The Bristol-Bath Urban freight Consolidation Centre from the perspective of its users

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Abstract

Urban freight consolidation centres are part of the city logistics measures that aim to reduce the negative impacts related to urban freight transport activities, whilst at the same time providing a more seamless, higher-value logistics experience for their users. By collecting the goods destined to the target area and consolidating deliveries into one large delivery made by high-load vehicles, urban consolidation centres can relieve congestion and improve air quality. Significant benefits also accrue to the participating retailers, e.g. improved staff productivity and safety, the provision of pre-retailing services and recycling of packaging.

The paper draws on the experiences of the Bristol-Bath Urban Consolidation Centre (BBUCC), established in 2002 to serve Bristol city centre and uniquely extended in 2011 to cover Bath, each served by electric lorries; it appraises the benefits of shared 'last mile' freight services focusing in particular on the perspective of its users: the participating retailers.

Keywords

Case study; City logistics; Stakeholders perception

1. Introduction

The un-sustainability due to transport imposes on society significant costs in terms of economic impacts (e.g. traffic congestion, mobility barriers, accidents, services costs, etc.), social impacts on human health and environmental impacts (e.g. greenhouse gas emissions, pollution emissions, noise, etc.) (Korzhenevych et al., 2014). Road transport is very important in this context, because it is responsible for the majority of external costs (Korzhenevych et al., 2014). According to Taefi et al. (2016), electric vehicles could be a good solution to reduce air pollution and greenhouse gas emissions related to urban road freight transport. However, the use of EVs is far to be widespread, because they are often considered as too expensive to acquire outside of the pilot projects. In

order to enable transport users to make travel decision and freight transport by considering the so-called 'external costs', policy intervention is needed (Korzhenevych et al., 2014).

To achieve urban sustainable development is necessary to balance economic efficiency, environmental efficiency and social efficiency (Witkowski and Kiba-Janiak, 2014). The urban environment includes different stakeholders with different needs and expectations. Local authorities want to improve the quality of life of cities by reducing the negative externalities related to urban freight transport, which represents a benefit also for citizens. Suppliers want to reduce costs and times related to last mile deliveries. Receivers want to receive a range of added value services (such as just in time, set delivery time, etc.) associated with the delivery of goods. The interaction between these different stakeholders increases the complexity of the search for solutions to achieve sustainable urban distribution (Transmodal, M. D. S., 2012). City logistics allows conciliating the different interests of the stakeholders involved in this complex system (Dablanc, 2007; Holguín-Veras and Wang, 2011; Stathopoulos et al., 2011). Taniguchi et al. (2001) defined city logistics as "the process of totally optimizing urban logistics 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". Freight transport in the urban area is essential for the economic vitality of the city. However, transport planning models rarely consider freight urban transport (Lindholm and Blinge, 2014), despite the number of studies that aim to find solutions to reduce negative externalities on urban areas are increasing (Russo and Comi, 2010). Authorities need to increase their knowledge on: - the influence of freight transport on the economic growth of a city; - the impacts of regulations and policies on the profitability of transport companies (Lindholm and Blinge, 2014). The overall objective of EU policy in this area has been defined as being the promotion of sustainable urban distribution (Transmodal, M. D. S., 2012). This concept aims to maximize the economic efficiency of goods distribution in urban areas while minimizing the environmental and social impacts related to the door-to-door transport chain (Paddeu et al., 2014 – page 1). The use of petrol and diesel engine causes the release of air pollutants such as Particulate Matter (PM), Carbon Monoxide (CO), Carbon Dioxide (CO2) and Nitrogen Oxides (NOx). The main problems are caused by PM and NOx (Schreyer et al., 2004).

This paper considers a case study analysis: the case of the urban freight consolidation centre that serves the neighbouring cities of Bristol and Bath (UK). The survey investigates what services and with what frequency the participating retailers receive from the consolidation centre. The

advantages and disadvantages for the participating retailers and their satisfaction with the services provided by the consolidation centre are also investigated.

The paper is organized into 8 sections. Section 1 is the introduction. Section 2 provides a review of existing and planned urban freight practices and measures developed across the EU Member States; this section aims to verify whether (to what extent and in which form) sustainable action at European level can be established to improve the performance of freight transport. Section 3 is focused on the definition and the classification of Urban Consolidation Centres (UCCs). Section 4 provides an analysis of a case study: the Bristol and Bath Urban Consolidation Centre. An analysis of impacts from the perspective of its users is carried out in order to investigate what are the benefits provided by the UCC to them. Also, it can help to persuade potential users to the convenience and efficiency of UCCs so as to provide revenues with the aim to make a financially self-supporting scheme. Data collection and analysis is described in section 5, whereas results are discussed in section 6. Key issues in data collection are highlighted in section 7. Conclusions are provided in section 8. Further research development is suggested at the end of the paper.

2. An overview on studies about Urban Consolidation Centres (UCCs)

Urban goods distribution is crucial to the economy of a city, due to the high presence of shops, restaurants and other businesses in the urban area. However, freight distribution is responsible for increasing gas emissions rates, congestion, noise and traffic safety issues (Nordtømme et al., 2015 – Pag 179). For this reason, logistics initiatives started in all of Europe in order to solve the issues related to freight transport in urban areas. However, policy measures implementation is no easy task (Kelly et al., 2008; Nordtømme et al., 2015). Browne et al. (2005) carried out an analysis of the 67 Urban Freight Consolidation Centre (UCC) schemes developed in Europe and U.S., which actually are those the literature provides information about (Table 1). The analysed schemes date from the 1970s onwards (Browne et al., 2005 – Page 15).

The countries that have been mostly involved in researching and piloting UCC schemes are France, Germany, Netherlands and the UK. The majority of the German UCC schemes were operational, whereas in the UK there were above all research and feasibility studies. In the three mainland European countries, the main purpose of the schemes was to improve the environment (goods were delivered by means of alternatively powered vehicles to reduce air pollution); they were often civic-led with “boards” of participating players. However, due to dissatisfaction with the service levels of those schemes, they are no longer operating (Browne et al., 2005).

Table 1
Analysis of Schemes by Country, Category and date of investigation/start up - Browne et al. (2005).

Country	Total	Research/ Feasibility[1]	Pilot or Trial	Operational[2]	1970-1975	1976 - 1990	1991 - 1995	1996 - 2000	2001 +
Austria	1	1	-	-				1	
Belgium	1	1	-	-				1	
Canada	1	1	-	-		1			
France	8	5	2	1	1		5		2
Germany[3]	14	1	2	11			8	6	
Italy	5	-	2	3				1	4
Japan	3	-	2	1		1			1
Monaco	1	-	-	1		1			
Netherlands[4]	7	3	-	4		2	3	1	1
Portugal	1	-	1	-				1	
Spain	1	-	-	1					1
Sweden	4	1	1	2				2	2
Switzerland	2	-	2	-			2		
UK	17	12	1	4	4	4	1	4	4
U.S.A.	1	1	-	-	1				
Total	67	26	13	28	6	9	19	17	15

The majority of the early research and feasibility studies started in the UK in the 1970s were undertaken by local authorities. Since the mid-1990s, the schemes developed were mostly trails and operational schemes, which were led by commercial enterprises that recognised the benefit of controlling the logistics movements that affected their operations (Browne et al, 2005). The literature review highlights increasing interests in the UCC concept in the European countries during the 1990s and 2000s (Allen et al. 2012). Nevertheless, several UCCs did not progress beyond an initial research/feasibility project as shown in Table 1 (Browne et al., 2005). The majority of the UCC schemes have been dependent on public funding from the central, regional or local government such as for example, Amsterdam and Monaco. Some UCC schemes have received funding from EU projects (such as La Rochelle, Nuremberg and Broadmead in Bristol), while others have been funded through financial support provided by commercial partners and contributions from receivers using the scheme (i.e. the Heathrow retail consolidation centre). However, funds do not cover all the costs due to the UCC; this is the reason why the retailers involved are expected to pay some fees for the service they receive, in order to cover at least part of the total operating costs.

[1] "Research/ Feasibility" refers to UFCCs that did not progress beyond an initial research/feasibility project. Far more schemes have either been planned or trialed in Germany than shown in the table. The table contains schemes about which it has been possible to obtain literature.
[2] The "operational" schemes include any that extended beyond the trial stage.
[3] In addition, German multi-modal freight centres that operate at a regional scale (referred to as Güterverkehrszentrum - GVZ) have been omitted from the table, as although some urban distribution does take place from some of these centres it is not their primary operational purpose.
[4] In the Netherlands Leiden had both a study and an operation and Maastricht had a study and a trial, in both cases in different years. For this Table only one event is recorded – Leiden / operation, Maastricht / study.

To date, a lack of evidence-based information has been found concerning UCC to support policy-makers. To date, a lack of evidence-based information has been found concerning UCC to support policy-makers. In fact, there are no many published evaluations to quantify the positive/negative results of the schemes. The literature (Browne et al. 2005) suggests who mainly may take advantage of UCC are:

- Transport operator making small, multi-drop deliveries;
- Shared-distribution operation users;
- Business located in an environment with particular constraints with delivery operations;
- Independent and smaller retail companies.

Investigating about the total supply chain costs and benefits associated with the use of a UCC, including traffic and environmental benefits is needed. In fact, finding the best solution is less important than verifying which measure is the most feasible in each specific case. Visser et al. (1999) carried out a study on policies related to urban freight transport in the Netherlands, France, Germany and Japan. They concluded that further regulation of urban freight transport and a technological innovation can greatly influence policy-making in the future (Visser et al., 1999).

3. Urban freight Consolidation Centre (UCC)

3.1. Definition

In the last years, due to the ongoing globalisation of production, the demand for new logistics and distribution facilities (e.g. warehouses, distribution centres, transfer depots) is highly increased in many European regions (Cushmann and Wakefield, 2006; Jones Lang Lasalle, 2006; Wagner, 2010). However, companies tend to streamline their supply chain by reducing warehousing space and consolidating the load (Wagner, 2010; McKinnon and Woodburn, 1994). These reasons and also the need of reducing emissions from last-mile freight transport (Nordtømme et al., 2015) make UCCs emerge during the last decades. Nordtømme et al. (2015) described a UCC as "*a location near a city centre where goods from outside the city centre are received, consolidated and subsequently delivered by smaller vehicles or by foot on designated routes in the city centre*" with the purpose to "*optimize deliveries and minimize transport*". UCCs allow reducing congestion, parking and manoeuvring large trucks in narrow streets (Nordtømme et al., 2015). However, due to the complexity of the urban environment, a successful UCC implementation strongly depends on the involvement of all the stakeholders in the decision-making process (Macharis et al., 2010).

Also, the success or failure of a UCC is based on the ability of logistics companies to market and operate a freight transport service that meets the needs of its customers at a competitive price.
In a study carried out by Lin et al. (2016), it was pointed out that the potential monetary and environmental benefits of UCC could come from either maximizing the utilization of the vehicle capacity by consolidation or providing cheaper storage space at the UCC for its customers.

3.2. Classification

Different categories of UCCs exist:

a) UCCs serving all or part of an urban area, usually associated with supply or retail products, office products, food supplies for restaurant and cafes. This scheme is used to serve historic urban areas with narrow streets. This type of UCC is usually suggested by local authorities that hope to benefit from the related traffic and environmental improvement. Examples of (a) are: La Rochelle (France) and Bristol (UK).
b) UCCs serving large sites with a single landlord, which include airports, shopping centres and hospitals. Examples of (b) are London Heathrow airport retail, Meadowhall shopping centre in Sheffield and Hospital Logistics centre in London.
c) Construction project UCCs, which are used to serve areas dedicated to major building projects, to consolidate construction materials; the (c) types can exist only for the lifetime of the building project. An example of (c) is London Heathrow airport during major development work.

3.3. Business model

Despite the benefits related to the reduction of HGVs and the improvement of livelihood of the city centre, it is far from obvious that UCCs are efficient and viable (Faure et al., 2016). Initial funding of the central or local government is necessary for feasibility studies and trials during the first period time. UCCs must be financially viable during the medium to long-term because public subsidies are not necessarily a desirable solution. Funds from other transport-related sources (e.g. congestion tax and road pricing) can be used to cover UCC costs, due to the traffic and environmental benefits coming from them. Less financial issues are related to (b) and (c) UCC types; in fact, the owner/manager of a shopping centre or an airport can define contractual conditions including the mandatory use of UCC. The (a) type, instead, especially in the first period of its lifetime, needs public funding from the local authority to keep down the prices charged by the UCC. Local authorities finance these trials for the positive effects that UCCs have in reducing

environmental and social impacts of freight transport activities. However, it has been subject to a substantial number of abandoned UCC trials. So, potential users may be persuaded about the convenience and efficiency of the centre so as to provide revenue and reduce public subsidy or remove the need of it when the UCC becomes financially self-supporting. According to Kin et al. (2016), the size of the potential demand for a UCC is influenced by the size of the area (potential critical mass) and the complexity of the deliveries. In fact, the bigger and denser the city, the higher the probability of economies of scale in road haulage (Olsson and Woxenius, 2014). UCC could achieve both monetary and environmental benefits compared to non-consolidation strategy when there is an economy of scale or high customer density (Lin et al. 2016). However, according to Dell'Olio et al. (2016), usually, receivers are not willing to change the manner by which they receive their goods, especially if such change involves increased costs (either in terms of time or money). The carriers delivering goods to a UCC receive major benefits in terms of time savings (e.g. the area to be delivered is usually congested, narrow streets, no nearby loading areas, etc). Olsson and Woxenius (2014) carried out a study on UCC and Small Road Hauliers (SRHs). SRHs are responsible for the majority of the deliveries performed in a city centre. The most of them are linked to forwarders and haulier associations that rarely allow consolidation with goods transported by competitors. Olsson and Woxenius (2014) identified difficulties in: - changing shippers' priorities (time and punctuality are seen as more important than cost); - matching deliveries among participants. Also, shippers were not willing to wait for vehicles to fill up as the risk of delays increases and there were small time gains for SRHs. The most difficult thing is quantifying the potential savings from UCC on the total traffic because no precise information on the proportion of traffic related to the different sectors of the economy is available. To date, public subsidies are still needed because "there is no strong evidence that any self-financing scheme yet exists" (Browne et al., 2005). Furthermore, according to Janjevic et al. (2016), the non-monetary benefits and the power relations among supply chain actors strongly influence the acceptance of UCC schemes.

4. The Bristol and Bath Urban Consolidation Centre

Bristol is the largest centre of culture, employment and education in South-West England. It is affected by high levels of pollution due to urban congestion. In fact, during an interview addressed to the technical staff of Bristol City Council, they declared there are around 500,000 car movements every day in and out of the city centre. This implies average speeds lower than 25kph

and this makes Bristol one of the most congested cities in the UK.[5] Part of this congestion (as well as all the related negative externalities) is due to freight vehicle movements. The transport strategy wishes to support the economy of the city, which strongly depends on an effective delivery of goods in the city centre; however, it is necessary to minimise the negative impacts due to freight distribution in the served area. Bristol City Council (BCC) developed a Central Area Cordon surrounding the city centre in order to monitor the air quality. BCC declared that the total number of the vehicles entering the city of Bristol every day is 104,802; 13.3% of the whole inbound vehicles are Light and Heavy Goods Vehicles (11,682 LGVs and 2,206 HGVs).[6]

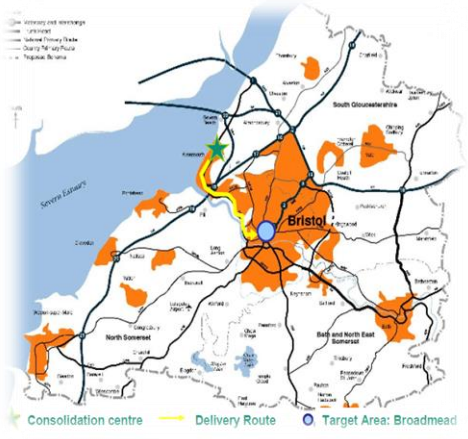

Fig. 1. The Bristol and Bath Urban Consolidation Centre – location

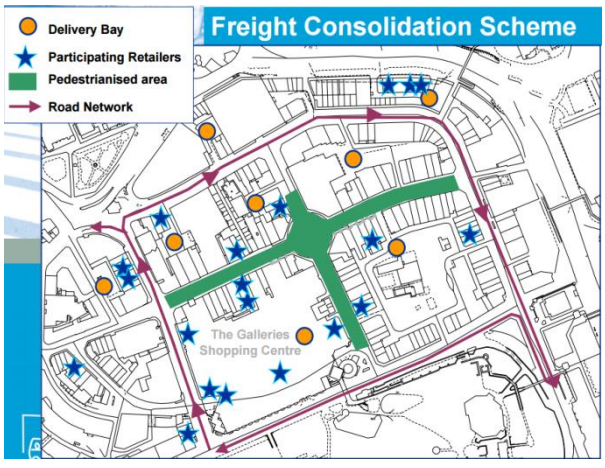

Fig. 2. Broadmead, the target area in Bristol

[5] Bristol City Council declared 23% of travelling time in Bristol is spent stationary in traffic queues (2013).
[6] Data were provided by Bristol City Council during an interview carried out the 25th of April, 2013.

Bristol was involved in three projects funded by the European Union that provided for the use of a Consolidation Centre. The first project was the CIVITAS VIVALDI (2002-2006). In 2007 the second project started - START (2007-2008). The third project was CIVITAS-RENAISSANCE, which indirectly involved Bristol because it concerned the neighbouring city of Bath (Figure 1). However, due to the excellent results of the first and the second project, the BCC decided to provide funds to finance the UCC to cover also the retailers already involved in Bristol. Moreover, traffic and access restrictions were applied in Bristol, in order to incentivize new retailers to join the scheme. Nevertheless, no all the costs were covered by the BCC, so the retailers have to pay a fee for the service; all of this aside, no one left the scheme after the EU projects ended, because the retailers realised they benefit using the UCC.

Due to its long lifetime, the Bristol-Bath Urban Consolidation Centre (BBUCC) represents one of the most successful schemes. It is the only one in the UK that serves two cities. It is managed by DHL and deliveries are made by means of electric vans. The BBUCC opened in Emersons Green in 2004 and moved to Avonmouth in 2007 (Figure 1). It is connected with the major corridors coming from the North and the Midlands by motorways. It is connected to Bristol city centre by the low congested A4 - just 20 minutes of travel. It is primarily a cross-dock centre and it is occasionally used for storage. It usually holds stocks for a few days if retailers are experiencing some short of storage space problems. The goods primarily arrive from the Midland (Birmingham) by means of articulated vehicles, 18-tonne trucks, 7.5-tonne trucks and vans. Deliveries to the city centre are made by 9-ton electric vans with a load factor of 5-tonnes. The 3.5-tonne diesel vans are occasionally used for break-down problems or busy periods (Christmas). Deliveries are usually made between 7 a.m. and 2 p.m. Goods can be received also by night because it is open the 24 hours. Except for perishable food, every type of products is delivered. In addition to deliveries, the BBUCC offers just-in-time deliveries, storage, pre-retailing, crisis stock management, drip feed of stock, recycling of packaging (cardboard and plastics). Additional services are charged at a reduced rate respect to normal commercial rates. The retailers participating the scheme are 81 in Bristol and 25 in Bath. They are part of big companies (multiple retailers): 49 retailers which translate into 106 outlets in total. The BBUCC periodically runs marketing campaigns to involve more retailers in the scheme. However, in the opinion of the manager of the BBUCC, the retailers that are not participating the project do not do it because they perceive it as an additional cost or an extra link in the supply chain. They are happy as they are and do not see the need to change.

Unfortunately, there is a limited availability of information on costs, benefits and subsidies received because they are commercially sensitive.

5. Methodology, collection and process data

This study aims to understand what are (if any) the benefits for the retailers involved in the scheme and if they perceive the BBUCC as beneficial for them. For this reason, a survey has been carried out by means of questionnaires administration and interviews addressed to the store managers of the outlets that joined the scheme in the city of Bristol during a period of 3 months.

The questionnaire included open-ended questions, closed questions and multiple choice answers. The first part of the questionnaire aims to describe the delivery service by analysing: delivery frequency, number and size of delivery, security of delivery, on-time delivery and so on. The second part aims to investigate the level of satisfaction with the services provided by BBUCC. Around twenty minutes were required to fill in the questionnaire.

The retailers that are using the BBUCC for their deliveries in Bristol at the moment are 81. The majority is located in the shopping area of Broadmead and Cabot Circus, the core of the city centre of Bristol (Figure 2). The whole area includes over 500 stores and more than 50 cafes and restaurants. The population is composed as shown in Figure 3.

However, only 21 retailers use the BBUCC for the whole deliveries (or most of the deliveries). The other stores involved in the project (the remaining 60 stores) rarely use de BBUCC. For this reason, the author decided to involve only the retailers who use the BBUCC more frequently, in order to not to bias the results of the survey. The sample is composed as indicated in Figure 4.

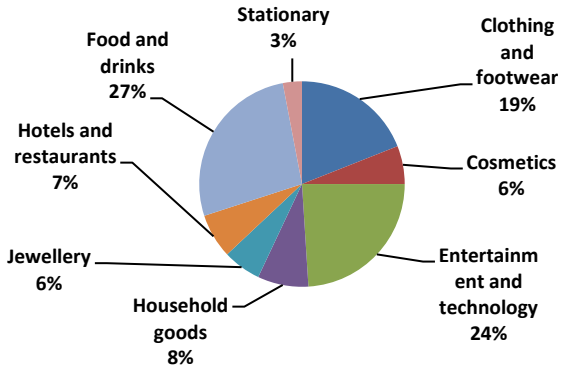

Fig. 3. Retailers involved in the scheme in Bristol (the whole population – 81 retailers)

Fig. 4. Sample composition

The author was interested in understanding how BBUCC users perceive the service, what kind of services they receive and what kind of benefits they achieve through the BBUCC. She also wanted to investigate the users' satisfaction with the service provided by BBUCC. In sum, the key research questions are:

- *What services, and with what frequency, do participating retailers receive from the Consolidation Centre?*
- *What are the advantages & disadvantages for the participating retailers?*
- *Are the retailers satisfied with the Consolidation Centre service?*

Retailers showed low confidence in the survey at first, so interviews were performed by accompanying the BBUCC drivers in a typical delivery day, in order to be introduced to the retailers by the drivers. Seventy-seven percent of the stores surveyed were located in the city centre (Broadmead, Cabot Circus and Queens Road), whereas the remaining 23% were located in commercial areas out of the city centre.

6. Results

6.1. Delivery service description

This sub-section provides a description of the delivery service received b the sample. It also provides the answer to the key research question number 1: "*What services, and with what frequency, do participating retailers receive from the Consolidation Centre*"?

Most of the retailers interviewed do not know for how long they have been using the BBUCC for their deliveries (Figure 5). Actually, almost no one knew that the deliveries are made through the BBUCC and most of them do not know what a Consolidation Centre is.

Only one retailer (5%) declared to receive storage as added service and 5 retailers (24%) recycling (plastics and cardboard coming from packaging). Eighteen retailers (86%) said they are not interested in receiving added services despite deliveries.

The most of the retailers declared orders and related deliveries are automatically arranged (automatic cash and inventory system), four retailers (19%) make orders by PC and three retailers (14%) by the telephone. No one uses fax. In most cases, the delivery is made one or two days after the order is made (9 retailers - 43%). Three retailers (14%) declared to receive goods ordered after one week and one retailer (5%) usually waits for 10 days before the order is made; only two retailers (10%) receive just in time deliveries (12-24 hours waiting). Six retailers (29%) did not know how long the delivery takes. The most of the sample uses to receive goods by boxes, some of them by pallets and a few by cages. Clothing stores also receive items by hangers.

Eighteen retailers (86%) receive deliveries from the BBUCC frequently (1-3 times a week), one retailer (5%) 4-6 times a week and two retailers (9%) 1-3 times a month.

The busiest delivery day is Friday (14 deliveries); the second one is Wednesday (12 deliveries) and it is followed by Monday (9 deliveries), Thursday (6 deliveries) and Tuesday (4 deliveries) – See Figure 6.

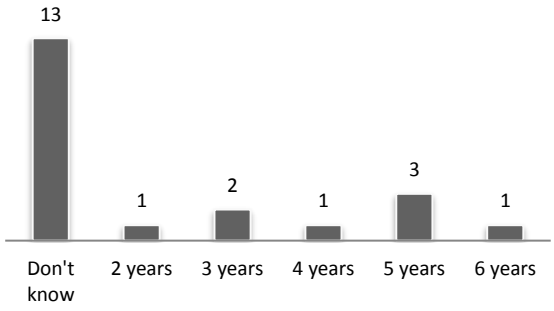

Fig. 5. How long the retailers are using the BBUCC

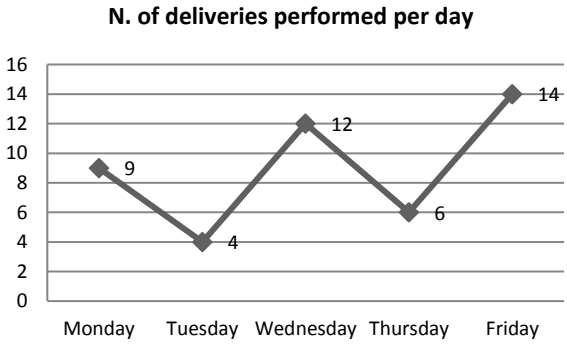

Fig. 6. Weekly delivery frequency flow

Nineteen retailers said that the store is opened when the delivery is made and 90% of them is not willing to move the deliveries after customer closing time if it would be possible. The number and size of deliveries change month by month (15 retailers).

The retailers were asked to indicate the three busiest delivery months. Some retailers indicated more the one month as the busiest one and other retailers were not able to indicate the third busiest month: they explained that they have some months that are busy at the same level (e.g. December and November for the phones store and December and July for the Clothing stores). The top three busiest months is: December (35%), November (27%) and January (12%).

Thirteen retailers receive deliveries other than from the BBUCC and these deliveries are frequently for 5 of them (7 or more times a week); one retailer receives deliveries made by other transport companies 4-6 times a week, three retailers declared to receive other deliveries 1-3 times a week and seven retailers less than once a month. Five of the interviewees said that these deliveries could not be made through the BBUCC; the remaining 8 retailers did not know if it could be possible.

About the damages and the shortages with the deliveries made by the Consolidation Centre, fifteen of the interviewed retailers answered they have experienced damages very few times, two retailers sometimes and four retailers never. Then they were asked to compare it with their previous delivery experiences: eight retailers said that it is about the same, six retailers said that it is better and the remaining six retailers were not able to answer to make comparisons. Also, the Consolidation Centre team delivers on time most of the times for 11 retailers.

6.2. Benefits

This sub-section provides the answer to the key research question number 2: "*What are the advantages & disadvantages for the participating retailers*"?

One of the purposes of a Consolidation Centre is to reduce pollution. For this reason, the BBUCC makes the deliveries by means of electric vehicles.

The retailers were asked to indicate on a scale from 1 to 5, how important this is for their business. The most of them answered that it is very important. Someone said: "*this is great to see happening and so, should continue provided it does not financially impact the end user*"; cosmetics stores said "*it supports our ethos*"; someone else affirmed: "*I don't know if it is considered important by business as a whole but it sends out the right message*"; it has also been said: "*it is*

not something that I was aware of and it would not really encourage or discourage to use the service".

The retailers interviewed were left free to answer what kind of benefits their business receive by the use of the BBUCC (Table 2). They declared to be very happy with the "delivery to stock room" (10). The most of the retailers were also happy for being able to set the delivery time (5); in fact, setting the delivery time allows them to better organise their work and manage their hours more productively. Five of them said they appreciate the security of the delivery: BBUCC staff is very reliable and they alert the retailers if something is wrong in the delivery (e.g. delay, etc). A detail about the advantages declared by the retailers in the use of the BBUCC is indicated in Figure 8. Table 2 provides an indication of the relationship between the type of retailer and the perception of benefits coming from the UCC. The analysis pointed out that stores related to clothing and footwear recognised "security of delivery" and "delivery to stock room" as the most important benefits to their businesses. One of them, together with one store related to entertainment and technology, also indicated to benefit from the "duration of delivery" that is very short. The stores that sell items of entertainment and technology indicated to receive a high number of benefits. In particular, in addition to the "duration of delivery", they indicated: "delivery to stock room", "Staff Time Saved Per Delivery", "Set Delivery Time", "Additional Services Provided" and "security of delivery". Except for "duration of delivery", stores that sell cosmetics indicated the same benefits revealed by the outlets of entertainment and technology. "Staff safety" was indicated only by one retailer related to clothing and footwear. The only two categories of stores that did not indicate to benefit from the "delivery to stock room" were Household Goods and Jewellery. On the contrary, they respectively indicated "costs" and "security of delivery" as major benefits, together with "set delivery time". Stores that sell food and drink indicated "delivery to stock room", "Staff Time Saved Per Delivery", "Set Delivery Time" and "Additional Services Provided" as benefits.

Table 2
Relationship between the type of retailer and the perception of benefits coming from the UCC

Type of retailer	Delivery to Stock Room	Staff Safety	Staff Time Saved Per Delivery	Set Delivery Time	Costs	Additional Services Provided	Duration of Delivery	Security of Delivery
Clothing/Footwear	3	1	0	0	0	0	1	4
Cosmetics	2	0	1	1	0	1	0	1
Entertainment and Technology	4	0	1	1	0	2	1	1
Food and Drink	1	0	1	1	0	1	0	0
Household Goods	0	0	0	1	1	0	0	0
Jewellery	0	0	0	1	0	0	0	1
Tot	10	1	3	5	1	4	2	7

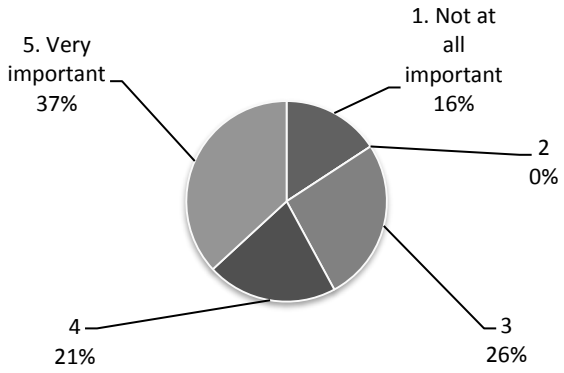

Fig. 7. Electric vehicle perception: importance for their business

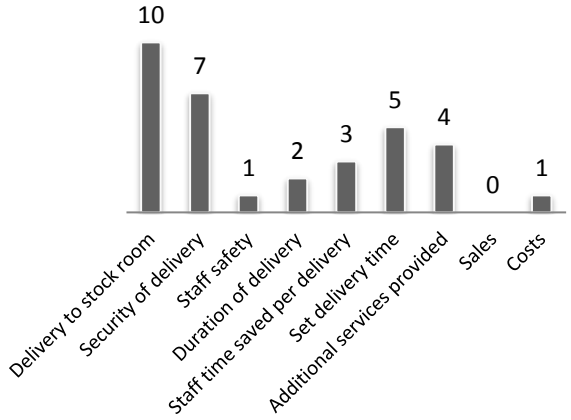

Fig. 8. Advantages/benefits/improvements to the retailers interviewed

6.3. Level of service perception

This sub-section provides the answer to the key research question number 3: "*Are the retailers satisfied with the Consolidation Centre service*"?

It also provides the results concerning the second part of the survey, which aimed to evaluate the level of service provided by the BBUCC by considering the perspective of the retailers being part of the sample.

The level of satisfaction with the time arrangements, the delivery frequency, as well as the overall satisfaction has been evaluated. The goal of this part of the survey was to identify the areas of intervention in order to support decision makers to highlight priorities needed to enhance the service. About the delivery time arrangements, 50% of the sample declared to be very satisfied with it. Just one retailer said to be not at all satisfied; however, it mostly depends on the arrangements that the head office of the companies makes with the BBUCC; in this case, the latter is not directly responsible for this dissatisfaction. About the satisfaction with the delivery frequency (Figure 9), the interviewed declared to be very satisfied (14 retailers).

The retailers were asked to rate, on a 1 (not at all satisfied) to 5 (very satisfied) scale, the satisfaction with the overall service provided by the BBUCC. Results are shown in Figure 10.

The interviews allowed collecting also qualitative comments. The interviewed declared to be highly satisfied with the delivery team because they said they are "*very friendly and always willing to take time with the delivery. They go the extra mile"; also, "the delivery team is very friendly, helpful and always professional*" and *"never any issues".*

Table 3
Relationship between type of retailer and satisfaction with BBUCC (average values – rates 1 to 5)

Type of retailer	Delivery Frequency	Delivery Time	Timeliness	Delivery Safety	Overall Satisfaction	AVG
Clothing/Footwear	4.40	3.60	4.60	4.20	4.80	4.32
Cosmetics	4.00	4.00	3.66	3.66	4.33	3.93
Entertainment and Technology	4.50	4.50	4.13	4.13	4.25	4.30
Food and Drink	5.00	4.50	4.50	4.00	5.00	4.60
Household Goods	5.00	5.00	4.50	4.50	4.50	4.70
Jewellery	4.00	4.00	4.00	4.00	5.00	4.20
AVG	4.48	4.24	4.24	4.09	4.52	4.31

The relationship between the type of retailer and the satisfaction with the different areas of the service provided by the BBUCC is presented in Table 3. The average highest score has been given by stores that sell Household Goods (4.7) and the average lowest score by stores that sell cosmetics (3.9). In general, delivery frequency and the satisfaction with the overall service have been evaluated with the highest score (4.5). On the contrary, the lowest score is given to delivery safety. This is supported by qualitative comments provided by the retailers during the survey. In fact, they complained that sometimes they receive wet boxes. However, this is due to the typical English weather so this is not a significant result. Nevertheless, due to the high scores were given, in general, retailers could be considered very satisfied with the service provided.

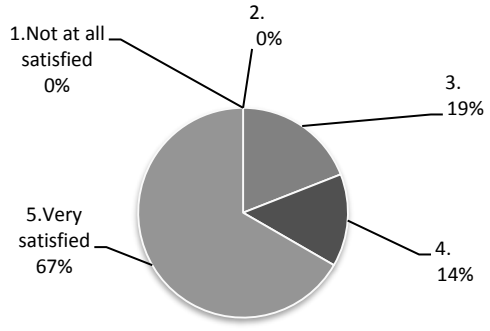

Fig. 9. Satisfaction with the delivery frequency

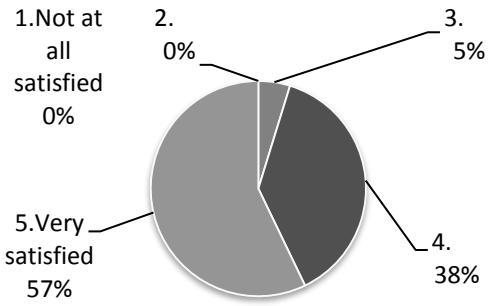

Fig. 10. Satisfaction with the overall service

7. Key issues in data collection

During the design of the survey, there have been some issues in the identification of the "proper person" to be interviewed. In fact, Bristol's pool of participants is made up of retailers who have their deliveries organised by large distribution companies or their own remote in-house transport company. For this reason, the author identified with difficulty the most appropriate person to be asked to answer all the questions. The majority of them declared to not manage neither the orders because everything is automatically managed. Approaching the interviewees was very difficult due to lack of confidence from the retailers. Sometimes they were unaware of DHL and the BBUCC. None of the store managers knew what a Consolidation Centre is and that their deliveries are made through the BBUCC. Only one of them knew that the deliveries are made by electric vehicles. High level of misinformation on deliveries was noticed. Store managers often were unable to know how/what orders and deliveries are made (head office decision). Moreover, willingness to participate in the survey depended on the type of product sold (e.g. jewels: delivery details are high-level security information) and on the company ethics.

8. Conclusion

In general, surveys allow identifying factors that influence the success of a UCC scheme. However, limited quantitative data can be found about UCC cases and usually no ex-post evaluation is carried out. For this reason, it is difficult to determine to which extent the objectives are reached. In any case, the literature shows the best practices for the success of a UCC; also, all the surveys suggest the full participation of the shops of the target group can produce a reduction in terms of goods vehicle-kilometres in the city centre. Scientific studies could provide more accurate advice, but evaluations of UCCs are often poorly documented.

City planning is mainly focused on passengers, rather than on freight transport and public authorities do not feel responsible for private firms; for those reasons scant data concerning urban goods management are available. Both retailers and suppliers benefit from the UCC: retailers can receive a high quality and highly reliable delivery; suppliers can save time and money.

This survey highlights retailers involved in the scheme are very happy with the services provided by the BBUCC, so much so that nobody left the scheme from the 2002 (only shops that closed). However, if subsidies stopped, probably the BBUCC may have financial issues to follow with providing the service. This is the reason why it is important to understand who benefits from it because they can contribute paying (more) for the service. The survey described in this paper tried to evaluate the BBUCC scheme by considering the perspective of its users, the participating retailers. C 95% (20 retailers) of the retailers evaluate the overall service 5 (12 retailers - 57%) and 4 (8 retailers - 38%), in a scale 1 to 5. It means they are very satisfied with the overall delivery service provided by BBUCC. Over half of the sample receives deliveries other than from the BFCC (i.e. emergency deliveries, express deliveries and e-commerce sales). Most frequently mentioned benefits are delivery to the stock room and security of delivery. Most are very satisfied with the time and the frequency of the deliveries. It is worth noting that all the interviewees highlighted the high importance of the relationship with the BBUCC staff. In fact, when they were asked to explain any reasons for their satisfaction or dissatisfaction, thinking about the aspects that they like or dislike the most, the majority of them expressed positive qualitative comments related to the delivery staff. Retailers were free to answer and they all said the same. It was a very good result and totally unexpected. The delivery staff is always considered friendly and professional and retailers said they follow using the service also because they like and rely on BBUCC staff. It would be necessary analysing under which conditions city logistics measures are successful and also identifying to what extent they are effective and in which environment they perform at best. Reducing subjectivity and arbitrariness and finding a replicable, systematic and transparent methodology to approach the problem is needed.

Further research

It can be useful to follow investigating what kind of benefits the suppliers receive from the Consolidation Centre; in fact, it can allow defining the factors that encourage transportation companies to participate in a UCC scheme. It can allow understanding how to create a self-financed Consolidation Centre scheme.

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QUESTIONNAIRE – Participating retailers in the Bristol Consolidation Centre

1. **Please select from the following options the products delivered to you by the Bristol Consolidation Centre (Tick all appropriate boxes)**

Products Delivered	Tick		Tick
Household Goods		Sports and Leisure	
Clothing/Footwear		Entertainment and Technology	
Food, Drink and Tobacco		Other	

2. **How long have you been using the BRISTOL Consolidation Centre for your deliveries?**_____

3. **What services do you currently receive from the Consolidation Centre? (Tick all that apply)**

☐ Deliveries ☐ Recycling
☐ Storage ☐ Other [Please specify:]
☐ Pre retailing (e.g. unpacking, labelling, tagging etc) _____

4. **Would you be interested in receiving other services from the Consolidation Centre? (Tick all that apply)**

☐ Deliveries
☐ Storage
☐ Pre retailing (e.g. unpacking, labelling, tagging etc)
☐ Other (please specify):
☐ No

5. **How do you order your deliveries? [Tick only one]**

☐ By PC
☐ By Telephone
☐ By Fax
☐ Other [Please specify:] _____

6. **On average, how long does it take to get the delivery from when the order is made?** _____

7. **Until what time can you make the order for the next-day deliveries?** _____

8. **How often do you receive deliveries from the Consolidation Centre? (Tick only one)**

☐ 7 or more times a week
☐ 4-6 times a week
☐ 1-3 times a week
☐ 1-3 times a month
☐ Less than once a month

9. **What is the size of a typical delivery from the Consolidation Centre?**
In terms of number of: - Boxes _____ - Cages _____ - Pallets_____

10. **Is the business open to customers when the deliveries are usually made? [Tick only one]**

☐ Yes ☐ No

11. **Please show how many deliveries you receive at different times on each day of the week:**

	Specific time										Or just	
	6-7	**7-8**	**8-9**	**9-10**	**11-12**	**12-13**	**13-14**	**15-16**	**17-18**	**AFTER 19**	**a.m. only before 12.00**	**p.m. only after 12.00**
Example	0	2	0	0	0	0	0	0	1	0	0	0
Monday												
Tuesday												
Wednesday												
Thursday												
Friday												
Saturday												

11.1. On a scale from 1 to 5, how satisfied are you with your current delivery time arrangements?

☐ 1Not at all satisfied ☐ 4
☐ 2 ☐ 5Very satisfied
☐ 3

Why?_____

11.2. Would you rather have the deliveries made at the end of the day, after customer closing time? (This is not something DHL is planning to do, only a question) for my research)

☐ Yes ☐ No ☐ Don't Know

12. **On a scale from 1 to 5, how satisfied are you with the current frequency of your deliveries?**

☐ 1Not at all satisfied ☐ 4
☐ 2 ☐ 5Very satisfied
☐ 3

Why? _____

13. **Do the number and size of deliveries change month by month? [Tick only one]**

☐ Yes ☐ No ☐ Don't Know

If YES, please rank your top three busiest months below: [1 being the busiest etc.]

January		**May**		**September**	
February		**June**		**October**	
March		**July**		**November**	
April		**August**		**December**	

14. Do you receive more/the same/less deliveries than before the Consolidation Centre made deliveries? (Tick only one)

☐ More ☐ About the same
☐ Less ☐ Don't know

15. Do you receive deliveries other than from the Consolidation Centre? (Tick only one)

☐ Yes ☐ No ☐ Don't Know

- **If YES**

15.1. Why? _____

15.2. How often do you receive deliveries other than from the Consolidation Centre? (Tick only one)

☐ **7 or more times a week** ☐ **1-3 times a month**
☐ **4-6 times a week** ☐ **Less than once a month**
☐ **1-3 times a week**

15.3. Where are they come from?_____

15.4. Could these deliveries be made through the Consolidation Centre?

☐ Yes ☐ No ☐ Don't Know

16. As a result of joining the BRISTOL Consolidation Centre scheme, what are in your opinion the advantages/benefits/improvements to your business? (Tick all that apply)

A. Delivery to stock room
B. Security of delivery
C. Staff safety
D. Duration of delivery
E. Staff time saved per delivery (You manage your hours more productively; the delivery time has improved your time management;…)
F. Set delivery time
G. Additional services provided (recycling, pre retailing, storage etc)
H. Sales
I. Costs (Comparing the costs with your previous experience; if you don't know, please indicate who can answer about the costs)

17. How often have you experienced damages/shortages with the deliveries made by the Consolidation Centre? (Tick only one)

☐ Never ☐ Most of the times
☐ Very few times ☐ Always
☐ Sometimes

18. How does this compare with your previous delivery experiences? (Tick only one)

☐ Better ☐ About the same
☐ Worse ☐ Don't know

19. How often does the Consolidation Centre team deliver on time? (Tick only one)

☐ Never ☐ Most of the times
☐ Very few times ☐ Always
☐ Sometimes

20. How does this compare with your previous delivery experiences? (Tick only one)

☐ Better ☐ About the same
☐ Worse ☐ Don't know

21. The Bristol Consolidation Centre uses an environmentally-friendly ELECTRIC truck to make deliveries. On a scale from 1 to 5, how important is this for your business? (Ask for their genuine views on this, tick only one)

☐ 1.Not at all important ☐ 4
☐ 2 ☐ 5Very important
☐ 3

Why? _____

22. Overall, how would you rate the service you receive from the Consolidation Centre (for example thinking about the service you received from your previous delivery experiences)?

☐ Very poor ☐ Good
☐ Poor ☐ Very Good
☐ Average

Please briefly explain any reasons for your satisfaction or dissatisfaction, thinking about the aspects that you like or dislike the most:
_____

23. Are there any areas where you feel the Consolidation Centre could do better, for example compared to your previous delivery experiences? (Tick only one)

☐ Yes ☐ No ☐ Don't Know

24. Do you have any additional comments?

_____

Thank you for your time