

# FACTORS OF ADOPTION GOVERNING THE EMERGENCE OF URBAN CONSOLIDATION CENTRES

## **Samuel GRANDVAL**

Normandie University, UNIHAVRE, NIMEC  
76 600 Le Havre, France  
[samuel.grandval@univ-lehavre.fr](mailto:samuel.grandval@univ-lehavre.fr)

## **Kanyarat NIMTRAKOOL**

Faculty of Business Administration and Information Technology, Rajamangala University of  
Technology Tawak-Ok Chakrabongse Bhuvanarth Campus  
10 400, Bangkok, Thailand  
[kanyarat.nimtrakool@cpc.ac.th](mailto:kanyarat.nimtrakool@cpc.ac.th)

## **David B. GRANT\***

Hanken School of Economics  
FI-00101, Helsinki, Finland  
[david.grant@hanken.fi](mailto:david.grant@hanken.fi)

**Samuel GRANDVAL** is Associate Professor (with accreditation to supervise research) of strategic management at the School of International Affairs, University of Le Havre Normandy (France), NIMEC Laboratory. His research mainly addresses corporate social responsibility, interorganizational cooperation, business model and agricultural entrepreneurship. He has published several articles in peer-reviewed journals such as *International Management*, *Revue Gestion*, *Revue Internationale PME* or *International Journal of Entrepreneurship and Innovation*.

**Kanyarat Nimtrakool** is Lecturer and Researcher of Logistics Technology and Transportation System Management Department at Rajamangala University of Technology Tawak-Ok Chakrabongse Bhuvanarth Campus. Her research interests are urban logistics, inter-organizational innovation, organizational innovation, decision making and urban consolidation center. She has publications in *Logistique & Management Journal* and *City Logistics II*.

**David B. Grant** is Professor of Supply Chain Management and Social Responsibility at Hanken School of Economics and Bualuang ASEAN Chair Professor at Thammasat University, Bangkok. His research interests include logistics customer service, satisfaction and service quality; retail logistics; reverse, closed-loop and sustainable logistics; and logistics and supply chain relationships. Grant has over 250 publications, is on the editorial board of many international journals, and is a member of the UK Logistics Research Network (LRN), the French Association Internationale pour la Recherche en Logistique (AIRL) and the Nordisk Nordisk Forskning i Material Administration (NOFOMA).

\*Corresponding author

## **ABSTRACT**

This paper investigates adoption factors governing the emergence of urban consolidation centres (UCCs), i.e. before UCC adoption, by various stakeholders and whether a UCC is thus an Inter-organisational innovation (IOI). The paper's objective, using diffusion of innovations (DOI) theory is to understand antecedent factors for UCC adoption (or not). Data collection consisted of observation of the Bristol-Bath UCC operation and semi-structured interviews with stakeholders. Findings supported the proposition that a UCC represents an IOI and increases stakeholder performance in both urban and operational contexts. Contributions include combining aspects of IOI and DOI theory to broaden understanding of stakeholder expectations of adoption factors and determining seven factors that play a key role for stakeholders to adopt this form of innovation and in understanding IOI dropouts: relative advantage, compatibility, complexity, adoption risk, trialability, partner trust, and partner power/government influence.

Keywords: Urban Consolidation Centre (UCC), Logistics pooling, Diffusion of innovation theory, Inter-organisational innovation, Bristol-Bath

## **INTRODUCTION**

The concentration of population in urban areas presents a challenge for urban freight transport to find innovative solutions to efficiently respond to customers' needs (Rose et al. 2016). Urban logistics has become one of the primary topic areas for research and practitioners. For example, the EU's CIVITAS projects include more than 300 researchers and practitioners involved in numerous urban logistics projects (Gonzalez-Feliu 2018). Research into urban logistics over the past twenty years has primarily discussed opportunities to pool logistics between companies to transport goods into a city centre (Boussier et al. 2011; Nimtrakool, Chanut, and Grandval 2014). Gonzalez-Féliu and Morana (2014) defined logistics pooling as the sharing and pooling of logistical resources. The 'urban pooling' concept pools resources for logistics and freight transport activities within urban areas and shares information between different direct stakeholders<sup>1</sup> *e.g.* suppliers, distributors, service providers, local authorities, and retailers, whether they are in competition with one other or not, in offering collaborative services to optimise costs from an economic, corporate and environmental point of view.

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<sup>1</sup> We use the term stakeholders to refer to direct, external stakeholders as defined by Freeman and Dmytriyev (2017) in the operations of UCCs. However, stakeholder theory is not part of our theoretical framework.

This notion of pooling and sharing raises issues regarding inter-organisational collaboration between different stakeholders and the behaviour of stakeholders which have their own performance targets (Taniguchi and Tamagawa 2005). An Urban Consolidation Centre (UCC) is considered one way of effectively implementing such collaboration (Lagorio, Pinto, and Golini 2016b; Johansson and Björklund 2017). Browne et al. (2005, 4) define a UCC as “*a logistics facility that is situated in relatively close proximity to the urban area that serves a city centre, an entire town or a specific site (for example, a shopping centre), from which deliveries are pooled in this area*”. Much research into UCCs has mainly focused on modelling flows to simulate and optimise goods traffic in city centres (Alho and de Abreu e Silva 2015) or adopting a prism of transport (Allen et al. 2012).

The increasing urbanisation towards mega-cities coupled with congestion and a general inability to deliver products to urban stores in a sustainable manner also prompts a need to develop innovative solutions. The concept of a UCC does just this to make urban deliveries more efficient but demands a level of collaboration and coordination hitherto unseen in traditional distribution activities. However, implementation of many UCCs has failed in the long term (Lagorio, Pinto, and Golini 2016a).

Little research has focused on interorganisational innovations in urban areas and factors affecting adoption of innovative strategies or organizations; most research has considered innovations in general (*e.g.* Kaufmann 2007). Indeed, UCCs are a new concept for some urban stakeholders as retailers or city government. Recently, Paddeu (2017) investigated the users’ perspectives of the Bristol-Bath UCC in an urban area of the UK, specifically perceptions of the UCC’s usefulness *i.e.* its services and benefits. Additionally, Paddeu’s work focused on user satisfaction in using this platform and thus the research concentrated on consequences after adopting the UCC.

However, while a UCC is an innovative logistics mechanism for addressing issues of urban/city logistics users need to be persuaded of its benefits to adopt using such an innovation while at the same time recognising shortcomings of a UCC that need to overcome to mitigate the risk of failure. Thus, a UCC as a specific type of organisation requires a more specific explanation of its innovative function in an inter-organisational context of. Indeed, this has an impact on the various business actors by obliging partners to go beyond the usual frameworks in their business sectors to adopt an intersectoral perspective such as a UCC as a third party. So, on the one hand

we have a logistics inter-organizational innovation. On the other hand, to be successful this innovation needs to be adopted by the stakeholders to be implemented.

Therefore, to understand these factors the purpose of our paper is to determine whether a UCC is an inter-organizational innovation (IOI) and propose a theoretical framework based on diffusion of innovations (DOI) theory, which has been frequently used for studying innovation attributes and their influences on innovation adoption (Kapoor, Dwivedi, and Williams 2014).

Our unit of analysis is also the Bristol-Bath UCC, a unique UK organisation, and we investigate factors of adoption governing the emergence of UCCs, *i.e.* before UCC adoption, by adopters *i.e.* retailers and other stakeholders to understand antecedent factors for adoption (or not as the case may be). The Bristol-Bath UCC also gives us the opportunity to ‘close the loop’ on its organisational structure and the roles and motivations of actors within it and stakeholders outside of it. We also seek to understand how this phenomenon of multiple failures might be explained by what various stakeholders require, *i.e.* we focus on the UCC concept in terms of its inter-organisational innovation characteristics and the factors positively affecting its adoption by direct stakeholders. To achieve our paper’s purpose, we develop related research propositions and test their efficacy and validity in an abductive manner by exploring adoption factors and issues influencing decisions in an earlier part of the Bristol-Bath UCC’s emergence, providing our paper’s differential and unique contributions.

This paper first discusses the literature regarding factors that encourage the adoption of UCCs by drawing on DOI theory after having characterised this practice as an IOI. The paper then deals with the methodology and analysis of the exploratory research conducted. Finally, we will conclude by relating the case of the Bristol-Bath UCC and its contribution to theory and practice.

## **LITERATURE REVIEW**

### **Urban Consolidation Centres (UCCs)**

There are many positive attributes of UCCs. One is reducing greenhouse gas emissions (Zanni and Bristow 2010). A second relates to a city’s economy as the attractiveness of a city has been demonstrated by a market for goods delivered in dense areas (Marcucci and Danielis 2007) where a UCC also has the advantage of optimising costs by pooling fleets of delivery vehicles (Allen et al. 2014). The third concerns safety as UCCs can mitigate transport-related risks (*e.g.*

accidents) in cities by reducing the number of vehicles entering and leaving them (Van Rooijen and Quak 2010). A fourth attribute is the improvement of transport organisation by optimising load capacity and a better organisation of delivery rounds (Allen et al. 2014). Finally, UCCs can also offer value-added services to city-centre shops in many cases (Browne et al. 2005).

However, while most retailers in city centres have already consolidated goods in one way or another, it is often not as good as it could be from a local authority's point of view (Van Rooijen and Quak 2010). There are many issues related to UCCs. The first one is reducing greenhouse gas emissions (Zanni and Bristow, 2010), due in particular to a decrease in city-centre congestion (Dablanc 2007). Also, despite the importance of these interests, several UCCs have been aborted *e.g.* SAMP in Barcelona and Cityplus project in Milan, or put on hold *e.g.* ECOGUS in Evora, Portugal or CityPorts in Kavala, Greece. Lagorio, Pinto, and Golini (2016a) investigated such failures at 83 different UCCs and found three main reasons: the high cost of ownership, the lack of stakeholder participation, and the reduction of public funds to support the UCC. Non-participation of stakeholders was also due to their relationships with local governments.

### **Diffusion of Innovations (DOI) Theory and Inter-Organizational Innovation (IOI)**

Several theories and concepts are used to identify the antecedents of innovation adoption however, most of them have been related to technological innovation (Al-Jabri and Sohail 2012). Our paper investigates non-technological innovation and its inter-organizational dimension. In addition, we study both an organizational and network analysis unit. Diffusion of innovations (DOI) theory is considered a benchmark to study factors affecting an individual (or any other type of unit of analysis) when an innovation is adopted (Al-Jabri and Sohail 2012; Chigona and Licker 2008). The result of the DOI theory is represented by acceptance or penetration of a new idea, new behaviour or physical innovation (Al-Jabri and Sohail 2012).

UCCs are a known mode of logistical distribution, especially in Europe, but perceived as new by many stakeholders, especially as regards to participating actors in urban logistics. We consider a UCC as a new concept or innovation for actors in an urban area and also participating in both individual and group business model innovation (Doganova and Eyquem-Renault 2009; Doz and Kosonen 2010). However, relatively little academic attention has been paid to specific issues of supply chain innovation. Arlbjørn et al. (2011) highlight a lack of thorough consideration of both content and conceptual foundations of supply chain innovation. They note

few contributions have been identified that explicitly deal with supply chain innovation and it is difficult to find academic research about drivers for innovation adoption.

Björklund and Forslund (2018) developed a framework for classifying sustainable logistics innovations. However, their study only bridges research streams of logistics and innovation regarding social implications and do not include the question of adoption. However, they suggested testing a framework provided by Schleper and Busse (2013) that is largely inspired by Rogers (2003) as it could provide understanding about the largest inhibiting factors in adopting a logistics innovation.

Björklund and Forslund (2018) also suggested investigating unsuccessful (or not yet implemented) innovation ideas to obtain a better understanding of antecedents for adoption (or not) of a logistics innovation. A traditional logistics approach does not explain much about dropouts of UCC services, hence the need for alternative theoretical frameworks to complement these traditional approaches. Mol and Birkinshaw (2014) argued that literature on diffusion of management innovations focuses on a single innovation and fails to recognize how the innovation's characteristics influence diffusion and implementation processes.

An IOI is thus frequently associated with less radical but more systemic innovations and using a business model approach gives this systemic view (Doganova and Eyquem-Renault 2009; Doz and Kosonen 2010). In order to study the process of UCC adoption we consider different aspects and features of this form of IOI. Our approach using DOI theory is thus our theoretical framework of reference but before presenting it we discuss next why UCCs may be considered an IOI.

Rogers (2003, 11) defines innovation as being “*an idea, practice or object perceived as new by an individual or another unit of adoption*”. A concept or product is considered as being innovative if the person adopting it perceives it as new (Mark and Poltrock 2001). Recent changes in the strategic management literature consider innovation as being beyond technology (Chesbrough 2007) and disruptive innovations are often the ones that affect the reconfiguration of corporate business models (Zott and Amit 2010). Further, Arlbjørn, Haas, and Munksgaard (2011, 8) define supply chain innovation as “*a change (incremental or radical) within the supply chain network, supply chain technology, or supply chain processes (or combinations of*

*these) that can take place in a company function, within a company, in an industry or in a supply chain in order to enhance new value creation for the stakeholder”.*

Kim and Lui (2015) argue organizational innovation will exhibit some or all of the following features:

1. A significant change in learning or knowledge sharing systems;
2. A significant change in production or supply management practices, *e.g.* introduction of Six-Sigma, lean production, and/or supply chain management;
3. Change in work flexibility and interdepartmental integration, *e.g.* introduction of new work systems designed to integrate tasks and/or a substantial delegation of authority to lower levels;
4. Outsourcing of specific functions or departments; and
5. A significant change in collaborative networks with suppliers, customers or government agencies, *e.g.* strengthened collaboration for product development and/or sales information sharing.

We adopt the definition of organisational innovation (OI) from the OECD (2005:51) as the *“implementation of a new method in business practices, workplace organisation or external relations. Organizational innovations can be intended to increase a firm’s performance by reducing the administrative costs or transaction costs, improving workplace satisfaction (and thus labour productivity), gaining access to non-tradable assets (such as non-codified external knowledge) or reducing costs of supplies”*. This definition of OI encompasses the majority of novelty typologies as well as the (internal and external) boundaries of an organisation, by taking into account the firm’s performance as an expected outcome.

Recent works define OI by focusing on the intra and inter-organisational aspects, see for example OECD (2005), Armbruster et al. (2008), and Battisti and Stoneman (2010). OI is thus not limited to the intra-organisational aspects of a company (Lavastre, Ageron, and Chaze-Magnan 2014). Indeed, UCCs are platforms which implement new concepts for some urban stakeholders, which appears new to them in organisational and practical aspects. For retailers, UCCs can reduce their transaction costs or improve their client’s satisfaction, *e.g.*: a driver brings parcels into the storage zone of the store.

Our study therefore takes an interest in the way in which upstream stakeholders have adopted UCCs such as potential users (retailers), decision makers (public and private actors) and operators (service providers). Indeed, our paper adopts a partnership vision as our subject of research, *i.e.* a UCC will involve several public and/or private stakeholders who work together on a logistics platform. A UCC therefore can be an innovation concept for certain of those stakeholders as their perception of it is different from well-known UCC users.

Armbruster et al. (2008) specify that the inter-organizational aspects of OI, or IOI, include new structures or procedures outside the company such as cooperative agreements. Zott and Amit (2010) consider a company's business model to be a system of interdependent activities that transcends the focal firm and extends its boundaries to its partners. These authors believe the design of a business model lies in the way in which it creates and shares value with partners and that a partnership, activity system configuration relates to the system architecture: the content, structure and governance, and the sources of value creation for this architecture.

Mol and Birkinshaw (2014) suggest management innovation is highly iterative and informal. Organizations have no experience or prior routines to fall back on, so the process ends up being rather haphazard and lacking in structure. This is especially true in the motivation and invention phases, due to the ambiguity surrounding organizational problems and what they term 'the multifaceted nature of dissatisfaction' and the intangibility of inventions. The process of management innovation is a relatively complex one, involving a great need for legitimacy and the bringing together of disparate pieces of knowledge and experiences.

This process thus explains the need to involve a variety of stakeholders and knowledge sources, the importance of prior experience, the length of management innovation processes, and the difficulty of capturing management innovation in the act (Mol and Birkinshaw 2014). It also allows us to adapt these concepts to a supply chain setting, *i.e.* a retail UCC, where work on using management innovation theories to help understand phenomenon are lacking, for example Swanson et al. (2017) only note seven articles (0.4%) use DOI theory in their structured literature review of 518 logistics and supply chain articles in eight journals from 1991-2015.

The concept of organized proximity (Torre and Rallet 2005) emphasizes that beyond geographical proximity, the transfer of knowledge and the exchange of information require



proximity in terms of communication, a relationships system of collective rules and the representations to manage the interactions. Management innovations are socially-constructed and organizations must develop new ways of working (Birkinshaw, Hamel, and Mol 2008). External involvement is almost always an important feature of the management innovation process. Barratt (2004) underlined the key role of cultural elements in supply chain: trust, mutuality, information exchange, openness and communication, and suggested that many problems related to supply chain collaboration are due to a lack of understanding of what collaboration implies. Organizations confuse the ‘value’ term that may be derived from collaboration. The cost of wide-scale collaboration implementation would simply outweigh any value derived from such efforts.

Urban pooling implies a cognitive moving from a geographical proximity to an organized proximity with a modification of the routines to coordinate with other stakeholders (and not only companies with the same geographical location). That implies getting in touch with the carriers or logisticians to increase the efficiency of their logistics. Although Barratt (2004) proposed a segmented supply chain approach limiting collaboration to a small scale, the potentially critical number of partners is a more appropriate context for such collaboration. Torre and Rallet (2005) proposed integrating partners within a new institution, *i.e.* through a recomposed, organized proximity enabling resolution of conflicts and the launch of processes for cooperation or negotiation within *ad-hoc* mechanisms.

## **RESEARCH PROPOSITIONS**

Our paper adopts the partnership vision as our subject of research, UCCs, involves several public or private stakeholders who work together on a logistics platform. According to Camisón and Villar-López (2014), an innovation requiring external relations involves implementing a new way of organising relations between firms and/or public institutions such as collaboration with research organisations or with customers, or the methods used to integrate suppliers or service providers. This type of organisation requires a more specific explanation of the innovative function in the inter-organisational context of UCCs.

IOI from a business model perspective enables the steady transformation and experimentation of a trial-and-error process leading to group learning (Doganova and Eyquem-Renault 2009). In addition, such group learning comprises sets of structured and interdependent operational relations between several stakeholders (firm, customer, supplier, partner, etc.) that articulate

actions undertaken (Doz and Kosonen 2010) despite their different objectives. Thus, the business model approach provides evidence of the feasibility of an innovative project and arouses third-party interest through demonstration and persuasion by providing elements of project logic aimed at determining the feasibility and value for the partners brought together. It also plays a role by placing an internal organisational system of interdependent activities into a network of external stakeholders such as suppliers, customers and partners (Sorescu et al. 2011). Indeed, organisations need to adapt itself for providing customers' needs and requests in interorganisational innovation context (Hertz and Alfredsson 2003).

Innovation thus focuses on the ways of governing and the reconfiguration and diversification of business models. (Boissinot and Kacioui-Maurin 2009, 12)) define logistical innovation as *“the introduction of a new offering, new technologies on new markets and/or to new shippers which may imply the reorganisation of processes or a significant change in the job of service provider”*. They identify three IOI criteria relating to levels of IOI: complexity, adaptation to the customer, and control over the process as described in Table 1. UCCs are a multi-stakeholder meta-organisation (MO) involved in sustainable supply chain management (Carmagnac and Carbone 2018). The presence of an MO in the supply chain of members changes the environment and operations for its members. Some bias in the MO's governance and decision-making mechanisms may limit the action of each member however members perceive an innovation regarding to the business model of the MO that supports it.

**Insert Table 1 here.**

A UCC thus represents an IOI having an impact on corporate business models and more particularly the value architecture of each of the partners (Chesbrough 2007). Indeed, it obliges partners to go beyond the usual framework of the business sector's supply chain to adopt an inter-sectoral perspective coordinated by a third party, often a logistics service provider (Leuschner et al. 2014). In this context, firms adopting a UCC signify they are direct stakeholders of that UCC who adapt their supply chain with each other to increase value creation. Indeed, a UCC also provides value-added services to its users (retailers) to meet their needs and requirements. Accordingly, we conclude a UCC is an IOI if the following proposition is met:

***Proposition 1: A UCC increases value creation by modifying the business models of firms adopting it.***

The ways in which potential users perceive an innovation and its characteristics have an impact on the process of adoption (Mol and Birkinshaw 2014). However, there is not much research into what happens *before* IOI adoption, and none of it deals with the adoption of UCCs. Rogers (2003) identifies five perceived features of innovation that influence adoption. His work in his book, *Diffusion of Innovations*, continues to be considered the most important model as regards IOI adoption (Sahin 2006). As suggested by Schleper and Busse (2013) and Björklund and Forslund (2018), we refer to these features as they are relevant and useful for our study, and develop five additional propositions around them.

### **Relative advantage**

Relative advantage can be described as “*the degree to which an innovation is perceived as being better than the idea it supersedes*” (Rogers 2003, 13). Thus, relative advantage results from an increase in efficiency, economic benefits and improved status. Existing research has demonstrated that the relative advantage of an innovation is positively related to its adoption (Zhu et al. 2006), particularly in the context of IOI adoption (Bunduchi and Smart 2010).

***Proposition 2: Relative advantage positively influences UCC adoption.***

### **Compatibility**

Compatibility is “*the degree to which an innovation is perceived as being compatible with the existing values, past experiences and needs of the potential adopters*” (Rogers 2003, 15). Innovation must comply with the way in which users currently work and their values, so adoption depends on their habits or on previous experiences (Sultan and Chan 2000). In an IOI context, the more the system in place is close to or compatible with the innovation, the more organisations will be able to adopt it (Forman 2005). Organizational compatibility corresponds to the degree to which the existing competence needs to change.

***Proposition 3: Compatibility positively influences UCC adoption.***

## **Complexity**

Complexity is “*the degree to which an innovation is perceived as difficult to understand and use*” (Rogers 2003, 15). Ease of use refers to the notion of complexity in academic literature while the difficulty of use perceived by users of innovation comes from a gap between the way in which the innovation works and their previous experiences (Hsiu-Sen and Chia-Chen 2014). Regarding IOI, Barringer and Harrison (2000) argue that complexity may come in different forms such as geographical distance, language differentiation, cultural diversity or legal difference. When looking into the case of a partnership between public and private stakeholders, Esteve et al. (2012) found it essential that public decision-makers choose the most appropriate form of organisation to set up a partnership on the basis of innovation complexity and abilities inherent in each partner organisation. Leroux and Pupion (2011) determined that increased complexity in the form of difficulty of use and lack of visibility of the result have a negative influence on the adoption.

***Proposition 4: Complexity negatively influences UCC adoption.***

## **Trialability**

Trialability is defined as “*the degree to which an innovation may be experimented with on a limited basis*” (Rogers 2003, 15). In technological innovation, trialability refers to the ability to experiment with a new technology before it is adopted (Al-Jabri and Sohail 2012). Thus, potential adopters who can experiment with an innovation will feel more comfortable with it and be more likely to want to adopt it. In IOI, Chigona and Licker (2008) confirmed that innovations that can be tried are intrinsically easier to adopt than those whose entire technology needs to be mastered before use.

***Proposition 5: Trialability positively influences UCC adoption.***

## **Observability**

Observability is defined as “*the degree to which the results of an innovation are visible and accessible to others*” (Rogers 2003, 15) and can be divided into two categories (Moore and Benbasat 1991). The first is visibility of the result, which refers to the ability to organise demonstrations with stakeholders. The second is the actual demonstrability of the result, *i.e.* the ability to demonstrate that users have had positive results. We use both categories in our study.

***Proposition 6: Observability positively influences UCC adoption.***

Rogers' five factors above are those most studied by scholars in the field of innovation. However, research on IOIs has identified other factors influencing adoption of the innovation (Kapoor, Dwivedi, and Williams 2014). Three factors, perceived risk, voluntariness of use, and trust and power, influence adoption of an IOI such as a UCC and we incorporate them with three additional propositions as follows.

**Perceived risk**

Perceived risk is the “*degree of risk associated with the use of an innovation*” (Al-Jabri and Sohail 2012, 382) and represents uncertainty resulting from a possible negative consequence of the use of a product or service (Featherman, Valacich, and Wells 2006). In an IOI context Paluch and Wunderlich (2016) demonstrated that perceived risk by users has a negative influence on the adoption and use of an innovation.

***Proposition 7: Perceived risk negatively influences UCC adoption.***

**Voluntariness of use**

Voluntariness is the degree to which the use of an innovation is perceived as being voluntary or from free will (Moore and Benbasat 1991; Žvanut et al. 2011). Žvanut et al. (2011) tested the voluntariness of use for e-learning adoption and found this phenomenon has no direct effect on the adoption of an innovation. They nevertheless confirmed that voluntariness of use influences the attributes of complexity and observability.

***Proposition 8: Voluntariness of use positively influences UCC adoption.***

**Trust and power**

Inter-organisational relations must be based on a commitment from the partners, several negotiations and cooperative efforts (Shang, Chen, and Liu 2005), and trust and power are two important factors here (Chong and Ooi 2008). Inter-organisational trust rests on two aspects, the partner's intentions and the necessary skills of partner for cooperation (Bueno Merino, 2006). Trust is built from two elements: partner competencies and the belief that partner has the technical expertise necessary to achieve the cooperation's objectives (Harmon, Kim, and Mayer 2015).

The question of power (and its control) in supply chains (Grant 2005) is a recurring problem of inter-organisational governance theories, specifically neo-classical theory. These theories adopt an essentially coercive prism of power. However, the conception of power is different in sociological theories versus neo-classical theories as they attach a central importance to the non-coercive power. According to Yeung et al. (2009), power is the ability of a member of a supply chain to influence the behaviour of other members. This approach is necessary in the case of a UCC. Indeed, integration of supply chain actors more extensively into a stakeholder network complicates the analysis of the influence sets (Ackermann and Eden 2011). Non-coercive power proceeds from identical processes and produces effects similar to those of trust in relationship management (Yeung et al. 2009).

***Proposition 9: Trust positively influences UCC adoption.***

***Proposition 10: A partner's power positively influences UCC adoption.***

Table 2 summarizes the foregoing factors and sub-factors or antecedents of organizational and inter-organizational adoption for of an IOI together with the associated literature for each.

**Insert Table 2 here**

Many studies of IOI have measured the influence of these factors and have provided a divergence of findings and two theoretical gaps. Firstly, DOI theory has improved through technological innovation research but to our knowledge has not had much study in an IOI framework. A second gap consists in the theory of urban consolidation itself. We characterise a UCC as an IOI that allows us to determine antecedents of UCC acceptance through factors of innovation adoption. However, there has not been much research conducted into the upstream UCC adoption process. Our study, therefore, takes an interest in the way in which upstream stakeholders have adopted UCCs using the case of the UK's Bristol-Bath UCC using DOI theory as our theoretical foundation and considering the foregoing factors to investigate their influence on UCC adoption.

## **RESEARCH METHODOLOGY**

We used an abductive methodology (Dubois and Gadde 2002; Kovács and Spens 2005) which is useful if a research objective is to discover new things such as other variables and

relationships and is more about theory development rather than theory building. We adopted systematic combining of Dubois and Gadde (2005:55) that allows a researcher to constantly go “*back and forth from one type of research activity to another and between empirical observations and theory, is able to expand ...understanding of both theory and empirical phenomena*”. Our methodological process used this abductive approach as discussed throughout the paper. Our different stages provided a cybernetic loop between the theoretical and empirical study to observe the inter-organisational relationships phenomenon suited for an exploratory study.

Due to the exploratory nature of our enquiry our empirical study consisted of a single in-depth case study (Yin 2003) of the Bristol-Bath UCC, which is semi-private and which as an IOI provides an appropriate unit of analysis for empirical study. A case study was an appropriate method for this work to investigate the factors of adoption and the strength of their influence identified by actors at the UCC. In urban logistics work, a single case study approach (Yin 2009) has been used considerably in urban pooling contexts (Gammelgaard 2015). Our case study research design was established to investigate in-depth a contemporary phenomenon, in our case adoption of a UCC as an IOI, within its real-world context particularly when boundaries between the phenomenon and context are clearly not evident.

A qualitative approach was also relevant to better specify and understand the expectations of stakeholders on what an IOI is and how this uncommon partnership works. In light of this, we considered it relevant to look at the complexity of the anticipation process of this atypical IOI (Yin 2003). To do so, our study aims to provide a wider vision of the phenomenon and thus necessitated meeting all concerned stakeholders (Eisenhardt and Graebner 2007). Our case study approach for primary data collection was thus qualitative and included fifteen semi-structured interviews conducted with eleven key stakeholders in the Bristol-Bath UCC and two experts in urban logistics, as well as researcher observation of operations during a day of freight delivery rounds.

We considered all direct stakeholders related to the Bristol-Bath UCC as our sample population: two local authorities, the service provider and retailers who adopted or non-adopted. However, most retailers refused to be interviewed due to confidentiality issues and we were only able to conduct interviews with those retailers who local authorities identified to voluntarily

communicate their information. We also interviewed experts who are considered as key informants.

Our main primary data consisted of a series of fifteen interviews, thirteen with eleven key stakeholders in the Bristol-Bath UCC (interviews in English) and two international experts in urban logistics who have had the opportunity to work for (or observe) several UCCs (interviews in French). The latter provided important information which help open the way to more knowledgeable observation and interviewing (Padgett 2016). We consider all fifteen interviewees have tacit knowledge from Leonard and Sensiper (1998, 113) who consider that *“explicit knowledge is shared through a combination process and becomes tacit through internalization; tacit knowledge is shared through a socialization process and becomes explicit through externalization”*.

The interview information allowed us to adjust results between theory and empirical parts in our abductive manner and we reached data saturation when information was repeated by interviewees. All interviews were transcribed verbatim and the data initially analysed by using the antecedents' factors identified through literature review. Each interview was coded manually. The intra and inter-coder reliability checks were realised by different researchers (Miles, Huberman, and Saldaña 2013). The results of the analysis were adjusted by the experts' interviews, enabling the validity of the interpretation of findings. Indeed, in logistics research, this validity and reliability determines research quality (Halldórsson and Aastrup 2003).

In addition, the primary data also includes results of an observation of deliveries with the Bristol-Bath UCC driver, which was an opportunity to discuss perceptions of urban pooling with actors in the UCC. Indeed, we were able to meet six customers during this day of observation, in addition to the delivery man and warehouse staff.

Finally, our study drew on lots of secondary data from a preliminary study of academic articles, study reports, research reports, trade publications, trade reports, etc. to enrich the understanding of the context and the origin of the process of adoption and the stakes.

Details of the fifteen interviews are in Table 3. The aim of these interviews was to understand better what made the UCC an IOI and to investigate the factors influencing its adoption. On the one hand, we talked to stakeholders in the Bristol-Bath UCC. In the interests of data



objectification, we took into consideration profiles of all stakeholders involved in the Bristol-Bath UCC: the local authorities (Bristol City Council and Bath and North East Somerset Council), the service provider (DHL), retailer brand members of the UCC, retailers who are not members, and two retailers who ceased membership. These interviews with potential customers who had not adopted the UCC, customers who had become members of the UCC, and customers who had stopped using the UCC enabled us to gain a comparative perspective of the Bristol-Bath UCC with the other existing UCCs.

**Insert Table 3 here.**

There are several interactions between these stakeholders in dyadic and network relationships. Additionally, the needs of each stakeholders are different due to the public-private partnership nature of the UCC. There is a dyadic relationship between retailers and the service provider and indeed the service provider has relations with other stakeholders (suppliers, distributors, local authorities) involved in the UCC. Interviewing these different categories of actors provided an opportunity to determine different contingencies relevant to developing theories of IOI. There are several logistics flows in the Bristol-Bath UCC between these actors and Figure 1 shows the circulation of flows such as forward goods flow, reverse goods flow, and information flows of all stakeholders of this case study.

**Insert Figure 1 here.**

We recorded each interview and transcribed them and used techniques recommended by (Miles, Huberman, and Saldaña 2013) to analyse the data resulting from the interviews by conducting thematic coding for each of the attributes of innovation. Open coding (Strauss and Corbin 1990) enabled us to identify the precise nature of the attributes of innovation for a UCC. Finally, we compiled an overview table presenting the nature of the attributes of innovation for the Bristol-Bath UCC for discussion among the researchers to summarise, present and analyse the variety of collected data.

We began the empirical study by interviewing the service provider who is the single operator of the UCC and then both local authorities who provide the financing support for the UCC. The latter provided retailer contact details and we were successful in interviewing three retailers, two who have ceased UCC membership and one who continues to use it. We also interviewed

four retailers who have never been members of the UCC. Additionally, we interviewed international experts in urban logistics who had either worked for or observed several UCCs. Their testimonials enabled us to gain a comparative perspective of the Bristol-Bath UCC with the other existing UCCs.

The trustworthiness of qualitative research in a supply chain context can be judged on four criteria: credibility, transferability, dependability and conformability (Halldórsson and Aastrup 2003). The data analysis processes were discussed above to make them transparent and increase the credibility of the study. There is transferability of these findings as work with our experts indicates aspects of UCCs should appear in other European countries and thus our findings appear to be generalizable. Comparisons between interviews were made to enhance dependability. Lastly, the preliminary analysis and results have been presented at conferences and checked by the authors with informants for their correctness to improve conformability.

## **FINDINGS**

### **The Bristol-Bath UCC Case**

The Bristol-Bath (United Kingdom) UCC began in 2004 with the CIVITAS VIVALDI project funded by the European Commission during its first two years of launch (CIVITAS 2013). Bristol City Council was the originator of this UCC, which had four primary objectives:

- Reduce the number of freight transport vehicles;
- Reduce carbon dioxide (CO<sub>2</sub>) emissions and improve air quality;
- Reduce disputes between delivery vehicles and the road users; and
- Provide better-quality deliveries and opportunities for value-added services to retailers (Cox 2015).

Participation in the UCC is voluntary. DHL is the operator managing all the offerings and operations for the shops in the city and an incentive provided for all Bristol city centre retailers to use these services free during the first year of operation (DHL 2015). In 2008, Bristol introduced new pedestrian areas with limited access for delivery vehicles, which encouraged retailers to use the UCC. In 2011, the city of Bath through the Bath and North East Somerset Council, located around 13 miles from Bristol, joined the UCC with the same objectives and the UCC now serves both cities. There are 99 stores in Bristol and 36 stores in Bath selling low-value, non-perishable goods that are currently using it.

The UCC facility or platform is located in Avonmouth on the outskirts of Bristol and is around 10 miles from Bristol and 30 miles from Bath, and has 500 square metres of floor space (Allen et al. 2014). The UCC uses two electric vehicles for one or two delivery rounds per day. The UCC operates 24 hours a day, 7 days a week with orders, deliveries and services all made during the same day. Bristol City Council has given the delivery vehicles authorised access to bus lanes and wider delivery slots than other vehicles since they are electric.

In addition to the UCC's advantages, DHL, as the operator, offers several value-added services according to our interviews conducted with them:

- Same day or next day receipt and delivery of goods;
- The possibility of scheduling delivery times;
- The possibility of storing goods on the UCC platform;
- Easier return or transfer of goods to shops of the same store brand;
- Collection and recycling of empty packaging;
- The possibility of storing goods during festive periods and periods of renovation;
- Repackaging services; and
- Delivery outside shop opening hours.

The two local authorities fund 60% of the project with the remaining 40% coming from invoicing the participants (stores) for services, which enables DHL's operating costs for managing of all the UCC's activities.

### **UCC as an Inter-Organizational Innovation (IOI)**

We summarize characteristics of the UCC into the three dimensions discussed in the literature review pertaining to an IOI and related to our business model approach: increasing corporate performance; inter-organizational aspects; and a source of value creation.

Regarding the first characteristic, the Bristol-Bath UCC increases corporate performance of firms through several aspects. The important aspects are a reduction of costs and CO<sub>2</sub> emissions. The UCC is an alternative solution for retailers to use to decrease their logistics service provider costs compared to their current system. In this case, the partners' power between supplier-

distributors plays its role in using the UCC as denoted by I10: “...as our business grows, we will have more influence on our suppliers and therefore we might be more influenced by what supply chain they used”. Further, a reduction of transaction costs for an IOI has been suggested as an essential aspect. The UCC stakeholders acknowledged this characteristic but its influence is opposite to that discussed as in literature. The global cost of pooling is at a high level so it is necessary for the UCC to benefit from public funding as the cost threshold of adopted retailers is insufficient.

Another UCC influence is a reduction of CO<sub>2</sub> emissions through electric vehicle delivery and a platform establishment close to the city centre that decreases the number of vehicles going into the city centre. Moreover, the Bristol-Bath UCC shows an improvement in work-related satisfaction and therefore productivity. By using this practice, retailers could apply new operational service strategies such as speeding up services and improving service quality. We conclude that the Bristol-Bath UCC increases the corporate performance of adopting stakeholders, but it is a huge cost for local authority to subsidize the UCC’s operations.

The second characteristic concerns inter-organizational aspects. A UCC requires cooperation between different stakeholders, an *ad hoc* governance structure, and a change in the organization of actors’ supply chains (OECD 2005; Armbruster et al. 2008), and the Bristol-Bath UCC actors mentioned diverse elements of this practice. The Bristol-Bath UCC is a platform that requires new structures and procedures, including cooperative agreements, according to I6, I10 and I11. Regarding a new structure, it necessitates the adaptation of all actors (Gammelgaard 2015) including the operator DHL, primary stakeholders and shops as customers in their own structures for using the UCC (I6).

A UCC also requires new inter-organizational procedures within all actors. According to I2b, I6, I6 and I8, these new procedures could be to find new funding sources (*e.g.* European Commission funding) or define relationships between actors such as supplier-distributor, distributor-end-customer, authorities-authorities. For example:

*Yes, it changes the supply chain. To begin with, an additional link is created, meaning that we break the supply chain that is supposed to optimise to the end. It will be broken with an additional link and an additional operator. (I5)*

In the same way, a UCC illustrates an ability to federate among its players. However, one actor who has the capacity to lead and organise must assume the smooth running of a UCC's operations. In this case, public stakeholders and operator are both actors who encourage potential users to use and organise all operations through one logistician, the operator DHL. This element is crucial to run and operate the UCC as an IOI.

Lastly, an inter-organizational aspect contains the sharing of added-value services between the partners as well. A UCC creates a numerous of added-value services as mentioned above. The question of the contribution of these values is required in an inter-organizational relationship such as in this UCC case. All actors use the UCC for different objectives and goals but despite a divergence in some goals, they can find common sharing (I6). We conclude that the Bristol-Bath UCC confirms the inter-organizational characteristics of the business model.

The third-dimension concerns source of value creation which relates to three IOI elements discussed above: the levels of complexity, adaptation to the customer, and control over the process. From a level of complexity perspective, the Bristol-Bath UCC offers numerous services to its actors who collaborate but do not belong to the same supply chain. They share added-value services provided by using this practice despite their different objectives of use (e.g. I2b, I4, I6). Their complexity of service is also different depending on their level of extensive logistics.

Additionally, the Bristol-Bath UCC provides a level of adaptation to customers in the interactions between the UCC operator DHL and its customers. It supports customer expectations such as the rate of satisfaction for goods, for the quality of trucks and goods, additional services, delay of delivery according to I1, I2b and I6. Finally, the Bristol-Bath UCC contributes a level of control over the process of the UCC operator. Some actors (e.g. I1, I5) identify that selected operator DHL as having the ability to offer services and additional solution to customers and other stakeholders' needs.

We conclude the Bristol-Bath UCC represents a source of value creation in modifying the business model. In summary, the three pillars identifying a UCC as an IOI business model by increasing corporate performance, representing inter-organisational aspects and be the source of value creation. ***Consequently, this study supports Proposition 1.***

## **Influence of Factors on Adoption of the Bristol-Bath UCC**

We found evidence of all nine factors discussed above regarding innovation adoption, but our study did not support two factors and partly supported a third. We found that factors may operate as a facilitator or inhibitor and we have classified these factors into those two categories where a facilitator influences positively, and an inhibitor influences negatively.

### ***Relative advantage and Partner power***

The relative advantage of using a UCC is quite visible for small and medium store brands, as it could be an opportunity for them (*e.g.* I4, I7) to reduce their storage space, have a wider delivery time range and value-added services and the time needed for shelving or returns management (empty pallets, products) for the retailer (*e.g.* I4).

Economic gain is also perceptible to the extent that costs resulting from this innovation are borne 60 percent by the public sector; this governmental influence and the power of partners were identified by Rogers (2003) and Chong and Ooi (2008). In the case of the Bristol-Bath UCC, power becomes an important endogenous sub-criterion of relative advantage as the local authorities are stakeholders in the production of the innovation. Financial support (aid from Europe for example) is an important factor that stimulates initiatives to adopt the UCC and provides access to an extended service at a cost partially or totally borne by public funding. Shopkeepers who do not adopt or who put an end to their participation in the UCC are worried about the costs that this may represent over time (*e.g.* I7, I9).

The local authority (I2a) and the operator (I4) highlighted advantages relating to UCC adoption in comparison with what existed beforehand for neighbourhood shops and for the operator. The UCC can assist store brands by delivering their goods outside delivery times authorised by the local authorities due to the electric vehicles or the offering of value-added services provided by the operator that helps the store brands and the operator to gain money (I4, I7).

We conclude that the factors underlying Proposition 10 are endogenous factors of Proposition 2 and they all positively and strongly influence adoption of the UCC. ***Consequently, this study supports both Propositions 2 and 10.***

### ***Compatibility and Perceived risk***

Compatibility is a potential problematic factor in the case of the Bristol-Bath UCC and is the main risk when it comes to hindering adoption hence we combine these two factors here. The adaptation of logistics is not problematic as far as independent store brands are concerned. On the other hand, large store brands (department stores and franchises) with their own supply chains have to adapt them to adopt the UCC and these adaptations may be badly perceived and economically risky in terms of efficiency and effectiveness according to I8. Store brands already integrated into a supply chain may see the adaptation of their logistics as a constraint and prefer carrying on operating with their own supply chain (*e.g.* I10 and I1).

However, for the local authorities in charge of the project and its governance, it is a matter of investing in a domain that is not their core business and for which they have no skills. Thus, for them, the UCC represents a huge risk from an economic and legitimacy point of view. It is nevertheless of no significance for an interviewee representing the local authority, as this UCC is one of the first to exist there is little previous experience (I3a). Even if the local authorities are at the origin of the initiative of adopting the UCC, the latter represents a completely new organisation for them. They have adapted to it in their own way. There is a process of learning in co-construction: the exchange of ideas and the relations between public/private partners remain very useful in the process of the operationalisation of the UCC. They help to find solutions and solve problems together (I3a).

There is no problem of compatibility for the operator DHL; this is their core business as a logistics service provider (*e.g.* I1, I4). Both these interviewees from the logistics service provider mentioned the compatibility of the UCC with their systems on both technological and organisational levels (I4).

In summary, the logistics service provider operator believes that adopting the UCC is nothing new for them; it is their business and they were one of the first to enter into this partnership. For the store brands with their own quality control or consolidation operations, the adoption of a UCC will change their usual culture and therefore slow down its adoption. However, the fear of losing flexibility, due to consolidation, is also evident with store brands (*e.g.* I7, I10, I8), but not perceived in that manner by the local authorities who believe adoption of the UCC remains close to the social system of neighbourhood shops and therefore helps them more in their daily tasks (*e.g.* I3). Through this evidence, we conclude that the compatibility influences positively

and strongly to the acceptance of the UCC. Furthermore, the evidence confirms that risks associated with adoption are a factor that negatively influences UCC adoption. ***Consequently, this study supports both Propositions 3 and 7.***

### ***Complexity or Ease of use***

The operator, a logistics service provider, noted the ease of adoption and use of a UCC as they already have knowledge and experience in this field thanks to the control over their business (e.g. I2, I4). Further, for retailers and store brands pooling does not present problems of use when the approach is clearly explained, and expectations are taken into account (I4, I10, I11).

The local authorities did not identify UCC adoption as being easy but did not say it was difficult either. Their lack of knowledge and the awareness hinders adoption (e.g. I3). This results in a greater impression of complexity for the local authorities but does not negate the advantages they hope to gain. The local authorities' lack of skills in the governance of the UCC, even if operationalised by someone else, is a risk factor for potential customers who may fear the process will be badly controlled.

Complexity negatively influences UCC adoption but not as strongly as relative advantage, partners' power, compatibility and risks. In addition, risk is also present regarding complexity as an interaction relationship between these two factors. ***Consequently, this study supports Proposition 4.***

### ***Trialability***

Retailers were able to test the UCC free for one year to overcome any possible adoption reluctance and this greatly helped its adoption. Likewise, the existence of a process of learning in co-construction makes the compatibility with the former social system easier and the use of the service easier and of better quality (e.g. I3b).

The existence of this formalised process of improvement is likely to convince other potential customers. In the case of the UCC, there was the possibility of testing the operation over a four-month trial period before the three primary stakeholders made a contractual commitment. This trial period enabled them to obtain feedback on initial operating results as well as proving its capabilities to the main funder, the European Commission, before setting up the UCC.



Moreover, the neighbourhood stores had a period of free use of the UCC's services during the first year of operation (e.g. I1, I2b).

Nevertheless, retailers do not always perceive trialability as a decisive argument for adoption and continuance, as that process appeared very simple for the actors who ceased their UCC membership (e.g. I8, I9). Other retailers, whether adopters or not, who consider logistics more strategic have clearer perceptions (I8, I9).

We conclude that trialability positively influences UCC adoption but only for the three stakeholders as the retailers considered it non-influential in their decision process. ***Consequently, this study supports Proposition 5 but only in case of the Bristol-Bath UCC stakeholders and not the other actors.***

### ***Observability***

As discussed above observability has two aspects: visibility and demonstrability of results. Visibility of the results can be defined by measurable criteria: urban congestion and the emission of greenhouse gases. These criteria may affect urban logistics (Browne and Gomez 2011). Further, the number of retailers who are UCC members provides additional evidence for potential customers that the system works properly and offers advantages. Two main store brands in the UK, Tesco and Sainsbury have been using logistics pooling for their own goods in distributor-supplier relations since the 1990s (I4). After the trial period, the results clearly show the stakeholders gains with respect to their targets through the increase in the number of shops using the UCC (e.g. I1, I3a, I4, I11). Moreover, they met their targets to reduce pollution and the number of non-electric vehicles in the city centre and such evidence encourages stakeholders to continue using the UCC platform. Nevertheless, retailers did not identify observability as a factor necessary for their decision of UCC adoption despite results of use being an important factor in their decision to continue to use it such as service (I8, I9).

As for the demonstrability of the results, the players perceive the benefits of using the UCC such as the value-added services, the effectiveness of optimising the delivery vehicles through pooling or the reduction of CO<sub>2</sub> (I2b, I11). Although some actors of the Bristol-Bath UCC perceive both visibility and demonstrability of results, others did not perceive these factors. The evidence of all actors is two contradictory perceptions. We conclude that observability can be

accepted to influence on UCC adoption, however, its essential perception for some actors. ***Consequently, this study does not support Proposition 6.***

### ***Trust***

Chong et Ooi (2008) and Shang et al. (2005) identified the role of *ex-ante* trust factors for innovation adoption. Trust in the recognised technical skills (Bueno Merino, 2006) of the UCC operator (DHL) establishes its legitimacy that makes adoption of this naturally complex IOI. Trust in the benevolence of the partners is also a determining factor, *i.e.* “*trust based on the benevolence of a partner, or moral trust, reflects the belief that this partner intends to make its best efforts to optimise the relational gain*” (Bueno Merino 2006, 101) as demonstrated between the different local authorities (I2b, I3).

There is trust in the partners’ technical skills as well as in the benevolence of the partners when it is a matter of the advantages of the UCC hub (*e.g.* I2b, I3, I7, I10, I11, I12). Surprisingly, the retailers who ended their UCC membership do not perceive trust as a determining factor (I8, I9) and we can draw two inferences here. The first is that these actors believe the technical skills underlying pooling are not very complex as pointed out above under trialability. The second is that these actors do not perceive the need for relational dynamics that this inter-organizational cooperation implies and may explain why they withdrew. They may believe the contract entered into with the operator is a commitment to be complied with by the operator, hence the insignificance of *ex-ante* trust from their point of view (I7).

We conclude from this evidence that actors consider trust between partners positively (Grant 2005) and strongly influences UCC adoption. ***Consequently, this study supports Proposition 9.***

### ***Voluntariness of use***

The concept of voluntariness of adoption did not generate any discussion as actors perceived a lack of constraint here and considered a non-influencing factor in the adoption of the Bristol-Bath UCC (*e.g.* I2b, I4, I11, I7, I8, I9). ***Consequently, this study does not support Proposition 8.***

Table 4 provides an overview summarising the above findings related to the propositions.

**Insert Table 4 here.**

## **CONCLUSIONS**

This paper investigated whether urban consolidation centres (UCCs) represent an inter-organizational innovation (IOI) by proposing a theoretical framework based on diffusion of innovations (DOI) theory and test nine related propositions. We found that a UCC does represent an IOI and that six of the propositions were supported with one partially supported and two not supported. IOI theory was deemed an insufficient framework for the understanding of the ‘multifaceted nature of dissatisfaction’ of an IOI (Birkinshaw and Mol 2006). Combining theory may be powerful in this case (Spence *et al.*, 2011), however our research is at several intersections of DOI and IOI theories in a UCC context as shown in the Venn diagram in Figure 2. This paper’s contributions and a discussion of Figure 2 follow.

**Insert Figure 2 here**

### **Theoretical contributions**

The first theoretical contribution from our study of the Bristol-Bath UCC related to whether a UCC is an IOI that increases the performance of stakeholders in an urban sustainability context and/or an operational context (*i.e.* zone D in Figure 3). We found innovation in inter-organizational aspects as there was an introduction of new collaboration forms with an *ad hoc* structure (*i.e.* meta-organization) and an associated mode of governance to manage an innovative project with specific objectives that implies an organisational review of how subscribers operate in accordance with Carmagnac and Carbone (2018). The support of proposition 1 has shown that to be the case regarding the Bristol-Bath UCC, it is an IOI.

The study also identified and summarized important factors from the literature on organizational innovations, particularly IOI, that make adoption of UCCs easier by basing our work on the literature relating to DOI theory (zone B). Our study also showed the relevance of the explicative theory framework of the factors UCC adoption, despite it being an IOI and not a technological innovation.

Our study confirms that seven factors are important for all stakeholders accepting this kind of innovation like the Bristol-Bath UCC: relative advantage, compatibility, complexity, perceived adoption risk, partner trust, partner power/government influence and trialability (to some

degree). These factors support extant literature in innovation adoption. Particularly, relative advantage, government influence and ex-ante partner trust strongly and positively influence UCC adoption. However, we did not find support two factors: observability due to contradictory evidence from interviewees and voluntariness of use with any actor. Those findings suggest these factors may not be important for adoption of a UCC as an IOI and so inform IOI theory from a contextual perspective.

The second theoretical contribution comes from combining aspects of both IOI and DOI theories. This research has broadened our understanding of the expectations of stakeholders on what an IOI is (zone C). These expectations of DOI adoption factors are the future seeds of problems in implementation and even in the capacity to ensure the sustainability of the IOI. We contribute to the literature on diffusion of management innovations by demonstrating the cumulative and non-exclusive characteristics of these theories (DOI and IOI). This study therefore contributes to identifying, beyond the general concepts of IOI, that adoption factors of an innovation have a key role for understanding case of IOI dropouts. IOI theory previously has not recognized how an innovation's characteristics influence diffusion processes.

### **Managerial contributions**

The third contribution of this study is managerial by providing management and stakeholders in practice with an analysis framework to enable better understanding of the difficulty of UCCs emerging and continuing over time. Indeed, we noted above that several UCCs have ceased. This leads to an opening of a discussion into the possible coercive power of local authorities as a factor encouraging UCC adoption as they have potential levers of action. In other words, in the case of UCCs this attribute may have the opposite effect to those observed in the literature. It may be that local authorities could resort to coercive power related to their regulatory possibilities to make the retailers adopt the UCC, but we did not find this strong lever used in the case of the Bristol-Bath UCC.

Relative advantage appears as the most important incentive factor for IOI adoption with a positive perception in terms of value creation in this business model. On the other hand, complexity is not perceived as an obstacle by the actors whose urban logistic pooling is not their core business (*e.g.* local authorities and retailers). These findings show that the actors have a clear representation of what the results might be - even overestimate them - but that they outweigh the difficulty of implementation. This point of view is in accordance with Mol and

Birkinshaw (2014) where an IOI is frequently associated with less radical but more systemic innovations and can deceive stakeholders who have an incremental perception of the IOI. They can perceive the creation of value globally but do not perceive the risks associated with the systemic organization of the IOI. These adoption factors of DOI thus provide a theoretical analysis grid which makes it possible to better understand what the intangibility impact is to an IOI on bad perceptions of what it implies in terms of setting up routines and new ways of working (Barratt 2004; Birkinshaw, Hamel, and Mol 2008; Mol and Birkinshaw 2014; Kim and Lui 2015). Managers therefore need to be cautious when estimating the potential effects of UCC adoption and the costs to do so.

In accordance with Torre and Rallet (2005), stakeholders confused proximity and localization (zone D). They had expectations only on a geographical proximity view but not on an organized proximity view and thus underestimated the tension between geographical and organized proximity. In a UCC context the constraint of co-localizations for pooling neglects the fact that collective rules and representations do manage a part of the interactions. Integrating stakeholders within the UCC organization through a re-composed organized proximity within *ad-hoc* mechanisms is a complex way of working with new routines (Birkinshaw, Hamel, and Mol 2008; Mol and Birkinshaw 2014).

The only risk identified was funding sustainability of the UCC. To initiators of a UCC, generally local authorities, we suggest the following for a well-managed collaboration underpinned by trust and proper support:

- Communicate largely on the operation of the UCC;
- Create interactions among stakeholders to generate trust regularly;
- For the management of the logistics operations, it may be necessary to use well-known a logistics service provider that other actors can trust in terms of technical capabilities (*e.g.* logistics management);
- Use non-coercive powers wisely; and
- Commit to funding of the UCC to alleviate adopter risk and ensure sustainability.

## Limitations and Future Research

As with all research, there are several limitations to our work. The first is the specific character of a semi-private UCC. It would be beneficial to compare this type with another type of UCC to better identify its specific characteristics in terms of adoption factors. The second relates to the unique character of the case study, which is necessary to understand better processes and factors of adoption and abandonment of a UCC. A large-scale quantitative study of several UCCs, regardless of their type, to test systematically factors and UCC characterisation as an IOI and validate the various propositions will enable broader generalisations. For future research, the study of the interactions among adoption factors of UCCs is interesting to understand their influence on them and on UCC emergence. In addition, a study of inhibitors to UCC adoption can be another way to understand the reasons for the stopping the operation of most UCCs as business models, especially from an economic aspect. Finally, these factors can be used to test another form of IOI adoption context where several stakeholders collaborate.

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**Table 1: Characterisation of inter-organisational innovation (IOI) as regards a UCC**

<b>Criteria for inter-organisational innovation (IOI)</b>	<b>Description according to Boissinot and Kacioui-Maurin (2009)</b>	<b>Description of inter-organisational innovation for UCCs</b>
Level of complexity	The level of complexity refers to the scope and added value of the services offered to customers. Logistical services may range from transport alone (Sharman et al. 1999, 66) to the implementation of complex services (Delfmann, Albers, and Gehring 2002).	A UCC is a partnership between private and public stakeholders. A company collaborates with players that do not belong to its supply chain, whose core business is completely different to its own (intersectoral perspective). A company partners up with these stakeholders which have a different objective to it, but with which there may be converging interests in order to preserve its legitimacy (Doz and Kosonen, 2010; Doganova and Eyquem-Renault, 2009; Carmagnac and Carbone, 2018)
Level of adaptation to the customer	This corresponds to the ability of a service provider to develop and implement services meeting customer needs and requests (Hertz and Alfredsson 2003, 141).	Urban pooling enables retailers to benefit from new services and advantages in terms of cost improving their profit equation (Sorescu et al. 2011).
Level of control over the process	This corresponds to the ability of a service provider to provide services depending on the ownership of assets and the type of solutions offered to customers (Persson and Virum 2001) such as own service provision, partial or total subcontracting.	Pooling leads partners to constantly review their processes within a UCC in order for the latter to be viable. It implies a continuous revision of the company's integrated supply chain business model, to include other players in the UCC processes in order to pool goods in a city centre (Carmagnac and Carbone, 2018).

**Table 2: Antecedents for adoption of organizational and inter-organizational innovations**

<b>Factors</b>	<b>Sub factors</b>	<b>Influence</b>	<b>References</b>
<b><i>Antecedents of the adoption of organisational innovation through the Diffusion of Innovation Theory (DOI)</i></b>			
Relative advantage	Economic factor – social status and image – inventive innovation – perceived utility	+	(Mansfield 1968; Rogers 2003; Zhu et al. 2006; Tan et al. 2009; Bunduchi and Smart 2010)
Compatibility	Anterior value and belief – passed experiences – existed need	+	(Sultan and Chan 2000; Rogers 2003; Zhu et al. 2006; Bunduchi, Weisshaar, and Smart 2011; Tully 2015)
Complexity	Complexity to understand – complexity to use	-	(Teo and Lim 1996; Barringer and Harrison 2000; Rogers 2003; Leroux and Pupion 2011; Liang and Lu 2013; Rakhi and Mala 2014; Hsiu-Sen and Chia-Chen 2014)
Trialability	Testability – flexibility	+	(Kendall et al. 2001; Rogers 2003; Chigona and Licker 2008; Liao and Lu 2008; Al-Jabri and Sohail 2012; Even Fallan 2015)
Observability	Visibility of result – demonstrability of result	+	(Moore and Benbasat 1991; Rogers 2003; Lin and Chen 2012; Evan Fallan 2014; Safari, Safari, and Hasanzadeh 2015)
Perceived risk	Financial risk – confidential risk – functional risk – temporal risk – social risk – psychological risk	-	(Featherman and Pavlou 2003; Featherman, Valacich, and Wells 2006; Glover and Benbasat 2010; Al-Jabri and Sohail 2012; Paluch and Wunderlich 2016)
Voluntariness of use		+	(Moore and Benbasat 1991; Venkatesh et al. 2003; Hsu, Lu, and Hsu 2007; Zhou 2008; Žvanut et al. 2011)
<b><i>Antecedents of the adoption of interorganisational innovation</i></b>			
Trust	Competence trust – wellness trust	+	(Shang, Chen, and Liu 2005; Chong and Ooi 2008; Ke et al. 2009; Harmon, Kim, and Mayer 2015)
Partners' power	Non coercive power – coercive power	+	(Lee 2001; Jasperson et al. 2002; Shang, Chen, and Liu 2005; Chong and Ooi 2008; Ke et al. 2009; Yeung et al. 2009)

**Table 3: Details of the interview conditions**

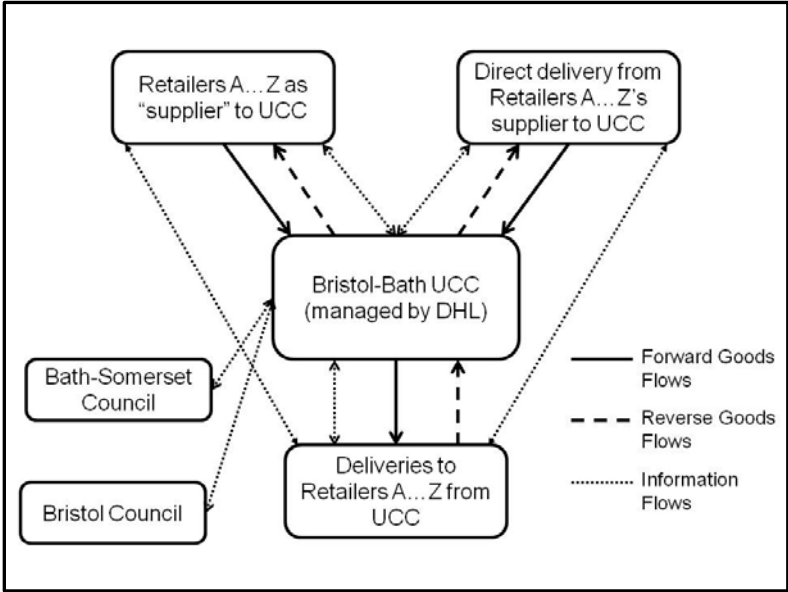
<b>Interview Number</b>	<b>Code</b>	<b>Stakeholder/ Experts</b>	<b>Position of respondent</b>
1	I1	DHL	Logistics manager
2	I2a	Bristol City Council	Transport and scheduling
3	I2b		
4	I3a	Bath and North East Somerset Council	Transport and scheduling
5	I3b		
6	I4	DHL	Managing director of Bristol-Bath UCC
7	I5	Urban logistics consultancy firm	Director of urban logistics consultancy firm
8	I6	Ex-Sephora consultancy firm	Director 7 years as International Supply Chain manager
9	I7	Retailer not adopting UCC in Bristol	Retail manager
10	I8	Retailer having stopped membership of the UCC in Bath	Managing director and retail manager
11	I9	Retailer having stopped membership of the UCC in Bath	Managing director and Retail manager
12	I10	Retailer not adopting UCC in Bath	Managing director and retail manager
13	I11	Store brand member of the UCC in Bristol and Bath	Director of International Transport
14	I12	Retailer not adopting UCC in Bath	Retail manager
15	I13	Retailer not adopting UCC in Bristol	Retail manager



**Table 4: Results pertaining to propositions 2-10**

<b>Proposition Number</b>	<b>Factors</b>	<b>Influence</b>	<b>Support for Proposition</b>
2	Relative advantage	+	Yes
3	Compatibility	+	Yes
4	Complexity	-	Yes
7	Perceived risk	-	Yes
9	Trust	+	Yes
10	Partner's power	+	Yes
5	Trialability	+	Partial support, only UCC stakeholders
6	Observability	+	No
8	Voluntariness of use	+	No

**Figure 1: Flow chart of the Bristol-Bath UCC supply chain (Authors)**



**Figure 2: Urban Consolidation Centre adoption at the crossroads of DOI and IOI theories (Adapted from Spence, Gherib, and Biwolé (2011))**

