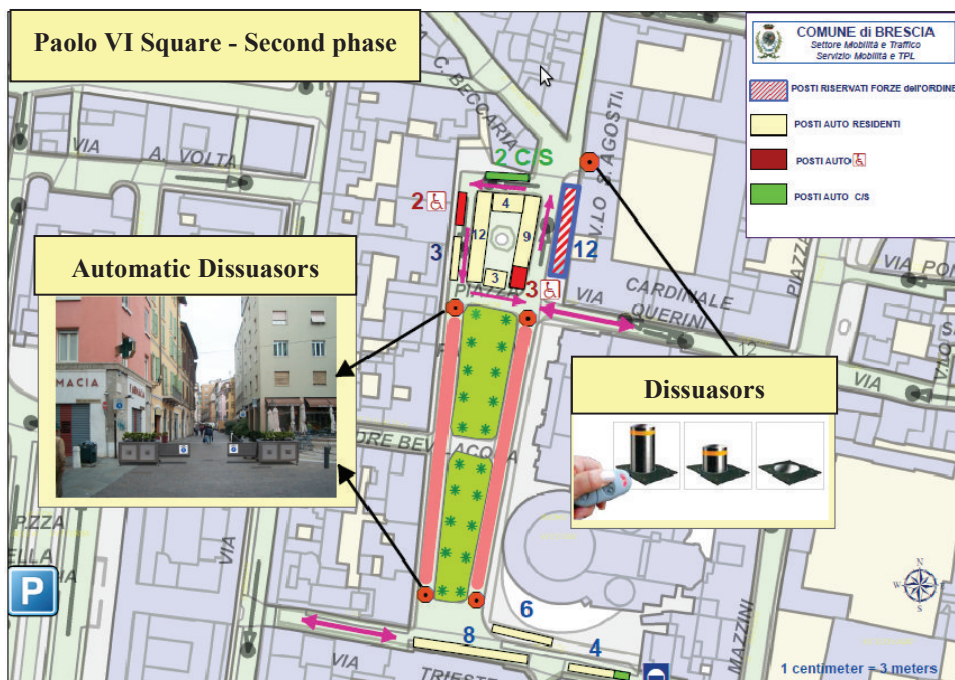


Fig.4: Second phase of the restrictive measures implementation in Paolo VI Square

The third phase (see figure 4) was carried out during Summer 2012 (in coincidence with the opening of the first floor of the parking lot of Victoria Square) and regarded:

- the introduction of a no parking zone in the Northern side of the square ,
- 12 parking slots reserved to the police set in the East side of the square near the Broletto
- implementation of new restriction in time bands for commercial vehicles.
- 5 delivery spots (were maintained) allowing goods distribution from 6:00 am to 10:30 am.

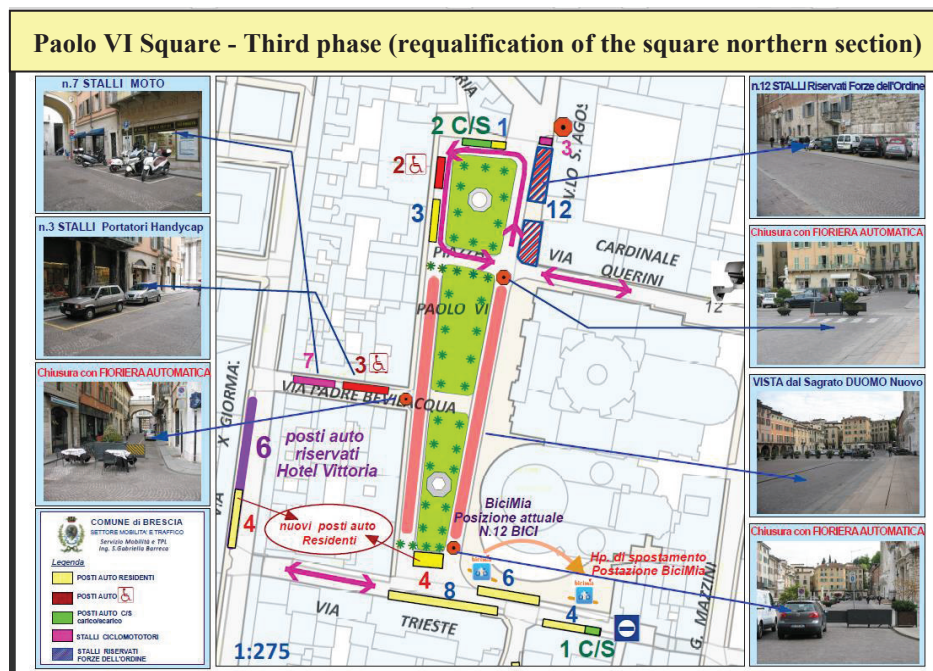


Fig.5: Third phase of the restrictive measures implementation in Paolo VI Square

Pedestrianisation also involved Corso Mameli (fig.6 reported below), from in Spring 2012 to July 2012. Corso Mameli is located between via Pace and Vicolo Paitone and the intervention on this street regarded:

- use of existing PILOMAT near the Pallata Tower to restrict vehicles transit,
- setting of flower pots to control the access to Corso Mameli, Calzavellia street and Contrada Delle Cossere (residents were allowed in via Calzavellia, Contrada delle Cossere, Vicolo San Pietro Martire)
- incentives (such as a discount up to the 50% of the costs of the public ground occupation) were offered to the traders in the area
- 1 freight load/unload slot was allowed in the west side (via Pace)
- 5 freight load/unload slots were allowed in the east side (Largo Formentone)
- restriction of the time bands for freight deliveries ,to 6.30 – 10.00 am. (instead of previous 6.30 – 11.30 am ; 13.30 – 18.30 pm).



Fig.6: Pedestrianization and restrictive measures implementation in Corso Mameli

*Piazza della Loggia pedestrianization was carried out into two steps starting from April 2011
The first step foresaw:*

- restrictions for the LTZ 0-24 (just residents bus and taxi)
- two new LTZ virtual gate, one in Largo Formentone, one in Corsetto Sant'Agata.
- new time bands for the suppliers accesses
- “no access” zones to Piazza Loggia for the commercial vehicles, a u-turn was allowed for commercial vehicles
- new delivery area located in Largo Formentone.
- new time band in Piazza Loggia and Corsetto Sant'Agata to 6.30 – 10.15 am. (instead of previous 6.30 – 11.30 am ; 13.30 – 18.30 pm).



Fig.7: Pedestrianization and restrictive measures implementation in Loggia Square

The second step foresaw (figure 8):

- no busses and taxis in Piazza della Loggia (from 8.00 p.m – to 04:00 a.m.), leaving the square completely free and accessible only to pedestrians and bicycles.



Fig.8: Final result of the restrictions introduced in Loggia Square

In mid October 2012 a new Municipality Decree - concerning Corso Zanardelli (transit of 350.000 vehicles a year) - to be carried out at the beginning of November was approved .

The restrictive measures, took into account both the needs of the residents and the traders and regard:

- delivery areas at the borders of Corso Zanardelli
- 2 freight distribution slots on the West side (via X Giornate)
- 3 freight distribution slots on the East side (via Mazzini/via San Martino della Battaglia crossroad).
- restriction of area to buses, taxis, police and disabled.
- time band to load/unload from 6.30 a.m. to 10.00 a.m. and compulsory exit within 10.15 a.m. (instead of previous 6:30 a.m. to 11:30 a.m., 1:30 p.m. to 6:30 p.m.).

In order to reduce parking demand in the historical centre free parking during the weekend (Friday to Sunday, from 7.00 p.m. to 2.00 a.m.) was provided in parking structures in Vittoria Square and Fossa Bagni (1 € from 6 p.m. to 8 a.m).

In order to improve the public awareness about these discounts of weekend parking rates, a communication campaign was carried out. At the same a free shuttle bus from Fossa Bagni parking to the city centre was introduced. .

New rules were also applied for goods delivery: the existing time bands were reduced to a single one 6.30 a.m – 10.00 a.m.

B5 Inter-relationships with other measures

The measure isn't significantly related to other measures.

C. Evaluation – methodology and results

From the evaluation point of view, the main impact of the measure consisted in the implementation of access restrictions - defined in the Logistical Urban Plan - that led to optimising weighting factor in the historical city centre,

This monitoring action is useful also in the view of the future freight distribution centre, which will manage the freight distribution in the historic centre.

At the beginning of the Civitas project, the measure was considered a focused one, because it foresaw the purchase of a selected, non pollutant fleet for freight distribution in the city centre.

Therefore, at the time, it was considered necessary to collect data on "Economy" (Average Operating Revenues and Costs) and also to built up a Cost Benefit Analysis (CBA). In addition, also environmental impacts of the purchased fleet would have been collected. It's important to highlight that, during the actual measure implementation, vehicles have not been purchased and the measure is not considered anymore as a focused one. Therefore, the CBA wasn't arranged and all the data related to the categories "Economy" and "Environment" weren't collected.

C1 Measurement methodology

C1.1 Impacts and Indicators

Table C1.1: Indicators.

No.	Impact	Indicator	Data used	Comments
1	Economy: Operating Revenues	Average Operating Revenues	Data from CBA	NO MORE COLLECTED
2	Economy: Operating Costs	Average Operating Costs	Data from CBA	NO MORE COLLECTED
3	Environment: Emissions	Emissions according to the typology of fleet selected and purchased	Environmental monitor stations data crossed with the commercial vehicles access in the city centre	NO MORE COLLECTED
4	Transport: transport system	Freight Movement	The indicator expresses the amount of commercial vehicles circulating in the historic city centre detected by LTZ cameras	Main Indicator First data collection after the OP: May 2011
5	Transport: transport system	Weighting factor (quest)	Data declared by the freight delivery operators in the feasibility study survey of the freight distribution centre	Main Indicator First data collection after the OP: April 2012
6	Society: Acceptance	Stakeholders	Data declared by the freight delivery	Main Indicator First data collection

		Acceptance (quest)	operators in the feasibility study survey of the freight distribution centre	after the OP: april 2012
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Detailed description of the indicator methodologies:

- **Indicator 1 (AVERAGE OPERATING REVENUES)** – Ratio of total income generated from fares divided by the weighting factor.- NO MORE COLLECTED
- **Indicator 2 (AVERAGE OPERATING COSTS)** – Ratio of total operating costs incurred by the fleet divided by the weighting factor.- NO MORE COLLECTED
- **Indicator 3 (EMISSIONS ACCORDING TO THE TYPOLOGY OF FLEET SELECTED)** – This indicator is defined as the average of several emission (CO₂, CO, NO_x and Small particulate) per vehicles/km by vehicle and fuel types of the fleet.- NO MORE COLLECTED
- **Indicator 4 (FREIGHT MOVEMENT)** – total number of commercial/industrial vehicles moving in the demo area (Brescia city centre). This indicator can be calculated considering the commercial vehicle passages recorded by LTZ cameras during a standard week. The vehicles detected by these cameras are delivery vans, trucks or articulated lorries.
- **Indicator 5 (WEIGHTING FACTOR)** – Data come from a survey made among the most important commercial operators that deliver freights in Brescia (15 companies). They have been asked to provide specific information used to calculate this indicator: the average weight of the deliveries in the historic centre and the type of vehicle used for the freight distribution in the city centre itself . The ratio between these values give the weighting factor.
- **Indicator 6 (STAKEHOLDERS ACCEPTANCE)** – Data come from a survey made among the most important commercial operators that deliver freights in Brescia (15 companies). This indicator is expressed by the ratio between the number of operators interested in a potential urban freight distribution centre and the total number of interviewed operators.

C1.2 Establishing a Baseline

From the evaluation point of view, the main objective of the measure consisted in introducing restrictive measures (since spring 2011), as defined in the Urban Logistics Plan, in order to optimise weighting factor of goods distribution and to reduce the vehicles access to the historic centre. The realization of the urban freight distribution centre to manage the freight distribution in the historic centre of the city wasn't foreseen within the end of Civitas project.

The selected indicators were able to evaluate the actions concerning the freight distribution reorganization in the city centre, (restrictive Municipality of Brescia Decree - time window for the freight delivery downtown and pedestrianization actions).

The operational phase consisted in the issue of the Decree in Spring 2011, therefore the baseline was set as year 2010, when the ex ante data collection was done, the indicators values are shown in the table below.

Indicators	BASELINE (2010)		
	Kind of vehicle	Average weekly accesses to Brescia city centre	%
4) Freight Movement	Passenger Cars	12290,2	84%
	Delivery Vans	983,8	7%
	Trucks	235	2%
	Autobus	899,8	6%
	articulated lorries	276,6	2%
	Total Vehicles	14685,4	100%
	5) Weighting factor	0,0016	
6) Stakeholders Acceptance	11/15 = 73,3%		

Tab.1: Baseline of the measure selected indicators

C1.3 Building the Business-as-Usual scenario

The BaU scenario of the measure was built basing on several qualitative assumptions. As a matter of fact, without the Civitas project contribution, probably the restrictive measures and the in-depth study carried out during the measure implementation wouldn't have been developed. Therefore the BaU scenario for the selected indicators was considered equal to the Baseline values.

Indicators	BaU (2012)		
	Kind of vehicle	Average weekly accesses to Brescia city centre	%
4) Freight Movement	Passenger cars	12290,2	84%
	Delivery vans	983,8	7%
	trucks	235	2%
	Autobus	899,8	6%
	articulated lorries	276,6	2%
	Total vehicles	14685,4	100%
	5) Weighting factor	0,0016	
6) Stakeholders Acceptance	11/15 = 73,3%		

Tab.2: BaU of the measure selected indicators

C2 Measure results

The results are presented under sub headings corresponding to the areas used for indicators – society and transport.

C2.4 Transport

Table C2.3.1: Results obtained for the Indicators corresponding to area “Transport”

Indicator	Before (April 2010)			After data collection			B-a-U			Difference: After – Before			Difference: After – B-a-U		
	Type of vehicle	Average weekly accesses to Brescia city centre	% of total vehicles	Type of vehicle	Average weekly accesses to Brescia city centre	% of total vehicles	Type of vehicle	Average weekly accesses to Brescia city centre	% of total vehicles	Type of vehicle	Average weekly accesses to Brescia city centre	% of total vehicles	Type of vehicle	Average weekly accesses to Brescia city centre	% of total vehicles
4) Freight Movement	Delivery vans	983,8	7%	Delivery vans	1225	7%	Delivery vans	983,8	7%	Delivery vans	+241		Delivery vans	+241	
	trucks	235	2%	trucks	239	1,3%	trucks	235	2%	trucks	+4		trucks	+4	
	articulated lorries	276,6	2%	articulated lorries	275	1,5%	articulated lorries	276,6	2%	articulated lorries	-1,6		articulated lorries	-1,6	
				May 2011			May 2011								
				April 2012			April 2012								
				May 2011			May 2011								
				April 2012			April 2012								
				May 2011			May 2011								
				April 2012			April 2012								
				May 2011			May 2011								
				April 2012			April 2012								

Indicator	Before (April 2010)	After data collection	B-a-U	Difference: After –Before	Difference: After – B-a-U
5) Weighting factor	0,0016	April 2012: 0,0018	April 2012: 0,0016	+0,0002	+0,0002

The commercial vehicles accesses were recorded by LTZ cameras during a standard week, in order to monitor the actual effectiveness of the restrictive measures implementation in the historic centre of Brescia.

Thanks to the data collection, a considerable reduction of vehicles was made evident (indicator n.4): delivery vans decreased by 18%, trucks by 14,5% and articulated lorries by 2,5%.

The weighting factor (indicator 5) increased by 12% from the ex ante to the after data collection. These results were related to the restricted time bands and to the pedestrianization, both implemented step by step, in the city centre by the Municipality. As a matter of fact, the transport companies had to reduce the journeys for the deliveries to respect the time restrictions to enter the centre and they had to increase the weighting factor, exploiting more the vehicles at their disposal, to satisfy the traders deliveries. The reduction and the reorganization of load/unload slot influenced the choice of vehicles used and the weighting factor.

In addition, by the data collected through the LTZ cameras, it was remarked that the pedestrianization and the restrictive measures also contributed to the reduction of the private cars accesses (- 9,2%).

C2.5 Society

Table C2.4.1: Results obtained for the Indicators corresponding to area “Society”

Indicator	Before (April 2010)	After data collection	B-a-U	Difference: After –Before	Difference: After – B-a-U
6) Stakeholders Acceptance	11/15 = 73,3%	April 2012: 73,3%	April 2012: 73,3%	0%	0%

Stakeholder acceptance of the distribution centre, was carried out through a survey arranged among the most important commercial operators in Brescia (15 companies).

The results proved that during the Civitas project operators had a constant interest in the distribution centre development.. Besides the implemented “restrictive measures in the historical centre” concerning didn’t negatively influence the general interest in the City logistic..

C3 Achievement of quantifiable targets and objectives

No.	Target	Rating
1	<p>Define the Logistical Urban Plan</p> <p><i>The objective can be considered achieved in full.</i></p> <p><i>As a matter of fact, the Logistical Urban Plan was arranged in July 2011 and the restrictive measures were the first step for the future actuation of the Logistical Urban Plan.</i></p>	**
2	<p>Introduction of restrictive measures in order to optimise weighting factor in the city centre</p> <p><i>The objective achievement was evaluated by three specific issues:</i></p> <p><i>1) Introduction of restrictive measures;</i> <i>The pedestrianization of some historic centre streets and squares and the restrictive measures for the freight distribution were implemented.</i></p> <p><i>2) Optimization of the weighting factor, increased by 60%</i> <i>To monitor the weighting factor indicator n. 5 (weighting factor) was considered:</i> <i>Ind. 5 (weighting factor)</i> <i>Year 2010 (Before) = 0,0016</i> <i>Year 2011 (After) = 0,0018</i> <i>The increase of the weighting factor was about 12%.</i></p> <p><i>2) Reduction of the commercial traffic flows by 20%</i> <i>To monitor the commercial vehicles accesses in the historic centre, indicator n. 4 (freight movement) was considered; From the data collection, reduction of delivery vans by 18%, trucks by 14,5% and articulated lorries by 2,5%.</i></p>	<p>**</p> <p>O</p> <p>*</p>
<p>NA = Not Assessed O = Not Achieved * = Substantially achieved (at least 50%) ** = Achieved in full *** = Exceeded</p>		

C4 Up-scaling of results

The freight distribution restrictions are already applied to the whole Limited Traffic Zone, the up scaling of the measure could only consist in the enlargement of the managed deliveries beyond the historic centre borders.

The proposed up scaling of the measure would potentially decrease the commercial vehicles traffic flows in Brescia increase the weighting factor and stimulate the use of the new freight distribution centre (start up by December 2012).

C5 Appraisal of evaluation approach

The evaluation approach was based on project's objectives as expressed explicitly in the original evaluation plan. The data collection methodology and the data quality can be considered sufficient for the needs of the technical evaluation of the measure.

The indicators selected at the beginning of Civitas project were divided in four different categories: Economy, Environment, Transport and Society. During the development of the measure several indicators were deleted in relation to the downgrade of the measure from "focused" to "soft" one.

Indicators from the following categories were no more collected:

- "Economy"
- "Environment".

As regards the "Transport" category the indicators n.4 "freight movement", n. 5 "weighting factor" were set in order to evaluate the impact of the restrictive measures on the freight distribution in the historical centre.

As regards the "Society" category indicator n. 6 "stakeholders acceptance" was introduced to measure the acceptance level of the operators in the development of an urban freight distribution centre.

C6 Summary of evaluation results

The key results are as follows:

- **Key result 1** – during Civitas project, the elaboration of the Logistical Urban Plan was carried out and it was considered a strong effort of Brescia Municipality, because it was the first action addressed to the rationalization and management of the freight movement in the city.. The investigated aspects were the load factor, the review of major traders, the localization of load/unload areas in the historic centre (LTZ) and the project proposal for the urban freight distribution centre, including also the definition and the possible localization of the centre itself.
- **Key result 2** – the introduction of restrictive measures was an important step for the Logistical Urban Plan implementation. As a matter of fact, the effectiveness of these activities was evaluated also through the weighting factor trend control, which increased more than 10% (from 0,0016, as ex ante data collection, to 0,0018, as ex post data collection) after the restrictive measures implementation.
- **Key result 3** – The pedestrianization project was another important result obtained also through the traffic flow control with the time bands restriction. This is also a first step in the historical city centre renewal. As a matter of fact the city centre is composed by Roman and Medieval squares and streets (Paolo VI Square, Loggia Square, Corso Zanardelli, Via X Giornate, Corso Mameli), which represent the core of the city.

C7 Future activities relating to the measure

The start up of the Urban Distribution Centre is foreseen by December 2012.

Measure title: **FREIGHT DISTRIBUTION IN BRESCIA**

City: **Brescia**

Project: **MODERN**

Measure number: **07.02**

Info updated after the final submission of the MERT in November 2012 and already reported in the Annex A of the measure (POINTER revision received on January 2013):

An experimental form of UDC (Urban Distribution Centre) was activated on November 12th 2012 and is currently operating. The experimental UDC offers the possibility to use 3 clean vehicles to access the city centre without restriction: this could influence the behaviour of all the freight operators, favouring the introduction of electric vehicles to take advantage of a wider time slots to deliver in LTZs.

D. Process Evaluation Findings

D.0 Focused measure

This measure was at first a focused one, but, considering the measure development, it was downgraded (see Annex A, October 2011).

D1 Deviations from the original plan

The Urban Distribution Centre wasn't started during Civitas and the new freight distribution fleet wasn't set up therefore the impact of the measure mainly regarded the restriction of the accesses to the historical centre - new time bands for freight and pedestrianization.

D2 Barriers and drivers

D2.1 Barriers

Preparation phase

- **Institutional barrier** – Long new bureaucratic procedures, introduced in year 2010, were met by ML during approval of the “restrictive” Decree by the City Council of Brescia, The delay was linked also to the necessity of political consensus by shopkeepers on the city centre reorganization.

Implementation phase

- **Cultural barrier** – Some difficulties were met as regards the operators' awareness and agreement about the restrictive measure implementation in the historic centre. As a matter of fact, the resistance in accepting the foreseen restrictive measure addressed also to the commercial vehicles for the freight distribution, was shown most of all by transport operators and dealers. On the contrary, the citizens mostly agreed with the pedestrianization of the city centre.

Operational phase

- **Problem related barrier** – a lack of shared sense of urgency among key stakeholders (freight operators and shopkeeper) was met during the implementation of the restrictive measures.

D2.2 Drivers

Preparation phase

- **Institutional driver** –The new metro line - start up by 2013 -, that allows the pedestrianisation of main squares and of several streets in the historical city centre.

Implementation phase

- **Cultural driver** - thanks to this measure implementation, the introduction of different ways to manage freight distribution in the city centre was possible; as a matter of fact a new cultural and life style was introduced in Brescia.

D2.3 Activities

Preparation phase

- **"State of art" studies** – the first important step consisted in the necessary in-depth studies concerning other cities (in Italy and Europe), that had rationalized and managed the urban freight distribution in the historic centre.
- **Preliminary stakeholders involvement** – key stakeholders were involved to discuss the freight distribution problems to be solved, to spread information about different viewpoints and to draw up informal agreements. In addition, it was necessary to explain the pressure of the freight distribution management problems and to share the sense of urgency among key stakeholders to reach a rational urban freight distribution in Brescia.

Implementation phase

- **Plan and analyze users needs** – An accurate technical and economic planning and analysis were carried out to determine requirements of user needs. It was important highlight that the involvement of Province of Brescia, FFSS Logistica and the Municipality of Brescia contributed to stimulate the interest to the urban freight distribution.

Operational phase

- **Implementation "step by step"** - pedestrianization restrictive measures addressed also to the freight distribution rationalization were implemented in the historic centre in several steps, to better monitor the effect of each one and also to create and increase awareness and acceptance among different stakeholders of the on going changing of the freight movement in the city centre.

D3 Participation

D.3.1 Measure partners

Only in relation to the City Logistic study, the partners of the measure were:

- **Brescia Mobilità SpA** - the Brescia Mobility Agency who manages all the current mobility services;
- **Brescia Mercati SpA** - a public company who hosts the logistic platform at Ortomercato;
- **Lombardia Region** - who supported the Brescia city logistics scheme;
- **CityPorto Padova** - the city logistic company who provided technical support to the service startup in terms of technology implementation and fare definition.

D.3.2 Stakeholders

- **Interporto** - it was the external society, which carried out the first survey among the commercial operators, potentially involved in the freight distribution management.
- **Transport operators** - they were involved due to the restrictive measures implementation and the reorganization of the delivery areas in the historic centre. Furthermore, they were involved in the feasibility in-depth studies about the freight distribution centre in Brescia.

- **Shopkeepers** - they were involved both in the pedestrianization and in the restrictive measure, as the deliveries addressed to them were influenced by these changes.
- **Citizen of Brescia and in particular of the historic centre** - They were involved most of all in the pedestrianization and in changing of the accesses to these areas.

D.4.1 Recommendations: measure replication

- **Follow progressive steps of implementation** - No specific methodology has been assessed to carry out the developed work, having applied consolidated methodologies to carry out the design and dimensioning work; most of the work performed on the UDC has been derived from the experience of the UDC operating in Padova. The results of the measure are represented by particular applications related to the specific interested area and situations, so that any transferability can only be methodological. In this sense it is recommended to tackle the urban freight distribution issue following progressive steps of implementation. The measure is successful not only if the time slots to access LTZs are modified, but also if the fleet composition is affected, by recurring, for example, to economic incentives for the fleet renewal or by offering an urban freight distribution service (such as UDC) able to give an alternative to deliver freights in the city centre.

D.4.2 Recommendations: process

- **Recommendation 1** - it's important to create a strong willingness of the Municipality in order to overcome the NIMBY attitude towards changing the existing state.
- **Recommendation 2** - the involvement of all stakeholders (shopkeepers, commercial operators and citizens) is considered fundamental to point out their needs as regards the access to the city centre, also in order to follow better lines of action in the freight distribution planning in the historic centre.
- **Recommendation 3** - an in-depth study about the realization of the freight distribution centre and its management (freight distribution entity, management costs, building costs, etc.) is considered fundamental. As a matter of fact, this information is important not only for the Municipality, but also for the transport operators, which usually have to pay this kind of service.
- **Recommendation 4** - the official commitment among Province of Brescia, FFSS Logistica and Municipality of Brescia was necessary to reach the goal to implement restrictive measures, sharing information and design of the restrictive measures to be implemented in the historic centre.

Annex 1: Historical data series for the BaU calculation

- Indicator 4 - (FREIGHT MOVEMENT)

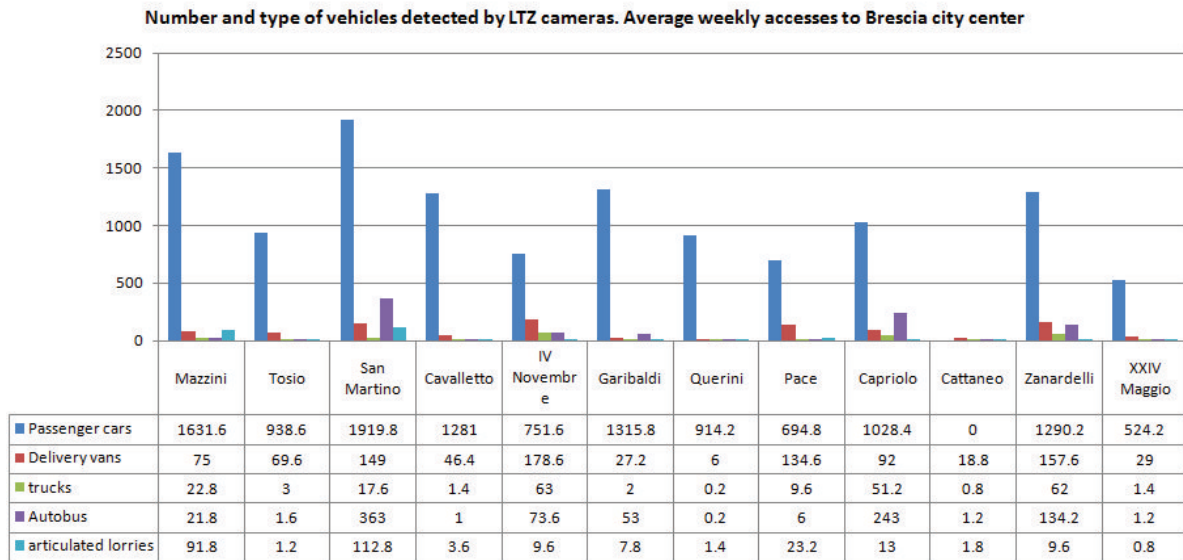


Fig.A1.1: Number of vehicles entering the Brescia city centre detected by LTZ cameras by type.

	Average weekly accesses to Brescia city centre	%
Passenger cars	12290,2	84%
Delivery vans	983,8	7%
trucks	235	2%
Autobus	899,8	6%
articulated lorries	276,6	2%
Total vehicles	14685,4	100%

Tab.A1.1: Number of vehicles entering the Brescia city centre detected by LTZ cameras by type.

- Indicator 5 (WEIGHTING FACTOR):** the table below shows the average weight per daily delivery in the city centre, as it has been declared by the operators.

**CALCOLO TONNELLATE MERCE GIORNALMENTE
IN ENTRATA NEL COMUNE DI BRESCIA**

Operatori intervistati	Nr consegne giornaliere	Peso medio/consegna Kg	Peso totale consegne Kg	Peso totale kg Consegne per circlogistics
Messaggerie del Garda	5	150	750	750
MIN	55	50	2750	2750
GLS - General Logistics Systems Italy S.p.A.	90	10	900	900
J.M Trasporti srl	4	120	480	
Tardini	1	10	10	10
SITTAM srl	1	100	100	100
Arco Spedizioni spa	30	150	4500	4500
FERCAM spa	8	100	800	
Antoni Trasporti spa	10	5	50	50
Autotrasporti Giudici	1	5	5	5
Simoni Trasporti	6	100	600	600
Sifte Berti spa	5	30	150	150
Omnia 2007	1	10	10	10
Speed Monti srl	20	10	200	200
Bartolini Corriere Espresso	200	5	1000	
TOTALE	437		12.305	10.925

Fig.A1.2: Results of the first survey carried out among transport operators.

The average weight per delivery (basing on the single weight declared by the operators) is 57 kg/delivery.

Considering that the most common vehicle used for the deliveries in the city centre can transport up to 35'000 kg (source: "Urban Logistic Plan" page 60), the weighting factor can be estimated dividing the average weight per delivery by the maximum weight that a commercial vehicle is able to carry.

Therefore, $ind. 5 = 57 \text{ kg} / 35'000 \text{ kg} = 0,0016$

- **Indicator 6 (STAKEHOLDERS ACCEPTANCE)** – Interviewed people have been asked to answer to a specific question: "Are you interested in a future citylogistic initiative?"
The following table shows the results of the survey and the answers to the question:

CALCOLO NUMERO DI CONSEGNE

Operatori intervistati	Eventuale adesione a iniziativa Citylogistics	Frequenza consegne in ZTL	N. consegne	Da intervistati	Da operatori potenziali aderenti Cityporto
Messaggerie del Garda	Sì	Giornaliera	5	5	5
MTN	Sì	Giornaliera	55	55	55
GLS - General Logistics Systems Italy S.p.A.	Sì	Giornaliera	90	90	90
3 M Trasporti srl	Indecisa	Giornaliera	3/4	4	
Tardini	Sì	Settimanale	5	1	1
SITTAM srl	no	Settimanale	2	1	
Arco Spedizioni spa	Sì	Giornaliera	30	30	30
PERCAM spa	no	Giornaliera	8	8	
Artoni Trasporti spa	Sì	Giornaliera	10	10	10
Autotrasporti Giudici	Sì	Bisettimanale	1	1	1
Simoni Trasporti	Sì	Giornaliera	6	6	6
Sifta Berti spa	Sì	Giornaliera	5	5	5
Onnia 2007	Sì	Mensile	2	1	1
Speed Monti srl	Sì	Giornaliera	20	20	20
Bartolini Corriere Espresso	no	Giornaliera	180/200	200	
TOTALE				437	225

Fig.A1.3: Results of the first survey carried out among transport operators.

The table above shows that 11 operators on 15 would be interested in a citylogistic initiative in Brescia, therefore:

Indicator n.6 = $11/15 = 73,3\%$

Annex 2: Ex ante and Ex Post data collection

- **Indicators 1 and 2** (Average Operating Revenues and Costs) :This measure should be a focus measure (object of a CBA), because of the restrictive measures adopted only in timing for freight distribution in the city centre without any restriction on the fleet used, neither the urban freight distribution centre will be realized in Civitas, the measure downgraded as soft won't foresee collection of the economic indicators.

NO MORE COLLECTED

- **Indicator 3** (Emissions according to the typology of fleet selected) - This measure should be a focus measure (object of a CBA), because of the restrictive measures adopted only in timing for freight distribution in the city centre without any restriction on the fleet used to access the historic centre.

NO MORE COLLECTED

- **Indicator 4** (Freight Movement) This indicator can be calculated considering the commercial vehicle passages recorded by LTZ cameras during a standard week. The vehicles detected by these cameras are delivery vans, trucks or articulated lorries.

EX ANTE DATA COLLECTION:

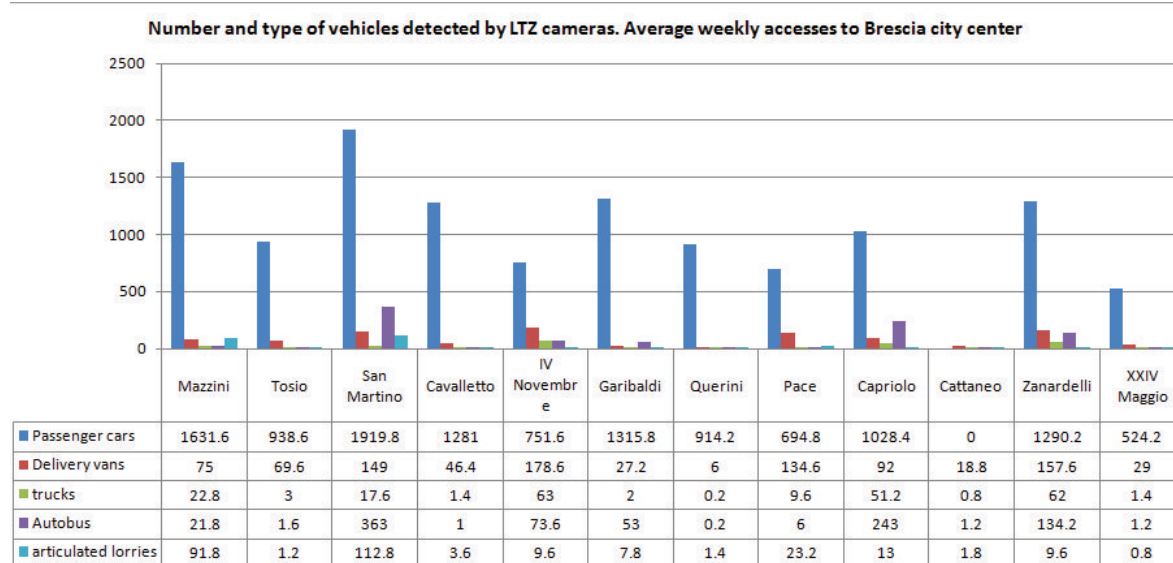


Fig.A2.1. Number of vehicles entering the Brescia city centre detected by LTZ cameras by type.

	Average weekly accesses to Brescia city centre	%
Passenger cars	12290,2	84%
Delivery vans	983,8	7%
trucks	235	2%
Autobus	899,8	6%
articulated lorries	276,6	2%
Total vehicles	14685,4	100%

Tab.A2.1. Number of vehicles entering the Brescia city centre detected by LTZ cameras by type.

EX POST DATA COLLECTION (May 2011):

Type of vehicle	Average weekly accesses to Brescia city centre	%
Passenger cars	15128	85%
Delivery vans	1225	7%
trucks	239	1,3%
Autobus	906	5,2%
articulated lorries	275	1,5%
Total vehicles	17773	100%

Tab.A2.2. Number of vehicles entering the Brescia city centre detected by LTZ cameras by type.

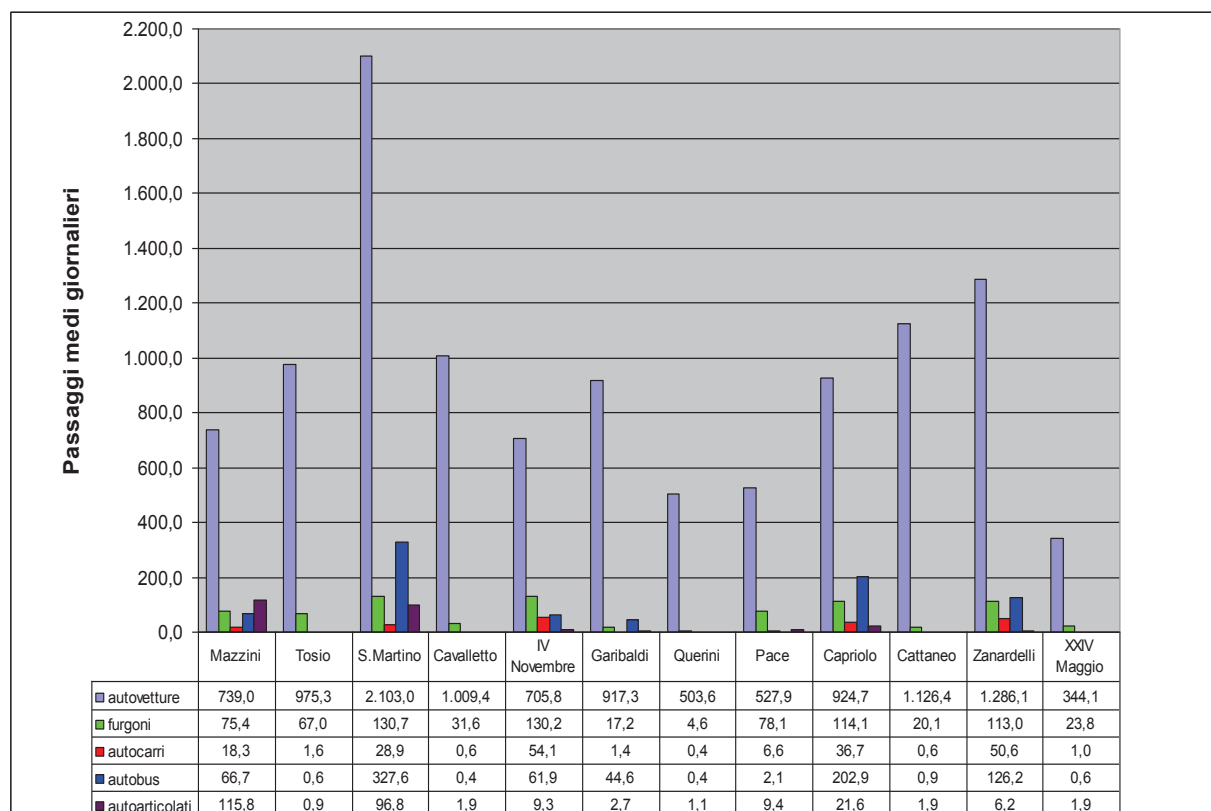
EX POST DATA COLLECTION (April 2012):

Fig.A2.2. Number of vehicles entering the Brescia city centre detected by LTZ cameras by type.

	Average weekly accesses to Brescia city centre	%
Passenger cars	11162,6	84,10%
Delivery vans	805,8	6,00%
trucks	200,8	0,15%

Autobus	834,9	6,01%
articulated lorries	269,5	2,05%
Total vehicles	13273,6	100,00%

Tab.A2.3. Number of vehicles entering the Brescia city centre detected by LTZ cameras by type.

- **Indicator 5** (Weighting factor): This indicator has been calculated using data coming from the feasibility study “Urban Logistic Plan”. Data come from a survey made among the most important commercial operators that deliver freights in Brescia (15). They have been asked to provide some specific information, as for example the average number of daily deliveries, and the average weight of the freights delivered in the city centre.

EX ANTE SITUATION (2010)

The table below shows the average weight per daily delivery in the city centre, as it has been declared by the operators .

Operatori intervistati	Nr consegne giornaliere	Peso medio /consegna Kg	Peso totale consegne Kg	Peso totale kg Consegne per citylogistics
Messaggerie del Garda	5	150	750	750
MIN	55	50	2750	2750
GLS - General Logistics Systems Italy S.p.A.	90	10	900	900
J.M Trasporti srl	4	120	480	
Tardini	1	10	10	10
SITTAM srl	1	100	100	100
Arco Spedizioni spa	30	150	4500	4500
FERCAM spa	8	100	800	
Antoni Trasporti spa	10	5	50	50
Autotrasporti Giudici	1	5	5	5
Simoni Trasporti	6	100	600	600
Sifte Berti spa	5	30	150	150
Omnia 2007	1	10	10	10
Speed Monti srl	20	10	200	200
Bartolini Corriere Espresso	200	5	1000	
TOTALE	437		12.505	10.025

Tab.A2.4: Results of the first survey carried out among transport operators.

The average weight per delivery (basing on the single weight declared by the operators) is 57 kg/delivery.

Considering that the most common vehicle used for the deliveries in the city centre can transport up to 35'000 kg (source: “Urban Logistic Plan” page 60), the weighting factor can be estimated dividing the average weight per delivery by the maximum weight that a commercial vehicle is able to carry.

Therefore, ind. 5 = 57 kg / 35'000 kg = 0,0016

EX POST DATA COLLECTION (April 2012):

**CALCOLO TONNELLATE MERCE GIORNALMENTE
IN ENTRATA NEL COMUNE DI BRESCIA**

Operatori intervistati	Nr consegne giornaliere	Peso medio/consegna Kg	(%) carico del mezzo	Portata mezzo consegne	Peso totale consegne Kg	Peso totale kg Consegne per citylogistics
Messaggerie del Garda	5	160	80%	35 q.li	800	800
MTN	60	60	85%	35 q.li	3600	3600
GLS - General Logistics Systems Italy S.p.A.	90	15	90%	35 q.li	1350	1350
3 M Trasporti srl	5	130	80%	35 q.li	650	
Tardini	1	12	75%	35 q.li	12	12
SITTAM srl	1	110	70%	35 q.li	110	110
Arco Spedizioni spa	30	155	75%	Max 15 q.li	4650	4650
FERCAM spa	8	120	75%	35 q.li	960	
Artoni Trasporti spa	10	8	90%	35 q.li	80	80
Autotrasporti Giudici	1	7	80%	12 tonn.	7	7
Simoni Trasporti	6	120	85%	35 q.li	720	720
Sifte Berti spa	5	35	75%	35 q.li	175	175
Omnia 2007	2	20	70%	35 q.li	20	20
Speed Monti srl	25	15	75%	35 q.li	375	375
Bartolini Corriere Espresso	200	5	90%	35 q.li	1000	

Tab.A2.5: Results of the second survey carried out among transport operators.

The average weight per delivery (basing on the single weight declared by the operators) is 64,8 kg/delivery.

Considering that the most common vehicle used for the deliveries in the city centre can transport up to 35'000 kg, the weighting factor can be estimated dividing the average weight per delivery by the maximum weight that a commercial vehicle is able to carry.

Therefore, ind. 5 = $64,8 \text{ kg} / 35'000 \text{ kg} = 0,0018$

- **Indicator 6** (Stakeholders Acceptance) – In order to obtain this indicator, data coming from the same survey described for the indicator n.5 have been used. Interviewed people have been asked to answer to a specific question: “Are you interested in a future citylogistic initiative?”

The following table shows the results of the survey and the answers to the question:

EX ANTE DATA COLLECTION:

CALCOLO NUMERO DI CONSEGNE

Operatori intervistati	Eventuale adesione a iniziativa Citylogistics	Frequenza consegne in ZTL	N. consegne	Da intervistati	Da operatori potenziali aderenti Cityporto
Messaggerie del Garda	Si	Giornaliera	5	5	5
MTN	Si	Giornaliera	55	55	55
GLS - General Logistics Systems Italy S.p.A.	Si	Giornaliera	90	90	90
3 M Trasporti srl	Indecisa	Giornaliera	3/4	4	
Tardini	Si	Settimanale	5	1	1
SITTAM srl	no	Settimanale	2	1	
Arco Spedizioni spa	Si	Giornaliera	30	30	30
PERCAM spa	no	Giornaliera	8	8	
Artomi Trasporti spa	Si	Giornaliera	10	10	10
Autotrasporti Giudici	Si	Bisettimanale	1	1	1
Simoni Trasporti	Si	Giornaliera	6	6	6
Silte Derti spa	Si	Giornaliera	5	5	5
Omnia 2007	Si	Mensile	2	1	1
Speed Monti srl	Si	Giornaliera	20	20	20
Bartolini Corriere Espresso	no	Giornaliera	100/200	200	
TOTALE				437	225

Tab.A2.7: Results of the first survey carried out among transport operators.

The table above shows that 11 operators on 15 would be interested in a city logistic initiative in Brescia, therefore:

$$\text{Indicator n.6} = 11/15 = 73,3\%$$

EX POST DATA COLLECTION (April 2012)

The table below shows that 11 operators on 15 would be interested in a citylogistic initiative in Brescia, therefore:

$$\text{Indicator n.6} = 11/15 = 73,3\%$$

CALCOLO NUMERO DI CONSEGNE

Operatori intervistati	Eventuale adesione a iniziativa Citylogistics	Frequenza consegne in ZTL	N. consegne	Da intervistati	Da operatori potenziali aderenti Cityporto
Messaggerie del Garda	Si	Giornaliera	5	5	5
MTN	Si	Giornaliera	60	60	60
GLS - General Logistics Systems Italy S.p.A.	Si	Giornaliera	90	90	90
3 M Trasporti srl	Indecisa	Giornaliera	5	5	
Tardini	Si	Settimanale	6	1	1
SITTAM srl	no	Settimanale	2	1	
Arco Spedizioni spa	Si	Giornaliera	30	30	30
FERCAM spa	no	Giornaliera	8	8	
Artoni Trasporti spa	Si	Giornaliera	10	10	10
Autotrasporti Giudici	Si	Bisettimanale	1	1	1
Simoni Trasporti	Si	Giornaliera	6	6	6
Sifte Berti spa	Si	Giornaliera	5	5	5
Omnia 2007	Si	Mensile	2	2	2
Speed Monti srl	Si	Giornaliera	25	25	25
Bartolini Corriere Espresso	no	Giornaliera	180/200	200	
TOTALE				449	235

Tab.A2.8: Results of the second survey carried out among transport operators.