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## Understanding Financial Viability of Urban Consolidation Centres: Regent Street (London), Bristol/Bath & Nijmegen

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### Abstract

The concept of an urban consolidation centre (UCC) has been extensively researched. Despite the potential positive environmental and social impact, the main obstacle remains the lack of a sustainable business model. The goal of this paper is to understand how to organize UCC viability as a concept providing environmental and social benefits while at the same time providing a sustainable business model (social and logistical value propositions of multi-beneficial relations between the involved stakeholders). A research framework will be designed to analyse and evaluate financial viable UCCs. The framework consists of four main stream components, namely: organizational integration, revenue streams, key-resource provisioning and buyer-supplier relation. These four types of relations result in the so called ORKB-framework to analyse the created added value. The research framework is applied and evaluated for the following urban consolidation centres: Regent Street in London, Bristol/Bath, and BinnenStadService in Nijmegen. With the development of the framework we want to reveal some of the uniqueness for each specific situation in order to address the UCC-environment more effectively when the dynamics regarding value creation and the needs of the involved stakeholders are better understood.

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## 1. Introduction

Today's cities cover only 2% of the earth's surface, yet they consume 75% of all resources and produce 75% of all waste (UNFPA, 2007). The total world population is now in excess of 6 billion; more than half of them already living in urban areas (Heilig, 2012). By 2025, the urban population is expected to represent more than two-thirds of the global population. The quality of life in our cities therefore is increasingly under pressure. Cities all over the world are facing similar developments and are struggling to keep air quality, noise emissions and traffic safety to acceptable levels.

To address these challenges, the need for sustainable and integrated urban planning processes related to mobility is widely recognized (Givoni & Banister, 2013). For many years an answer to these challenges with respect to urban freight transport has been the concept of urban consolidation centers. Although the concept has shown positive effects for the city logistics stakeholders and on most sustainability issues (Browne et al., 2005; Quak, 2008; Verlinde, 2015), at least in theory, many implementations of UCC projects proved financially unviable (Browne et al., 2005; Marcucci & Daniels, 2008; van Duin et al., 2010; Wolpert & Reuter, 2012; Olsson, 2014). In case of successful implementations of UCC it is often a small scale, local demonstration of which the outcomes are only appropriate within the specific context (Quak et al., 2014). From a scientific perspective one could argue that the method of evaluation is often restricted and not based on a multi-actor evaluation framework, identifying the relevant impacts and measurable indicators that represent the key objectives of all stakeholders (van Duin, 2012; Balm et al. 2014).

The scientific discourse on the viability of UCC is also not clear. Some researchers share the opinion that an UCC should be able to be viable and to be self-funding (Allen et al., 2007; Marcucci & Daniels, 2008). However, other researchers state that the viability of UCCs can only be safeguarded by permanent governmental subsidies (Browne et al., 2005; van Duin et al., 2008; van Duin et al., 2010; Quak & Tavasszy, 2011). Also, Browne et al. (2005) believe that UCCs should be limited only to areas where delivery-related problems exist. Our research is definitively inspired by Partier and Browne (2010) who increased the consistency with which urban good innovations and projects are evaluated. The methodology has been developed in France and is based on a detailed examination of 15 projects comparing the wide range of criteria used in their evaluation. Their core indicators have to be taken into account in our study.

From the scientific perspective our research goal is to generate explanative knowledge on, and insights on the key-success factors for UCC viability, by conducting a case-study research on the empirical multi-beneficial relations between the UCC operating entity and the involved stakeholders & public authorities. The selected UCC cases show a big variety in age of existence which provides a good overview of the key values crucial for the viability of the UCCs.

Section 2 starts with a literature overview on business modelling followed by the description of a new business modelling framework. Section 3 shows the application of the framework on three UCC cases. Section 4 concludes with the main findings of this research.

## 2. Towards an evaluation framework of understanding UCC viability

This section starts with a literature overview on business modelling tools. In paragraph 2.2 the new value framework will be described.

### 2.1. Literature overview business modelling tools

In this research a viable UCC is defined as an UCC that has a positive business case (= price-cost is profit?) and is able to sustain over time. The goal of this research is to understand how to organize UCC viability as a concept providing social and logistical value propositions of multi-beneficial relations between the involved stakeholders (Allee, 2008). The viability of a UCC is determined by two important aspects:

1. If a business wants to survive over the years, money has to be generated. The revenues have to be higher than the expenses to make a profit and to be viable. In the case of UCC, it should generate enough revenues by setting a

right price of its services, to cover the costs. Though this will only happen when the services offer something that have real benefits for the buyers.

2. A good cooperation between actors. Stakeholders influence the ability to ensure long-term viability of organizations (Bryson, 2004). An UCC has such a big involvement of different important actors: the municipality, the carrier, the retailer, the shipper, the consumer and the inhabitant. Each of these actors has a different interest and wants to benefit from the UCC. To cope with these different actor perceptions a UCC has to take care of a good cooperation to make it viable (Quak & Tavasszy, 2011).

The first aspect is derived from the economic perspective: generating enough money to keep the business up and running. The second aspect is more related to the social or political perspective: getting the different actors to work together and maintain their own interests without losing them or making too much sacrifices. All the different stakeholders need to benefit from the UCC to be successful (Porter & Kramer, 2011). Therefore the scope of the evaluation framework will focus on the creation of added value.

To understand how companies create and capture value Business modeling has become a mainstream concept (Chesbrough and Rosenbloom, 2002). In literature a couple of business modelling tools are found. The STOF method is developed by de Vos & Haaker (2008). This method takes the service as unit of analysis, and considers the network of organizations that are involved in providing that service. The concepts in the STOF model are based on theories from several disciplines. It considers four descriptive domains, which together provide a conceptual framework to design business models. The domains considers: Service, Technology, Organization and Finance. The STOF method gives more structure than the Business model canvas approach, as it lists a predefined set of design variables. However, the STOF method is only designed for ICT-enabled services (de Vos & Haaker, 2008), and therefore is not considered valid to address logistical services. Additional no evidence could be found for the conceptual model being applied for evaluative purposes.

The approach from Ballon (2007) focuses mainly on classifying business models in taxonomical schemes. Ballon argues that a classification of business models should be based on a set of key design parameters and a limited set of options per parameter. Although Ballon's approach appears useful when it comes to analyzing business models at a high level of abstraction, it provides limited insight in practical key-success factors and key-learning factors?. Therefore this business model is considered not to be suited for identifying key-success factors and explaining sources of value.

The E3-value methodology is especially useful to model the economic and financial aspects of business models (Gordijn & Akkermans, 2001). E3-value offers a means to model the exchange of value between the organizations of value network. Though, it requires that tangibles can be assessed rather accurately. Moreover, strategic business model issues like control over key-resources or customer relations are not included. Therefore, it is not considered to be sufficient for explaining value in the urban freight system.

Most prominent methodology is the Business Model Canvas developed by Osterwalder & Pigneur (2010) as described in their handbook *Business Model Generation*. This canvas helps describing a business model through nine building blocks that cover the four main areas of business: customer, value proposition, infrastructure and financial structure (Osterwalder & Pigneur, 2010). Underlying this practical tool is a detailed conceptual model in which various design variables are considered. An application of this model in city logistics can be found in (Quak et al., 2014).

## 2.2. *Towards a new business framework*

The Business Model Canvas (BMC) of Osterwalder & Pigneur (2010) describes how an organization creates value. A strength but also a limitation of the business model canvas is that it focuses on one single company's internal business model rather than a partner network (de Reuver et al., 2013). Therefore, the BMC's strength is not to reveal how added value is created in business relations beyond the boundaries of the individual firm. In addition, it provides little detail to the design variables, which does not correspond to the ambition to identify key-success factors. Therefore, a complementary analytical framework is developed to:

- Provide insight in what, and how, values are created for the different system stakeholders in business relations beyond the UCC’s organizational boundaries, and beyond the traditional buyer-supplier relation;
- Act as a complementary tool to map the UCCs’ business model in the BMC and to identify key-success factors;
- Ensure a uniform assessment of viable UCCs for the purposes of explaining their viability.

The business models of the system stakeholders are not likely to change due to an introduction of the UCC. Therefore value creation is taken to occur in business relations that correspond with a business model overlap. Osterwalder and Pigneur (2010) identify four components of a business model.

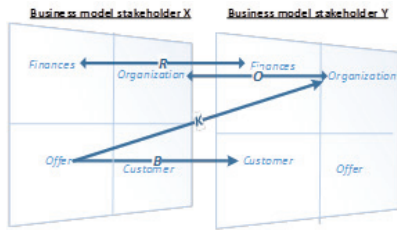


Figure. 1a. Four inter-business relations corresponding to an overlap between the four business model components

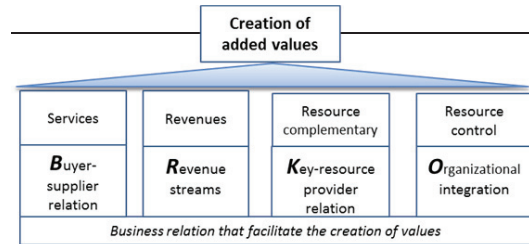


Figure. 1b. Four types of business relation facilitate the creation of four types of added values.

Given these four components, business models can overlap in four different manners resulting in four types of business relations (see Figure 1a+b), namely:

*Organizational integration*; this relation facilitates value creation through obtaining more control over resources. By gaining resource control via the organizational integration, this will entail system stakeholders to integrate with a UCC, therefore gaining multiple key resources. This will result in different types of organizational structures (Casciaro & Piskorski, 2005) for a UCC as operating entity. Here a distinction is made in public authorities and logistical users (see Table 1):

Table 1. Indicators revealing organizational integration

UCC involvement by Public authorities	UCC involvement by logistical users
<ul style="list-style-type: none"> <li>• A public-private partnership</li> <li>• Fully public service provisioning</li> <li>• (A) governmental affiliate(s) assigned at seat (s) on the board of directors</li> <li>• Public (veto power) shareholding</li> </ul>	<ul style="list-style-type: none"> <li>• Joint ventures</li> <li>• Mergers</li> <li>• Shareholding</li> <li>• An awarded (public) tender</li> </ul>

*Revenue streams*; this relation facilitates value creation due to the creation of revenues. These streams will go from a stakeholder to a UCC or the other way around. What kind of benefits does UCC have and what do the stakeholders offer being a UCC-customer? What profits are being made and to what stakeholders do they belong? According to Osterwalder & Pigneur (2010), Ville et al (2010), Hapgood (2009) different types of revenue structures can be determined, which are used for the calculating the revenue stream of this framework. Table 2 shows the indicators of the revenue structures.

Table 2. Indicators of the revenue structures

Logistics user → UCC	Public authority → UCC
<ul style="list-style-type: none"> <li>• Usage fee; Subscription fee</li> <li>• Gain Sharing</li> </ul>	<ul style="list-style-type: none"> <li>• Full subsidy of operations</li> <li>• Partial subsidy of the operational costs</li> </ul>

*Key-resources provisioning*; this relation facilitates value creation through the provisioning of key-resources. A key-resource provider relation occurs when resources are provided without a formal financial reward. These may be different resources, physical, financial, intellectual etc. which comprise resources that could be provided by different system stakeholders to other system stakeholders (Osterwalder & Pigneur, 2010). Indicators that would reveal such a relation are thus key-resources that could be provided. To determine which key-resource could be provided by the different system stakeholder to other system stakeholders an exploration has been conducted. The analysis is structured according the statement of Osterwalder & Pigneur (2010), namely that: “Resources allow an enterprise to create and offer a value proposition, reach markets and maintain relationships with customer segments”. The key resources have been identified based on the work of Muñuzuri et al. (2005), Allen et al. (2007), expert consultation, and empirical examples. The key-resources feed the indicators positively which are beneficial for UCC and/or for the stakeholders. The following Table 3 shows indicators that reveal a key-resource provider relations among carriers, shippers, UCC and the Public authorities.

Table 3. Indicators that reveal a key-resource provider relation.

Logistics users (Carrier & Shipper) to UCC:	Public authorities to UCC:	Public authorities to logistical users:
<ul style="list-style-type: none"> <li>• Operational know-how</li> <li>• Better load-utilization</li> <li>• Internal transport demand</li> <li>• Brand recognition</li> <li>• Transport savings tool</li> <li>• Facilities (e.g. depot equipment etc.)</li> </ul>	<ul style="list-style-type: none"> <li>• Providing dedicated infrastructure for UCC distribution.</li> <li>• Taxes and fees for non-UCC distribution</li> <li>• Access restriction for non-UCC transport</li> <li>• Traffic management favoring UCC vehicle movements</li> <li>• Providing land-use permits for desired location for UCC depot &amp; UCC landing zones</li> </ul>	<p><i>Inclusion of tender requirements on:</i></p> <ul style="list-style-type: none"> <li>• Maximum prices</li> <li>• Minimal service quality</li> <li>• Brand recognition of UCC operator</li> <li>• Zero emissions</li> <li>• UCC operator not having an interest in stealing business of carriers.</li> </ul>

The governance strategy of public authorities could include trying to facilitate the acceptance of the UCC on the behalf of the logistics users. In literature this is referred to as public-procurement for innovations (Edquist & Zabala-Iturriagoitia, 2012), and can be seen a key-resource provided by the authorities or other logistical users. This entails that the requirements of the end-user are included in the contractual agreements.

*Buyer-Supplier relation*; this relation facilitates value creation due to the exchange of a service; This can be described by the value proposition the service holds for the intended user (Porter & Kramer, 2011). Based on the alleged UCC benefits, the UCC holds a potential logistical value proposition for the logistics user(s) and a societal value proposition for public authorities (see Table 4).

Table 4: Indicators of the revenue structures based on Baumol &amp; Vinod (1970), Parasaruman et al. (1985) and Quak (2008)

Public buyer-supplier relation (Societal value proposition)	Logistical requirements (Logistical value proposition)
<ul style="list-style-type: none"> <li>• <i>Social sustainability by:</i> <ul style="list-style-type: none"> <li>▪ Reducing injuries and death resulting from traffic accidents, e.g. traffic safety</li> <li>▪ Reducing logistical nuisance, such as noise disturbance, visual intrusion, stench and vibration</li> </ul> </li> <li>• <i>Economic sustainability by</i> <ul style="list-style-type: none"> <li>▪ Reducing congestion</li> <li>▪ Creating labour</li> </ul> </li> <li>• <i>Environmental sustainability by</i> <ul style="list-style-type: none"> <li>▪ Reducing the emission of the local pollutants NO<sub>x</sub> and PM<sub>10</sub></li> <li>▪ Reducing the emission of CO<sub>2</sub></li> <li>▪ Reducing the use of non-renewable natural resources, such as fossil-fuel.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• <i>High service by delivering</i> <ul style="list-style-type: none"> <li>▪ Service reliability</li> <li>▪ Service responsiveness</li> <li>▪ Service security and credibility</li> <li>▪ Service flexibility</li> <li>▪ Transport flexibility</li> </ul> </li> <li>• <i>Facilitate competitive cost structure by offering</i> <ul style="list-style-type: none"> <li>▪ Competitive inventory holding prices</li> <li>▪ Competitive transport prices</li> <li>▪ Competitive holding prices.</li> </ul> </li> </ul>

Substantiation on the requirements for evaluating the societal value proposition is based on improving the sustainable impact of city logistics. The related indicators are derived from the work of Quak (2008). The requirements are structured according to the three Ps of sustainability: people (social), planet (environmental) and profit (economic). Substantiation on the requirements for evaluating the logistical value proposition are based on the rational of outsourcing transport to a third party logistics provider (3PL). This holds that the UCC service performance should either result in lower logistic costs and/or higher services levels for the outsourcing party (Baumol & Vinod, 1970; Vasiliauskas & Jakubauskas, 2007; Quak & Tavasszy, 2011;). The logistics costs components are based on the abstract-mode inventory model of Baumol and Vinod. Requirements for service quality are derived from the SERVQUAL model for service quality Parasaruman et al. (1985).

### 3. Application of the ORKB framework on 3 cases

The ORKB framework (waarom?) is applied in a case study research according to the methodology of Yin (2010), in which the following UCCs are studied: The BinnenstadService Nijmegen, The Bristol-Bath Consolidation Centre, and the London Regent St. (Street) Consolidation Centre. The aim is to explain how these UCCs are able to be viable. By confronting the analytical framework on the empirics, insights are generated on the position of the UCC in the system as a result of the present business relations. In section 3.1 the UCCs will be introduced. Each ORKB-value creation will be explained for all the three cases in the following sections. In section 3.6 summary explanations on UCC viability are given for all three case studies.

#### 3.1. Three case studies of UCCs

##### *Bristol-Bath UCC*

The Bristol-Bath UCC serves the extended area of both the city of Bristol (428,000 inhabitants) and Bath (84,000 inhabitants). Thereby the UCC is also serving receivers not located in the city centers. The prime retail area in Bristol houses over 300 outlets. Currently the UCC depot is located at the village Avonmouth on Smoke Lane, from which it is a 25 minutes trip [16 km] to Bristol and 40-45 minutes trip [48km] to Bath. The depot is located close to the M4 and M5. The UCC focusses on flows of non-perishable and not very high value goods. The main receivers are small-to medium size retail outlets (telecommunications, fashion, perfume, body shop) - Retailers that receive a few box deliveries, multiple times per week. In the core retail district, the Broadmead area, almost all receivers are outlets of large retail chains. Though, the operation is expanding to non-retail deliveries (universities, housing agencies, travel agencies etc.). At first the Bristol city council was the sole customer. The consolidation center was 100% publicly funded and retailer participation was free of charge. Currently the UCC serves also the following customer segments: carrier shippers & receivers. Next to that the Bristol & Bath city councils can be considered customers as they provide structural subsidies, which is more explained in the revenue part (R). The UCC



operations concern mainly cross dock operations with limited stock held on site as a rule. The UCC offers the following services:

- City distribution to stock;
- Delayed cross dock;
- Peak/seasonal storage & Crisis stock management;
- Off-hours deliveries;
- Facilitating return flows (waste & returns);
- Pre-retailing services.

For the city distribution the following key-activities are conducted: The inbound operations run from 22:00 hrs to 06:30 hrs. Afterwards the transshipment stock is loaded onto two electric vehicles (EV) and dispatched, leaving the warehouse empty during the day. The distribution of the goods requires 8 hours. Both EVs have the following specs: operating range-120 km, max speed-60 km/hour, capacity 2.5 ton, and recharging time-8 hours. The 8 hours recharging time is the limiting factor in optimizing the vehicles usage. First, three large customers are served in the pre-opening hours in the Bristol area. Afterwards one truck leaves to Bath, while the other trucks distribute the freight in Bristol. The scheme still grows and currently it serves a total of 141 retailers. In March 2014 this resulted in 48 trips, consisting on average trip-load of 6 cages and 7 pallets. The trucks have on average a load-factor of 74%. Due to UCC usage 195 (traditional freight) vehicles were able to avoid further distribution in the area in March 2014.

#### *Regent Street UCC*

The Regent St. UCC primarily serves the Regent St. retail area in London West-End, though destinations on the route and/or in the near surrounding area are also included. Regent St. is a prime retail area in London (8,2 million inhabitants). It has a frontage of 2km and is home to 700 small and medium sized businesses, and over 150 retail and catering outlets (Transport for London, 2011). The UCC depot is located in Harlow, Essex. The journey distance from the Harlow UCC to Regent St. is approximately 50 kms and takes approximately 45-60 minutes. The depot is located close to M25 and M11. The UCC focusses on flows of non-perishable and not very high value goods. All the served retailers are member of large retail chains. No independent retailers are located on the Regent St. The UCC is not used for non-retail store deliveries - i.e. it does not cater for offices and other non-retail businesses. None of the transport assignments have any special handling requirements, most of them comprise either boxes or hanging garments. The UCC serves only receivers as customer segment to which they offer the following services:

- City distribution to stock;
- Delayed cross dock;
- Return logistics (packaging materials, returns, inter-branch transfers);
- Stock holding facilities;
- Pre-retail services (pricing and unpacking services).

For the city distribution the following key-activities are conducted: deliveries to the Regent St. stores are consolidated with those of other retailers from Regent St. and dispatched from a distribution centre. If required, two electric vehicles make two delivery rounds to London per day (morning and afternoon). The EVs comprise 1 x 10 ton and 1 x 9,6 ton electric Smiths Newton (Standard 7.5 ton vehicle plus batteries). The capacity in terms of volume is equivalent to about 3,000 hanging garments or 120 boxes. The vehicles never reach their range as part of their Regent St UCC activities. The capacity of the vehicle is the limiting factor as the load factor is often 100% and hardly less than 75%. The morning and afternoon rounds both take about 5-7 hours to complete (approximately 05.00-11.00 and 16.00-22.00). The Regent St. UCC serves 21 retail customers, of which some have multiple outlets. This results in on average 40,5 trips/month. The number of retailers using the Regent St UCC, or the quantity of goods passing through the UCC, has not changed much in the last 18-24 months (after an initial increase during the trial period). Logistics service provider Clipper does not think that their share of all retail deliveries on Regent St is very large, probably less than 20-30%.



### *Binnenstadservice Nijmegen*

Binnenstadservice (BSS) is located in Nijmegen, it's a city in the province of Gelderland. The municipality of Nijmegen covers an area of 5,760 hectares, has 165,180 inhabitants, the number of business enterprises in Nijmegen is just about 12,600. With respect to the traffic in Nijmegen there are 62,605 cars, 5,565 commercial motor vehicles and 4,610 motorcycles registered in Nijmegen (Oozo, 2015). This ensures that Nijmegen is a busy city, with lots of traffic. BSS's consolidation center is located about 1.5 kilometers away. BSS has its focus on receivers rather than on carriers. The small and independent retailers pay a standard fee for BSS' basic service, i.e. receiving goods and delivering these goods to the store at the time the store-owner likes. BSS deliberately focuses on small and independent retailers, since their deliveries are usually not optimized, in contrast to those of retail chains. Nowadays the strategy is changing also towards larger retailers who operate in other Dutch cities due to the fact that BSS also operates more at a National scale. It is beneficial to have joint partnerships in many towns and can be a guarantee for enough transport volumes. Today the UCC serves only receivers as customer segment to which they offer the following extra services:

- Home-deliveries (for large goods);
- Delayed cross dock;
- Stock holding facilities;
- Value-added logistics including retour logistics (of for example clean waste).

BSS has outsourced their distribution activities to a carrier who delivers the goods in the city centre. To reduce the emissions this company uses an electronic bicycle and a natural gas truck. In the start-up phase (2008) 20% of the small shopkeepers signed their interest and became customer of BSS. Since their start we can observe that their market share has raised (*see* the revenue section 3.3).

### 3.2. *O: Evaluation of value creation in organizational integration*

#### *Bristol Bath*

The Bristol-Bath city councils are involved in the UCC operating entity through:

- 1) *A public-private partnership* – The exploitation of the Bristol-Bath UCC is public tendered. The contract can be classified as an extended management contract: The city councils authority engages the contractor to manage city distribution operations for a time period of 5 years. The contract is not performance-based. The operator is responsible for the sites asset management. The contract includes an obligation to use at least 2 EVs and to provide monthly (sustainable) performance reports.
- 2) *Advisory role* - The councils have close contact with the UCC's management and provide input for new business opportunities.

DHL Exel (carrier) is involved in the UCC operating entity through an awarded public-tender. The Bristol-Bath UCC has been operated by DHL Exel (Carrier) since it opened in April 2004. In May 2014 the city councils were preparing a 3/4 year renewal of the tender contract. DHL Exel and others are participating in this tender of which the contract conditions are similar to the old one.

#### *Regent St.*

The Crown Estate is involved in the UCC operating entity through a private-private partnership. Crown Estate tendered the delivery of multiple retailers on the Regent St. The Crown Estate is a property portfolio owned by the Crown, which includes all the properties on the Regent St. They are an 'independent commercial business' that aims to maximize returns. Therefore the Crown Estate is considered as a private party, i.e. no public authority that aims to safeguard the public good.

The tender contract can be classified as an extended management contract: Crown estate engages the operator to manage city distribution operations for a time period of 5 years. The contract is not performance-based. Clipper is responsible for the asset management. The tender contract includes: required usage of electric vehicles; 30% of the EV capital costs provided for by the Crown Estate and the obligation to produce monthly (sustainable)performance updates.

### *Binnenstadservice Nijmegen*

During the first two years the Nijmegen city councils are involved in the UCC operating entity through a public-private partnership between the municipality of Nijmegen and BSS (before the official startup of BSS). It was organized top down, but it failed. In practice now BSS is driven bottom-up, because the request for an initiative like this came from the local retailers. To startup this innovative and risky concept by Binnenstadservice the municipality was forced to give a start-up grant. The amount was 100,000 euros in total for two years. After these two years BSS became a totally private company. Additionally it also received some new grants for a few new projects such as “de goederencirkel”.

Transporting the packages was carried out by BSS itself during the first year. However, the delivery of packets carrier is now outsourced to a commercial partner. This is because BSS doesn't want to be seen as a competitor to other carriers. The operating carrier will receive a fixed amount per stop they make to deliver a package.

### 3.3. R: Evaluation of value creation in revenues

#### *Bristol Bath*

Revenue streams occur between Logistics users and UCC by paying a usage fee. The logistics users are receivers, carriers, shippers and DHL internal sourcing. The prices are respectively 12 pound/pallet and 9,75 pound/cage. If there is room available on the trucks, DHL's own transport demand is taken along on the vehicles. However, this is internally cross-charged and therefore generating a revenues stream for the DHL consolidation center. The Bristol and Bath & North-East Summerset city councils provide for a revenue stream towards the UCC in the form of a partial subsidy of operational costs. In the tender contract the city councils committed themselves to provide subsidies for 45% (fixed rate) of the operating costs. Thereby the councils are leaving 55% for DHL Exel to recover; the financial risk for not making the 55% lies at DHL Exel. The commitment between DHL and the city councils has been established for 10 years.

At the Bristol-Bath UCC costs are covered, but no profits have been realized since the start of the initiative. The estimated costs and revenues for 2014 are presented in Table 5: No profits are realized. Substantiation on the estimations can be found in Van Dam (2014). The estimations are presented in a MIN and MAX values representing the uncertainties in the calculations.

Table 5: Bristol-Bath UCC estimated costs/revenues for 2014<sup>†</sup> (K.Pound)

Cost	MIN	MAX	Revenues	MIN	MAX
<i>Labor cost</i>	236	320	<i>Income generated by providing city distribution services</i>	46	152
<i>Depreciation cost distribution vehicles</i>	13	17	<i>Subsidies</i>	131	178
<i>Rent cost</i>	33	45	<i>Losses</i>	113	65
<i>Vehicle maintenance costs</i>	3	4			
<i>Energy costs of EV vehicles</i>	4	5			
<i>Real estate insurance</i>	1	2			
<i>Finance costs</i>	0	2			
TOTAL	290	395	TOTAL	290	395

#### *Regent St.*

The revenue streams occur between the logistics users and UCC by paying a usage fee. The usage fee is 3.20 pounds per box or hanging set. A hanging set has 5-8 hanging units. Clipper is able to exploit the UCC in such a manner that it generates profits according similar distribution operations Clipper conducts. Substantiation on the

<sup>†</sup> based on DHL Exel's operational performance report of March 2014 and manager interviews

estimations can be found in Van Dam (2014). The estimations are presented in a MIN and MAX values representing the uncertainties in the calculations (see Table 6).

Table 6: Regent St. UCC estimated costs/revenues for 2014<sup>‡</sup> (K.Pound)

Cost	MIN	MAX	Revenues	MIN	MAX
Labor cost	150	204	Income generated by providing city distribution services	140	467
Depreciation cost distribution vehicles	26	36	Subsidies		
Rent cost			Losses	46	0
Vehicle maintenance costs	5	7			
Energy costs of EV vehicles	5	7			
Real estate insurance					
Finance costs	0	6			
Profits	0	207			
<b>TOTAL</b>	<b>186</b>	<b>467</b>	<b>TOTAL</b>	<b>186</b>	<b>467</b>

#### *Binnenstadservice Nijmegen*

The revenue streams occur between the logistics users and UCC by paying a membership fee and additional delivery cost. The retailer basic membership cost between 30 to 50 euros per month. Additional delivery cost are 9 to 12 euros based on an average stop per week per retailer. The transport is outsourced and 3.75 euro is calculated per stop for one stop per week per retailer. In the first year BSS received an initial subsidy of 100,000 euros. At that moment the retailers were free to join the BSS-initiative. The estimations are presented in Table 7. Substantiation on the estimations can be found in Kusters (2015) & van Amstel (2015). In case participation of retailers drops to 35% of the retailers then a loss of 71K Euros will be made. Therefore a high participation of retailers is essential for the viability of this UCC.

Table 7: Binnenstadservice estimated costs/revenues for 2014 (K.Euros) based on 180 retailers participation

Cost		Revenues	
Labor cost	78	Income generated by providing city distribution services	98
Transport cost	35	Retailer basic membership	76
Rent cost	15	Losses	
Additional cost	4		
Profits	42		
<b>TOTAL</b>	<b>174</b>	<b>TOTAL</b>	<b>174</b>

#### 3.4. K: Evaluation of value creation in key-resource provider relations

The aim is to evaluate whether and how value is created in revenue streams. This is achieved by assessing whether and what resources are provided by stakeholder to other system stakeholders. This effort is guided by the different type key-resources that could be provided (see Table 3). More substantiation on how these resources are of

<sup>‡</sup> based on cost components defined by Duin et al. (2010) and an interview with general manager

value to the stakeholders is presented in Van Dam (2014). An overview and explanation of the key-resources per UCC are presented in Table 8 (Bristol-Bath), Table 9 (Regent St.) and Table 10 (Binnenstadservice).

Table 8: Key-resource relationships Bristol-Bath

<i>provides to</i>	<b>DHL Exel</b>	<b>UCC</b>	<b>Public authorities</b>	<b>Logistical users</b>
<b>DHL Exel</b>		Brand recognition; Operational know-how; Transport savings tool; Depot at a multi-user site; Better load utilization Manager's credibility and personal network.		
<b>UCC</b>	Strategic opportunity; Better load utilization.		.	Green logistics service; On time-delivery.
<b>Public authorities</b>			Start-up subsidies; Bath retailers meeting; Long term commitment; UCC promotion	Set prices safeguarded in a contract.

Table 9: Key-resource relationships Regent St.

<i>provides to</i>	<b>Clipper Group</b>	<b>UCC</b>	<b>The Crown Estate</b>	<b>Receivers</b>
<b>Clipper Group</b>		Brand recognition; Operational know-how; Non dedicated distribution depot; Better load utilization; Existing contracts; Great transport network coverage.		
<b>UCC</b>	Green credentials Better load utilisation		Environmental improvement close to the buildings/shops	
<b>The Crown Estate</b>		Partial subsidy of the Electric Vehicles capital cost.		
<b>Receivers</b>		Large retail chain contracts.		

Table 10: Key-resource relationships Binnenstadservice

<i>provides to</i>	<b>Transport group</b>	<b>UCC</b>	<b>Public authorities</b>	<b>Receivers</b>
<b>Transport group</b>		CNG-truck and freight bicycles for delivery.		
<b>UCC</b>	Additional work		First implementation of a successful UCC in the Netherlands.	
<b>Public authorities</b>		Start-up subsidy during the first two years.		
<b>Receivers</b>		Large retail chain contracts.		Promotion of UCC to other retailers.

### 3.5. O: Evaluation of value creation in buyer-supplier relations

The aim is to evaluate whether and how value is created in the buyer-supplier relations. This can be assessed by evaluating the value proposition the service holds for the intended customer (*see* Table 4). The UCC holds a potential logistical value proposition for the logistics users and a societal value proposition for public authorities. The value proposition depends on the extend the UCC service performance meets the requirements of their users.

UCC performance is qualitatively scored on the requirements of logistical users and quantitatively on the requirements of public authorities.

### *Bristol-Bath*

First the logistical frame of reference is explained. Bristol Bath is confronted with the following distribution related problems:

- In both urban areas environmental zoning is in place. In Bristol a small area has full access restrictions, though this is easily circumvented since the distance to the destination from the edge is easily walkable.
- In Bath logistical operators experience issues with the limited stops for loading/unloading: only three stops are available, which result in waiting times during the peak-hours (09:00-16:00);
- The narrow Streets of Bath's historical center make it difficult to maneuver with larger vehicles. Thereby they are increasing the risk of hitting the world heritage and the protected lime-stone buildings. If this happens, the logistics operators are held responsible for costs of repair, which can be significant;
- There is severe local congestion, especially in the Broadmead area.

The inventory holding related problems for the receivers are:

- The severe local congestion in Bristol is preventing businesses receiving deliveries (Lewis & Fell, 2012);
- Most stock-room in Bristol are located on upper floors, which requires heavy lifting of store employees;
- Both Bristol and Bath suffered of floods several times over the last years, which resulted in stock-damages;
- Strong seasonality in demand.

Societal frame of reference can be characterized as follows:

Both Bath and Bristol city councils struggle with meeting the European norms on air quality in the city centers. Next to that, the Bath historical city center is classified as a world heritage, which the city council is keen to protect against damage caused by transport (blockages, collision with historical buildings, wear of the roads).

Table 11: Overview of the value propositions of UCC Bristol-Bath to all the stakeholders.

<b>City Councils value proposition</b>	<b>Carrier value proposition</b>	<b>Shipper value proposition</b>	<b>Receiver value proposition</b>
<i>Reduction in logistical nuisance &amp; traffic unsafety:</i> [1000;8000] reduction in urban area vehicle kms/month  The vehicle is conventional 7,5 ton truck with batteries, only noise reduction.	<i>Reliability:High</i> Bristol-Bath UCC deliveries are 100% on time and only 2 stock losses (thefts from vehicles) in 10 years. Therefore it is taken that the UCC offers high service reliability.	<i>Reliability:High</i> Bristol-Bath UCC deliveries are 100% on time and only 2 stock losses (thefts from vehicles) in 10 years. Therefore it is taken that the UCC offers high service reliability.	<i>Reliability: High</i> Bristol-Bath UCC deliveries are 100% on time and only 2 stock losses (thefts from vehicles) in 10 years. Therefore it is taken that the UCC offers high service reliability.
<i>Reduction in congestion:</i> [2000;12000] reduction in total vehicle kms during peak-hour/month	<i>Transport reliability: Medium</i> The UCC provides services to the extended geographical area of both Bristol and Bath. According to the manager an estimate of 50% of the distribution vehicles that attended the sight were able to avoid further distribution in the area.	<i>Transport reliability: Medium</i> The UCC is able to handle most of the non-food non-frozen transport requirements in dimensions, weight and handling equipment. The UCC provide services to the extended geographical area of both Bristol and Bath. Given the national or even International focus of shippers, the Bristol-Bath area is fairly small. Therefore it is taken that the UCC offers low transport flexibility.	<i>Supply responsiveness: Medium/High</i> The UCC is located close to Bristol and Bath, thereby being able to deliver daily and prompt distribution services. Though, given that no stock is being held on sight as a rule, the responsiveness of the total supply chain does not increase.
<i>Reduction in emission:</i> NO <sub>x</sub> [43;150] kg/month	<i>Competitiveness of transport prices: High</i>	<i>Competitiveness of transport price: High</i>	<i>Competitiveness in transport prices: High</i>

<p>PM<sub>10</sub> [2;5] kg/month</p>	<p>Distribution in the area is expensive due to delivery related problems. The fees DHL ask are approximately 40% and 50% of the conventional markets prices, respectively for pallets and cages.</p>	<p>Distribution in the area is expensive due to delivery related problems. The fees DHL ask are approximately 40% and 50% of the conventional markets prices, respectively for pallets and cages.</p>	<p>Attitudes towards the fee structure are positive, as most retailers claimed to have reduced their costs, and gained benefits, by joining the scheme (CIVITAS Renaissance, 2013). Besides the number of participants is growing still.</p>
<p><i>Reduction in fossil fuels usage:</i> [6000;14000] reduction of fossil fuel vehicle kms/ month</p>	<p><i>Security and Credibility: Medium</i> Carriers are only being served since a short period of time and the transport volume distributed for carriers in comparison to the whole is still very limited. Therefore it is taken that DHL Exel as a competing carrier is, despite the experience and network of the DHL manager, able to offer medium security and credibility to other carriers.</p>	<p><i>Security and Credibility: High</i> DHL is a known and trusted 3PL it is taken there is no reason for shippers to mistrust DHL Exel.</p>	<p><i>Security and Credibility: High</i> DHL is a known and trusted 3PL it is taken there is no reason for receivers to mistrust DHL Exel</p>
<p><i>Reduction in emission CO<sub>2</sub></i> CO<sub>2</sub> [1400;3000] kg/month.</p>	<p><i>Service flexibility: High</i> The UCC offers the services 'splitting large deliveries' and 'delayed cross-dock services' enables carriers to consolidated up-stream deliveries and free-up the corresponding resources. This also enables carriers to use large specialized long-haul vehicle to optimize long-haul transport.  Off-peak (night-time) goods acceptance.</p>	<p><i>Service flexibility: High</i> The UCC offers the services 'splitting large deliveries' and 'delayed cross-dock services' enables carriers to consolidated up-stream deliveries and free-up the corresponding resources. This also enables carriers to use large specialized long-haul vehicle to optimize long-haul transport.  Off-peak (night-time) goods acceptance.</p>	<p><i>Service flexibility: High</i> The UCC offers supply chain flexibility in the form of delayed cross-dock and consolidation services. It enables the retailer to change from multiple (up to 10!) deliveries per day to a few per week on convenient time slots. 50% stated their delivery time has improved (Hapgood, 2004). Retailers stated to save typically saving more than 20 minutes per delivery, resulting in that 38% of retailers can spend more time with customers (Campbell et al., 2010). Next to that the UCC offers flexibility by delivering to stockroom. As a consequence of 45% of retailers stated the service improved staff morale. (Campbell et al., 2010)</p>
		<p><i>Competitiveness handling prices: High</i> The UCC provides value added logistical activities relevant for shippers: Return logistics (waste, returns): Pre-retailing services.</p>	<p><i>Competitiveness handling prices: High</i> The UCC provides value added logistical activities relevant for shippers: Return logistics (waste, returns): Pre-retailing services. Attitudes towards the UCC's fee structure are positive, as most retailers claimed to have reduced their costs, and gained benefits, by joining the scheme (CIVITAS Renaissance, 2013)</p>
		<p><i>Competitiveness inventory holding prices: Medium</i> The UCC does not hold stock on sight as a rule. Though, it does provide crisis stock storage during seasonal peaks, which enables the shipper to free-up scarce warehouse space during season peaks.</p>	<p><i>Competitiveness inventory holding prices: Medium</i> The UCC does not hold stock on sight as a rule. Though, it does provide crisis stock storage during seasonal peaks, which enables the shipper to free-up scarce warehouse space during season peaks</p>

### Regent St.

Most important city logistics problems are experienced by the receivers and the Crown Estate. Both frames of reference are discussed here.

#### Receivers' frame of reference:

- Retailers in the West End receive a large number of daily deliveries due to the high turnover of stock. (Transport for London, 2011), which have to be attended for by shop employees.
- The Regent St. is within London's congestion charge area. Given this, and the fact that London is extremely congested, city distribution for receivers that operate their own distribution can be considered expensive (Lewis & Fell, 2012).
- Regent St. has a reputation for being the premier retail destination in London's West End. Corresponding retail surface is both costly and able to yield high revenues per square meter (Transport for London, 2011). Therefore there is a strong tendency to maximize the shopping area.
- Retailers are much affected by seasonality in demand - with much greater quantities at some times than others (such as Christmas, Easter and other special occasions).

#### Crown Estate's frame of reference:

- Regent St. represents the largest concentration of value in The Crown Estate's portfolio. With over 7.5 million tourist visits each year, Regent St. has a reputation for being the premier retail destination in London's West End.
- Regent St. experiences heavy road congestion which results in an unpleasant shopping environment for visitors. Therefore the Crown estate initiated efforts to improve the visitor and shopper experience, which would increase a retailer's turnover and ultimately result in a higher rental value for the property.
- The traffic on Regent St. had to be reduced, of which a significant proportion is attributed to delivery vehicles (35% of all peak hour traffic). It was discovered that retail deliveries were uncontrolled, causing unnecessary congestion and road blockages during peak retail periods (ARUP, 2014).

Table 12: Overview of the value propositions of UCC Bristol-Bath to all the stakeholders.

Public authorities value proposition	Crown Estate proposition	Receiver value proposition
<p><i>Reduction in logistical nuisance &amp; traffic unsafety:</i> [10000;15000] reduction in urban area vehicle kms/month</p> <p>The vehicle is conventional 7,5 ton truck with batteries, only noise reduction.</p>	<p><i>Reduction in logistical nuisance &amp; traffic unsafety</i> 207 trips reduction / month.</p> <p>The vehicle is conventional 7,5 ton truck with batteries, only noise reduction.</p>	<p><i>Reliability: High</i></p> <p>According to Clipper's manager they are always able to deliver the freight on time without any damages. The UCC operations are conducted at the same depot as were Clipper transport is organized for South-East London. This is a large facility were all equipment is present to handle any kind of non-food transport assignment.</p>
<p><i>Reduction in congestion:</i> [6000; 30000] reduction in total vehicle kms during peak-hour/month</p>	<p><i>Reduction in congestion</i> 139 reduced trips during peak-hour/month.</p>	<p><i>Supply responsiveness: High</i></p> <p>Regent St. retailers' throughputs are high and these retailers (H&amp;M and LK Benet) require multiple drops per day. In contrast to most competitors the UCC is able to meet these needs by serving the area each day in an evening and morning route.</p>
<p><i>Reduction in emission:</i> NO<sub>x</sub> [33;193] kgs/month</p> <p>PM<sub>10</sub> [2;6.5] kgs/month.</p>	<p><i>Reduction in emission:</i> NO<sub>x</sub> [33;193] kgs/month</p> <p>PM<sub>10</sub> [2;6.5] kgs/month.</p>	<p><i>Competitiveness in transport prices: Low/Medium</i></p> <p>The Regent St UCC has not resulted in increased operating costs for Clipper (compared with other urban distribution operations). It is assumed that therefore the prices are not higher than the conventional market prices. Though, it seemed that the UCC prices are also not lower than market prices. The new contract was mainly won on the green credential services offers and not by their competitive prices.</p>
<p><i>Reduction in fossil fuels usage:</i> [11000;31000] reduction of fossil fuel vehicle kms/ month.</p>	<p><i>Reduction in fossil fuels usage:</i> [11000;31000] reduction of fossil fuel vehicle kms/ month.</p>	<p><i>Security and Credibility: High</i></p> <p>Clipper is a known regional carrier organization that has similar operations, and which does not receive any privileges of public authorities. Besides the UCC scheme is entirely voluntary – the Crown Estate or other public authorities do enforce retail tenants to</p>



		make of the UCC. There seems to be no reason why retailers would have more negative perception or mistrust to Clipper’s operation than to other 3PLs.
Reduction in emission CO <sub>2</sub> CO <sub>2</sub> [1000;55000] kgs/month.	Reduction in emission CO <sub>2</sub> CO <sub>2</sub> [1000;55000] kgs/month	<i>Service flexibility: High</i> Retailers in the West End receive a large number of daily deliveries due to the high turnover of stock (Transport for London, 2011). By offering delayed cross-dock facilities and consolidation services the multiple drops per day are translated to a few drops per week at a convenient time slot. This results in less-time being spent on receiving deliveries. It also prevents having a delivery truck at the door step during peak shopping hours. For the retailers that organize their own up-stream supply chain the UCC offers additional service by offering the service of splitting large deliveries in combination with delayed cross dock services.
		<i>Competitiveness handling prices: High/ Competitiveness inventory holding prices: Medium</i> Due to high-turnover per square meter store space, there is a strong tendency to minimize stock-holding facilities. By offering stock-holding facilities and pre-retail services (pricing and unpacking) the store’s back-store facilities can be minimized. It offers up-to a maximum 20% space expansion (Transport for London, 2011). The UCC offers competitive prices compared relatively to the resulting costs savings (e.g. space expansion).

*Binnenstadservice Nijmegen*

Social requirements

The decrease in (large lorry) kilometers leads to a reduction of emissions, but the effects on air quality and noise are minimal. This is due to the large amount of other passengers and bus traffic and the high natural background concentration of PM<sub>10</sub> and NO<sub>2</sub> (van Rooijen & Quak, 2009). Therefore the municipality of Nijmegen is struggling with the question how to improve the air quality in the inner-city. The political atmosphere in Nijmegen contributes to a positive attitude of the local retailers and shopkeepers. They are open and willing to make logistical adaptations if the environmental conditions will improve. The general opinion is that the bundling of the deliveries by Binnenstadservice will result in a decrease of nuisance for residents in the city center of Nijmegen. In addition, fewer truck kilometers (and certainly less heavy truck kilometers) will lead to an improvement of road safety in the city center.

Logistical requirements

From a logistical perspective the retailers expect that the bundling of deliveries leads to more efficient delivery of goods. Retailers believe that that the municipality should be more involved to increase the participation of retailers.

Table 13: Overview of the value propositions of UCC Binnenstadservice Nijmegen to all the stakeholders.

Public authorities value proposition	Receiver <sup>1</sup> value proposition
<p><i>Reduction in logistical nuisance &amp; traffic unsafety:</i> A reduction of 85 vehicles per week (Nijmegen, 2015)</p> <p>The new vehicles are CNG trucks and electric cargo bikes leading to less nuisance and improvement of the safety.</p>	<p><i>Reliability: Medium/ High</i> The ability to deliver the promised service in a dependable and accurate manner.</p>
<p><i>Reduction in congestion:</i> 5% decrease in the number of truck-kilometres and the truck-travel time (Van Rooijen &amp; Quak, 2009)</p>	<p><i>Supply responsiveness: High</i> BSS delivers on appointment. It’s possible to deliver at desired times specified by the customer. Also there is a smaller time frame, because the deliverer only needs to drive the last mile.</p>

	Temporary storing of goods
<i>Reduction in emission:</i> hardly any difference in concentration for NO <sub>2</sub> and PM <sub>10</sub> (Van Rooijen & Quak, 2009).	<i>Competitiveness in transport prices: Low/Medium</i> Based on costs of 9 to 12 euros for the retailer, total costs based on average 1 stop per week per retailer. These prices seem competitive.
<i>Reduction in fossil fuels usage:</i> Follows the reduction of truck-kilometres (5%).	<i>Security and Credibility: High</i> The ability to make the customer feel free of danger, risk or doubt that outsourcing transport exposes the company to additional risks. All shopkeepers has the experience and belief that the hired company operates according the best interest of the customer and has the ability to deliver a secure service.
<i>Reduction in emission CO<sub>2</sub></i> CO <sub>2</sub> 50 kgs/week.	<i>Service flexibility: High</i> UCC Delivers on appointment. It is possible to deliver at desired times specified by the customer. BSS takes post and packages from the customers in the city, to stamp and dispatch them. This saves the customer time and reduces journeys since the deliverer was going already to leave the city, so these actions can be bundled.  The UCC stores goods  The UCC unpacks deliveries and checks the packing slip. This creates less waste in the store and the shop personnel have more time for their customers.  The UCC takes over the pricing of articles and uploads the products in the inventory system of the customer.  UCC takes return residues like paper, plastic and Styrofoam from the stores. Therefore, no separate garbage truck needs to get into the city center.

### 3.6. Summary explanations on UCC Viability

In this section the viabilities of the Bristol-Bath UCC, the Regent St. UCC and the Binnenstad Nijmegen UCC are summarized and explained.

#### *Explanation for the Bristol-Bath UCC viability*

The Bristol-Bath UCC viability is public driven. The involvement of Bristol-Bath city councils enables and enforces the UCC to charge 40-50% below market prices for city distribution. Thereby it offers opportunities for transport cost reductions and an increase in service quality at competitive prices. The UCC serves the following logistical customers: receivers, carriers and shippers. The improved service quality is mainly experienced by offering flexible services –tailor made services for specific needs. Contextual factors related to distribution and inventory holding related problems drive the experienced added value of the provided services.

The city councils provide structural partial subsidies of the UCC operating costs, a 45% fixed fee. In addition the councils set the UCC's distribution prices below market prices through tender agreements. The councils' involvement is driven by the UCC offering a more sustainable urban transport service:

- Reducing the vehicle kms in the urban area by 1000 to 8000 per month, combined with a reduction of nuisance & traffic unsafety. The electric vehicles also Besides these vehicle kms are driven by electric vehicles (EVs), which results in reducing the emission of the local pollutants NO<sub>x</sub> by 43 to 150 kgs/month and PM<sub>10</sub> by 2 to 5 kgs/month;
- Reducing the total vehicle kms during peak hour between 2000 and 12000 per month. Thereby reducing the congestion in the Bristol-Bath area;
- Reducing the total fossil fuel vehicle kms by 6000 to 14000 per month. Thereby reducing the dependency on fossil fuels and reducing the emission of CO<sub>2</sub> by 1400 to 3000 kgs/month.

This experienced added value by the councils is enhanced by:

- The public authorities enforcing the UCC to use EVs through tender agreements;
- Sustainability problems that acted as catalyst for public intervention: Struggle to meet the European norms on air quality; Bath's world heritage historic center which is to be protected against damage caused by transport; Sever delivery related problems at the Broadmead shopping area.

The UCC is being operated by DHL Exel. This provides additional revenue streams due to internally cross charging of DHL internal transport demand. Next to that this contributed to the UCC being perceived as credible and to operate the UCC efficiently due to their operational know-how and trusted brand. Other elements that helped the service in being trusted are:

- DHL Exel and the Bath & Bristol city councils have been committed to the project success for over 10 years. During which they both put a lot of effort in explaining the UCC concept and intent.
- Service usage is voluntary - no stringent urban policies (e.g. access restriction, time-windows) are in place that enforce UCC usage;
- The 30 years of logistical experience of the UCC manager and his personal network. This played especially an important role in contracting carriers.

DHL Exel does not make profits, but in the past they did recover costs. Also for 2014 it is estimated that that no profits will be realized. Their involvement is driven by that DHL believes that at some point UCC operations become a necessity in urban areas. Operating the UCC provides a strategic opportunity to gain UCC operating experience at low risk; Besides, DHL had to distribute in the area anyway and therefore the UCC provides for additional volume that allows for more efficient distribution.

The Bristol-Bath UCC cannot be considered viable; The Bristol-Bath UCC is very much depended on the city council's subsidies. Without these subsidies the UCC is unlikely to recover costs - without subsidies the losses for 2014 are estimated around 240.000 pound. In the past the subsidies have largely been covered by EU funds. Though, in the in-between period of EU CIVITAS funding this became a significant ongoing financial burden for the councils. The legitimization of these subsidies is not driven by a small scale and agreed upon societal problem for which it is clear how the UCC contributes to this problem. Therefore expenses of this magnitude – for 2014 estimated between £131K and £178K, will be subject of debate and unlikely to survive the cyclical nature of politics. Given this dependency on, and uncertain nature of, the subsidies, the Bristol-Bath UCC's business model is not considered robust, therefore, not viable - not being a UCC that yields greater revenues than costs and is able to sustain this over time.

#### *Explanation for The Regent St. UCC viability*

The Regent St. (Street) UCC viability is driven by a private-partnership between the Crown Estate - a landlord that owns the real-estate on the Regent St., and the Clipper group that operates the UCC. Revenues are generated by selling the logistical services to receivers - i.e. outlets of large retail chains. The UCC offers a value proposition to them by improving service quality, without increasing costs. The quality improvement is enabled by offering a high degree of service flexibility; the UCC offers the receivers control over their supply chain and the ability to optimize resources - e.g. minimize inventory, stock-room facilities and time that employees need to attend deliveries. Inventory holding & distribution related problems drive the experienced added value of the UCC services. The UCC is able to control costs by:

- Not having a dedicated depot – The UCC operations are conducted from an existing Clipper depot;
- The Crown Estate financed 30% of the vehicles purchasing costs;
- Efficient distribution – the load factor is between 75% and 100%.

The Crown Estate's support is leveraged by that the UCC reduces the number of vehicle visits to the Regent St; 207 /month of which 139 were to be during peak. The Regent St. represents the largest concentration of value in the Crown Estate' portfolio, though the Regent St. suffers from congestion that decreases the shopping climate and thereby affects property value. A study sponsored by the public body Transport for London found that delivery vehicles contributed significantly to this congestion. Besides, the Crown Estate enforces Clipper - through contractual agreements, to make use of EVs. Transport Of London (TfL) decides to sponsor this research, because the UCC is contributing to more sustainable urban freight transport, which is of value as London suffering of

congestion, traffic unsafety and struggles to meet the EU norms on air quality. The UCC improves the sustainability by:

- Reducing the vehicle kms in the urban area by 1000 to 15000 per month. Thereby reducing the nuisance & traffic unsafety. Besides these vehicle kms are driven by EVs, which results in reducing the emission of the local pollutants NOx by 33 to 139 kg/month and PM10 by 2 to 6,5 kg/month;
- Reducing the total vehicle kms during peak hour between 6000 and 30000 per month.
- Reducing the total fossil fuel vehicle kms by 11000 to 33000 per month, thereby reducing the dependency on fossil fuels and reducing the emission of CO2 by 1000 to 5500 kg/month.

Clipper's brand and operational know-how helps the UCC being perceived as a credible service provider. The Clipper Group claims to make profits similar to other comparable activities. For 2014 this profit is estimated for 2014 up to 207.000 pound. This profit is very much dependent on the volumes of two large retail chains - H&M & LK Benett. In winning these contracts the 'green credential' of the UCC service played an important role. However, most customers came on the back of other existing contracts. The major difficulty to include new retailers is that most large chain retailers have national logistics contracts. Therefore they are unlikely to award a contract to the UCC for a specific location (e.g. Regent St.). Therefore Clipper cannot easily add to its list of retailers by approaching store managers. Instead, this must be achieved by winning national and regional logistics contracts, which are mostly 'stuck' in long-term agreements. Therefore it is crucial that Clipper has national coverage to compete in such tenders.

#### *Explanation for the BinnenstadService Nijmegen UCC viability*

For this UCC it can be concluded that it was a good initiative that BinnenstadService was helped through subsidies provisioning by the government for the first two years. This is because it was a brand new business, with the aim to improve the city center of Nijmegen, and need to cultivate goodwill amongst the retailers before they are going to make profits. Therefore it is good that BinnenstadService was financially helped with the start-up.

BinnenstadService Nijmegen has chosen to focus on retailers. Therefore it is very important that the delivered service is of good quality. The deliveries by BinnenstadService are additional charges for the retailers, therefore the reduction costs are extremely important to keep up the business. From the predicted revenue stream it can be concluded that they make small profit/stay break-even if all retailers pay their service fee. Currently BinnenstadService is focusing on extra services (i.e. returns) to make the transport experience more positive for retailers. They are also extending their business model towards the carriers. The business model extension is

based on providing transport operators a solution to avoid costly last mile deliveries (Kin et al, 2015). Research among 4 carriers has shown significant time reductions between 5 until 26 minutes per stop. If their tariff will slightly reduce, there will be a potential market share available for BinnenstadService (Franssen, 2013).

The UCC improves the sustainability by:

- Reducing 85 vehicles driving around in the urban area per week, reducing the nuisance & traffic unsafety.
- Reducing 5% truck kilometers and travel-times, leading to a CO<sub>2</sub>-reduction of 50kgs per week.

#### **4. Conclusions**

Key element in explaining UCC viability is evaluating how inclusions of the UCC in the urban freight transport system results in added value for the involved system stakeholders (Porter & Kramer, 2011). These system stakeholders entail: logistics users - carriers, shippers and receivers, public authorities - local, national and European, and the UCC operating entity. For this purpose an analytical framework is developed. The ORBK-framework has provided insight in the value that is created in cooperation beyond the traditional buyer-supplier relation, and beyond the organizational boundaries of the UCC. It can be used as a complementary tool for to map the Business Model Canvas (BMC) of Osterwalder & Pigneur (2010). The framework is complementary to the following BMC limitations: the BMC's strength lies not in providing insight in relations beyond the boundaries of the individual firm; the BMC in itself provides little detail to the design variables which are required for the

identification of the key-success factors. Next to that, the framework enables to uniformly assess UCCs when studying their viability. The developed framework is grounded on scientific literature, reviewed by (field)-experts and improved by the gained insight of studying the empirics.

To put our findings in retro-perspective we can observe some overlapping findings with Gammelgaard et al. (2015) on how the delivery patterns and value adding services positively affect in-store operations especially in terms of more efficient use of store employees and ease of managing store labor. The additional related costs are the key elements to the success of the UCC and are often perceived as severe sacrifices and barriers for further use of city logistics services. In line with their findings we have seen that the UCCs have started with the simple activities in the periphery of the store activities, sometimes subsidies in the startup phase, using the national coverage to obtain more economies of scale. Although national coverage is established by the UCCs we can observe that a general missing participating stakeholders in the business models are the carriers. Although carriers can obtain last mile savings, ranging from 7.56 euro to 8.06 euro per bundled stop (Van den Berg, 2015), the carriers are still reluctant to join the business model and perceive the UCCs more as competitors instead of real business partners. Laurer et al. (2015) argue that the morphology of the city influences the performance of the UCCs. To our findings it is obvious that morphology of the city is not the main influence of success. To our opinion it is definitively based on the values that are offered in the multi-stakeholder business relationships and their related cost and benefit models. The future of viable business models for UCC lies in the recognition and unique design of the value relationships between all the stakeholders.

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