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SUPPLY CHAIN INNOVATION:
A CASE OF SUSTAINABLE URBAN FREIGHT TRANSPORT IN THE NETHERLANDS

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ABSTRACT

Purpose of this paper

This study describes a case on sustainable city centre distribution in the Netherlands and provides insights into the attitudes of and (potential) costs and benefits for two important stakeholders: retailers and logistics companies.

Design/methodology/approach

A combination of both quantitative and qualitative methods is used. The research describes a case on city centre distribution, which aims to decrease freight traffic in the city centre and thereby to improve the quality of life, air quality and accessibility. Interviews were held with retailers and logistics companies. A survey was conducted among retailers.

Findings

The attitudes towards Binnenstadservice.nl are mixed among the stakeholders. Participating retailers are very positive about the initiative, while many non-participating retailers still have some reservations. Logistics companies are also quite positive towards the initiative.

Research limitations/implications

This paper is a practical description of a new way in which city centre distribution can be organized. Further research suggestions to include other stakeholders or to take a more theoretical angle towards this subject are provided.

Practical implications

Governments, retailers and logistics companies can use the insights from this case to develop or improve their own initiatives with regard to sustainable goods distribution in city centres.

What is original/value of paper

Although urban freight consolidation centres have been subject to many studies, research on the effects of these centres on the wider supply chain is lacking. This study describes the effects on other parties in the supply chain, namely retailers and logistics companies.

Keywords: Urban freight transport, sustainable distribution, consolidation centre, supply chain, innovation

1. INTRODUCTION

For city centres to serve as the beating hearts of urban areas, transportation of goods is essential. Shops, restaurants and bars need to be supplied to be able to serve customers. Besides their economic importance as hubs for trading and industrial activities, which are key to wealth generation (Browne *et al.*, 2007), city centres often fulfill an important role with regard to leisure activities (Quak and De Koster, 2007).

To enable these industrial, trading and leisure activities in a way that is sustainable to people, planet and profit is difficult. Urban freight traffic is one of the most important sources of unsustainability in urban areas (May *et al.*, 2003). "It is responsible for fossil fuel use, global warming and acidification through global pollutant emissions, injuries and deaths resulting from traffic accidents, and the consequences of (local) emissions on public health. Furthermore, it is responsible for noise, congestion and decreased city accessibility, visual intrusion, vibration, loss of greenfield sites and open space, and damage of infrastructure and (historical) buildings from heavy vehicles" (Quak and De Koster, 2007: 1103). These negative externalities make freight transport unsustainable to people and planet.

The purpose of this study is to describe an innovative case on sustainable city centre distribution in the Netherlands and to provide insights into the attitudes towards the initiative as well as the costs and benefits for two important stakeholders: city centre entrepreneurs (retailers) and logistics companies. The case is situated in Nijmegen, a medium-sized city in the Netherlands, and is called *Binnenstadservice.nl* (city centre service). It can be classified as an urban freight consolidation centre.

Many initiatives have been developed to reduce the negative impact of urban goods distribution. A major part of the initiatives have focused on consolidating goods in urban freight consolidation centres (Browne *et al.*, 2005). According to Ljunberg and Gebresenbet (2004) much can be gained by coordinating goods distribution. Browne *et al.* (2005: ii) state that "in the right circumstances there are realistic opportunities for UCCs [urban consolidation centres] and therefore the concept should be progressed in the areas of greatest potential". However, in practice, many urban freight consolidation centres have failed.

Although urban freight consolidation centres have been subject to many studies, research on the effects of these centres on the wider supply chain is lacking. However, for these centres to become a success, it is crucial to have the support of the two most important stakeholders: retailers and logistics companies (Brown *et al.*, 2005). These players in the supply chain need to be willing to participate, otherwise a consolidation centre is likely to fail. Therefore, this study aims to answer the following questions:

- What are the attitudes of the most important stakeholders, being the retailers and logistics companies, towards this initiative in sustainable city centre distribution?
- What are the benefits and costs associated with the use of this urban freight consolidation centre for retailers and logistics companies?

The paper is structured as follows. First, the case of Binnenstadservice.nl will be shortly described, followed by the methodology. Thereafter, the results of the interviews and survey will be presented and finally, the conclusions, managerial implications and suggestions for further research will be discussed.

2. LITERATURE REVIEW

Urban goods distribution has been of interest to researchers for a long time. As early as 1958, Horwood noted the problem of congestion caused by urban goods traffic. According to a *Traffic World* editorial (cited by McDermott and Robeson, 1974, p. 166), transporting small shipments by trucks within an urban centre was “the most important US transportation problem of the 1960s”. However, not only back then, but also today, many cities in different countries still face the problems of urban freight transport and the problems are increasing (Browne *et al.*, 2007; Van Binsbergen and Visser, 2001).

The problems surrounding goods distribution in urban areas are mainly caused by the clash of interests between different stakeholders (Munuzuri *et al.*, 2005). An important stakeholder in this regard are the logistics companies (carriers) and shippers operating their own transport. Urban areas are often characterized by a high number of small shipments being delivered to retail outlets and office buildings. This practice leads to high operating costs for logistics companies. Research shows that costs for serving inner cities can be as much as 112% higher than for surrounding areas (McDermott and Robeson, 1974). Capacity utilisation of vehicles entering urban areas is generally low, with means of around 40% being reported in the literature (Ljungberg and Gebresenbet, 2004; McDermott and Robeson, 1974). Furthermore, congestion and long queuing times further increase operational costs for logistics companies (Golob and Regan, 2000).

Another important stakeholder in urban goods distribution are the receivers of the goods, such as retail outlets, industrial operations and office buildings. Receiving deliveries from different vehicles throughout the day causes inefficiencies on the side of the receiving party (McDermott and Robeson, 1974). Employees need to handle the deliveries and cannot spend this time on other tasks.

Besides the economic inefficiencies for both logistics companies and receivers, the large number of small shipments also lead to high environmental costs. Most freight vehicles use much energy and contribute heavily to air pollution and noise emissions (Browne *et al.*, 2007). Thereby, quality of life (important to visitors, inhabitants, and local governments, among others) is decreased.

Several solutions to decrease the negative effects of urban freight transport have been proposed and also implemented (Anderson *et al.*, 2005). In Europe (e.g. Germany, the Netherlands, France and the UK), several initiatives in the area of city logistics have been developed. City logistics aims at globally optimizing logistics systems within an urban area by considering the costs and benefits of schemes to both the public and private sector (Taniguchi *et al.*, 2003). City logistics can be defined as the process for totally optimizing the logistics and transport activities by private companies with the support of advanced information systems in urban areas considering the traffic environment, its congestion, safety and energy savings within the framework of a market economy (Quak and De Koster, 2006). According to Crainic *et al.* (2004), most current city logistics projects are based on cooperation and the utilization of a city distribution centre (i.e. urban consolidation centre (UCC)). These centres can be described as “logistics facilities that are situated in relatively close proximity to the geographic area that it serves, be that a city centre, an entire town or a specific site (e.g. shopping centre), from which consolidated deliveries are carried out within that area. A range of other value-added logistics and retail services can also be provided at the UCC” (Browne *et al.*, 2005, p. i).

A number of studies has focused on the (potential) benefits and costs associated with urban consolidation centres. Some economic benefits are improved load factors in delivery vehicles, improved accessibility for larger trucks (that can now deliver goods to the consolidation centre instead of the inner city), lower operation costs for logistics companies, improved accessibility and more efficient use of time for receivers of goods (Browne *et al.*, 2005; McDermott and Robeson, 1974; Munuzuri *et al.*, 2004). Environmental and societal benefits that can be identified are a reduction in the number of vehicle movements, less pollution, less noise and in general, a higher quality of life (Browne *et al.*, 2005; McDermott and Robeson, 1974).

3. BINNENSTADSERVICE.NL

Binnenstadservice.nl is a private organization aimed at reducing freight transport movements in the city centre of Nijmegen, a medium-sized city in the Netherlands. To reach this goal, they established a distribution centre just outside the city centre. The initiative started by asking retailers in the inner city to participate. Retailers who agree to participate tell their suppliers to no longer deliver goods to their shops in the city centre, but instead to Binnenstadservice.nl. Binnenstadservice.nl consolidates the goods and delivers them to the shops by trucks (on natural gas or electricity) or transport bicycles. By consolidating goods Binnenstadservice.nl hopes to reduce freight transport movements and thereby to improve the quality of life, air quality and accessibility of the Nijmegen city centre.

The initiative was started in April 2008 and had a trial phase of one year. After the trial, it was decided to continue the service. At that point in time, 85 retailers had agreed to participate. Furthermore, the initiative received much interest from logistics companies and local governments, who wanted to establish a Binnenstadservice.nl in other cities.

To make it more attractive for retailers to participate, Binnenstadservice.nl provides the basic service (consolidation of goods and distribution to shops) for free. During the trial phase, they were subsidized by the local government. However, after the trial they had to be financially successful in their own right. Revenue is generated by offering extra (paid) services, such as warehousing, price ticketing and labeling, picking up and sending packages on behalf of retailers, and collection of packaging materials. Furthermore, Binnenstadservice.nl approaches logistics service providers and suppliers operating their own transport to see whether Binnenstadservice.nl can add value for them by taking over distribution to the city centre and whether they are willing to pay for it. However, Binnenstadservice.nl only takes over transport to a specific retailer if this retailer agrees to participate in Binnenstadservice.nl.

Binnenstadservice.nl’s objective is not to take over all urban freight transport in the city centre. Large retailers operating their own distribution centres and receiving full truck loads at their outlets are not seen as potential beneficiaries of Binnenstadservice.nl. They focus on retailers who receive small deliveries from different suppliers or through different logistics service providers. By consolidating these deliveries, transport movements into the city centre can easily be reduced. Perishable goods or goods that have special transport requirements are not (yet) distributed by Binnenstadservice.nl.

4. METHODOLOGY

The present study focuses on retailers' and logistics companies' attitudes towards an initiative such as Binnenstadservice.nl as well as the (potential) costs and benefits for these stakeholders. To gain a comprehensive insight into these subjects, a combination of both qualitative and quantitative research methods was used, an approach that has been recommended by e.g. Mangan et al. (2004). The qualitative part consisted of in-depth interviews with retailers and key informants within logistics companies. The quantitative part comprises a survey among 225 retailers in the city centre of Nijmegen.

4.1. Retailers

First, in-depth interviews were held with ten participating and ten non-participating retailers in the city centre of Nijmegen. The interviews lasted from half an hour to an hour and they were held with the owners or managers of the stores. The interviews covered the following topics:

- Attitude towards Binnenstadservice.nl
- Reasons for participating/not participating
- Current and previous transport situation
- Expectations of Binnenstadservice.nl
- (Potential) benefits and costs of Binnenstadservice.nl
- Logistics service quality delivered by Binnenstadservice.nl (for participating retailers)/most important logistics company (for non-participating retailers)
- Satisfaction with and loyalty towards Binnenstadservice.nl/most important logistics company
- Willingness to pay for services delivered by Binnenstadservice.nl
- (Transport) situation in Nijmegen city centre
- Store details, such as size, type of goods sold, number of employees, industry

Each of the ten participating retailers was selected to be as different as possible in terms of size, type of goods sold, and location (street), to gain maximum insight into the different motives for participating, and (potential) benefits and costs of Binnenstadservice.nl. The non-participating retailers were selected using the same criteria. Moreover, five non-participating retailers were selected to be different from participating retailers (in terms of size, type of goods sold and location), to be able to identify possible (general) reasons for not participating in the initiative. Examples are retailers who sell fragile goods and outlets that are part of a retail chain. The other five non-participating retailers were selected to be similar to typical participating retailers to identify more individual reasons for not participating. Non-participating retailers were not required to be aware of Binnenstadservice.nl before the interviews. If they did not know Binnenstadservice.nl beforehand, information on the initiative was provided by the researcher before the interview was started. Participating as well as non-participating retailers were located in the same area: in or directly around the shopping area which was fenced by road barriers and where time access restrictions were in place. This is the area in which Binnenstadservice.nl operates. The interviews took place in September and October, 2008. The interviews were transcribed and then analysed by using a scheme to categorise the answers given by the interviewees. Answers were compared for each interview question.

Next, the information we collected through the interviews was used to develop a survey. The aim of the survey was to get a broader overview of the attitudes towards and the (potential) cost and benefits of Binnenstadservice.nl for retailers. The topics covered in the surveys were similar to the interviews. Two different questionnaires were developed: one for participating retailers and one for non-participating retailers. In December 2008, 225 retailers in the city centre of Nijmegen received a questionnaire. The researchers personally distributed the questionnaires among the retailers and collected them one week later. At that moment, there were 25 participating retailers, who all received a questionnaire. The response rate among these participating retailers was 72% (18 respondents). Two hundred non-participating retailers received a questionnaire, of which 129 completed the questionnaire (response rate of 67.9%). In total, there are approximately 300-350 retailers in the Nijmegen city centre who are potential customers of Binnenstadservice.nl. These are mainly small and independent retailers.

4.2. Logistics companies

Logistics companies can be split into logistics service providers and suppliers operating their own transport. Both were included in this study. To gain in-depth understanding of the attitudes towards and the (potential) costs and benefits of Binnenstadservice.nl for logistics companies, in-depth interviews were held. Since only a few logistics companies had made deliveries to Binnenstadservice.nl and the awareness of Binnenstadservice.nl among logistics companies was still rather low at the moment this study was conducted, we decided not to carry out a survey like we did among retailers. Instead, we focused on the in-depth interviews to reveal attitudes towards and (potential) costs and benefits of Binnenstadservice.nl.

First, interviews with the two most important Dutch logistics industry organizations were held. One organization consists of logistics service providers (TLN), the other of suppliers operating their own transport (EVO). Thereafter, seven interviews were held with key informants within logistics companies. The companies were selected to deliver goods to city centres and also more specifically, to the city centre of Nijmegen. We included different types of logistics companies: traditional transport operators, express delivery service providers, and suppliers operating their own transport. The interviews were held in December, 2008 and January, 2009 with people who were responsible for their organizations' transport in city centres. In most cases, they were transport or logistics managers. The interviews lasted between 45 minutes and an hour and covered the following topics:

- Attitude towards Binnenstadservice.nl
- Current (transport) situation in Dutch city centres
- (Potential) benefits and costs of Binnenstadservice.nl
- Willingness to pay for services delivered by Binnenstadservice.nl
- Potential effects for logistics companies if Binnenstadservice.nl expands to other cities
- Operational details, such as (city centre) routes, number and type of vehicles used, number of drops in Nijmegen city centre

The interviews were transcribed and then analysed by using a scheme to categorise the answers given by the interviewees. Answers were compared for each interview question.

5. RESULTS

The findings from the interviews with retailers are presented first, followed by the survey results. Thereafter, the findings from the interviews with logistics companies are described.

5.1. Retailers

5.1.1. Interviews

The interviews with participating and non-participating retailers revealed some differences in attitudes towards and (potential) costs and benefits of Binnenstadservice.nl. Almost all participating retailers (9 out of 10) are very enthusiastic and positive about Binnenstadservice.nl. They are satisfied with the services that are provided and they actively recommend participation in the initiative to other retailers, although these other retailers often show hesitation or resistance to participate. Nearly all participating retailers intend to continue their collaboration with Binnenstadservice.nl in the future as long as the prices for the services are kept low. They state that the basic service (consolidation of goods and distribution into the city centre) should be provided for free. Some retailers consider to pay a small amount of money for the extra services, such as warehousing, depending on what these services would cost elsewhere. Many retailers feel that the local government (municipality) should support Binnenstadservice.nl. Suggestions are to make time windows smaller and only allow Binnenstadservice.nl to enter the city centre outside the time windows, and to provide financial support to the initiative.

The reasons to participate in Binnenstadservice.nl are related to both to the environment and the own store. Many retailers are very dissatisfied with the current transport situation in the city centre. They find it important to decrease the amount of freight traffic, since this would be beneficial to the environment (e.g. less pollution) and to the attractiveness of the city centre. Furthermore, the retailers expect several benefits for their own businesses from Binnenstadservice.nl, such as the convenience of less deliveries made to their stores and the possibility of keeping their stocks at Binnenstadservice.nl instead of inside their stores.

During the first eight months of participating, the retailers already experienced several benefits. They value the fact that they can control the time at which goods are delivered to their stores. For example, some retailers mentioned that before they participated in Binnenstadservice.nl, they had to be present in their stores during the whole morning to receive potential deliveries, while their stores only opened at 12.00 p.m. Now, they can come in much later, because they asked Binnenstadservice.nl to deliver goods between 11.00 a.m. and 12.00 p.m. for example. They also value the fact that goods are consolidated before they are delivered. Now, they only have to receive one delivery instead of many, which saves time. It enables them (and their personnel) to work more efficiently. Furthermore, some retailers did not have much space to keep their stocks and therefore rented space elsewhere or used part of their floor space to keep stocks (which decreased the space that could be used as shopping area). They value the fact that they can store (part of) their goods at Binnenstadservice.nl and can ask Binnenstadservice.nl to deliver these goods whenever they want and in whichever quantity they want.

Although the retailers experience several benefits, they worry about the costs of Binnenstadservice.nl. The basic services are provided for free now, but many retailers are afraid that in the future this will change and they will have to pay. However, retailers' willingness to pay is very low. This is probably caused by two reasons: 1) most retailers do not pay separate delivery costs when they order goods, so they ask the question: why then should we pay for Binnenstadservice.nl?, 2) many retailers argue that they are not the ones who benefit most from Binnenstadservice.nl; the logistics companies are and therefore, they should pay.

Most retailers are very satisfied with the quality of the services provided by Binnenstadservice.nl. However, communication from Binnenstadservice.nl to the retailers could be improved. Some retailers did not know about the extra services that Binnenstadservice.nl offers. Furthermore, there have been a few occasions in which communication went wrong. In general, the retailers are satisfied with the contact they have with Binnenstadservice.nl employees. They state that this contact is very important to them. Retailers are also satisfied with the condition in which the goods are delivered. There have been no situations in which goods were damaged by Binnenstadservice.nl. Finally, some retailers receive their goods at a later time than before their participation in Binnenstadservice.nl, because some logistics companies first do their round in the city centre and then go to Binnenstadservice.nl to deliver goods. These retailers see this as a disadvantage, because it is important to them to receive the goods early in the morning. However, for other retailers it is not important to receive the goods early in the morning and they are very pleased that they can choose the time at which Binnenstadservice.nl delivers the goods.

Five out of ten non-participating retailers we interviewed were aware of Binnenstadservice.nl. The other five retailers were provided with information about the initiative before the interview was started. The majority thinks of Binnenstadservice.nl as a good initiative (6 out of 10). However, some retailers find it unnecessary or they foresee problems if another party is added to the supply chain. Similar to the participating retailers, many non-participating retailers feel that there is too much freight transport in the city centre. Some retailers are not bothered by the amount of freight traffic.

The non-participating retailers have their reasons for not participating. The main reason is that they are satisfied with the current situation. Other reasons are: they are afraid that something goes wrong with the goods, they expect a longer delivery time, they do not need space at Binnenstadservice.nl for stock keeping, they think the head office would not agree to participate, they expect the costs to be high, and they think they receive not enough deliveries to participate.

Some of the reasons for not participating are equal to the potential disadvantages of Binnenstadservice.nl that are seen by these retailers. The majority of the retailers expect that the costs of participating in Binnenstadservice.nl will be higher than the costs they have in the current situation. In general, they would not be willing to pay for the services if they participated. Another potential disadvantage is that Binnenstadservice.nl is an extra party in the supply chain, which increases the chance of goods being damaged or stolen, and also the delivery time. Furthermore, some retailers think Binnenstadservice.nl is too small to have an effect on the environment.

Besides the potential costs, the non-participating retailers also see potential benefits. Four out of ten retailers think that Binnenstadservice.nl could lead to a decrease in freight traffic, which in turn could lead to better air quality and a cleaner environment. Some retailers think that Binnenstadservice.nl could have benefits to their own stores, such as consolidated deliveries, less stock inside their stores, and collection of packaging materials. One retailer mentioned that logistics companies can deliver to Binnenstadservice.nl earlier in the morning than to the stores, because of opening hours.

We asked the retailers what would be the conditions under which they would consider to participate in Binnenstadservice.nl. Three retailers stated that participation should be for free. One retailer mentioned that Binnenstadservice.nl should take responsibility if something went wrong with the goods. Another retailer said that their supplier should agree with participation.

In their relationship with logistics service providers or suppliers operating their own transport, most retailers find it important that deliveries are reliable and accurate. Furthermore, some retailers want fast deliveries and/or want their goods to be handled with care. Finally, communication and friendly personnel are deemed important.

5.1.2. Survey

Of the 25 participating retailers at the time the survey was distributed, 18 filled in a questionnaire (72%). Two hundred non-participating retailers received a questionnaire, of which 129 completed the questionnaire (response rate of 67.9%). A classification of the retailers by industry and respondents' job title is given in Table 5.1.

Table 5.1 Retailer classification by industry and respondents' job title

Industry	No. of participating retailers	No. of non-participating retailers	Respondents' job title	Participants	Non-participants
Fashion	2	55	Owner	13	52
Luxury goods	2	12	Store manager	1	42
Home furnishing	1	11	Director	2	5
Electronic equipment	0	11	Assistant store manager	0	5
Drugstore	1	4	Sales person	0	3
Personal care	0	5	Assistant sales person	0	1
Food	0	4	Warehousing employee	0	1
Bookstore	2	4	Trainee	0	1
Supermarket	0	1	Educational employee	1	0
Health care	0	1	Pharmacist	0	1
Other	9	21	Missing	1	18
Missing	1	0			
Total	*18*	*129*	*Total*	*18*	*111*

Most retailers receive their goods as packages or on pallets. Sometimes, roll cages are used. Deliveries vary from one package to five pallets for participating retailers and from one package to ten pallets for non-participants. The number of deliveries per week can be seen in Table 5.2.

Table 5.2 Number of deliveries per week

No. of deliveries per week	Participants before participation to Binnenstadservice.nl		Participants now (incl. deliveries from Binnenstadservice.nl)		Non-participants	
	Frequency	Cum. %	Frequency	Cum. %	Frequency	Cum. %
1	1	5.6	3	16.7	12	9.3
2	2	16.7	2	27.8	34	35.7
3	4	38.9	3	44.5	11	44.2
4	1	44.5	1	50.1	12	53.5
5	1	50.1	0	50.1	12	62.8
6	5	77.9	4	72.3	15	74.4
> 6	4	100.1*	3	89.0	16	86.8
Other	0		1	94.6	14	97.7
Missing	0		1	100.2*	3	100.0
Total	*18*	*100.0*	*18*	*100.0*	*129*	*100.0*

** The total sum is above 100.0% due to rounding effects.*

Looking at the results in Table 5.2, there seems to be a slight decrease in the number of deliveries per week for retailers participating in Binnenstadservice.nl since they started their participation. However, there are no clear differences between participating and non-participating retailers.

With regard to the current transport situation in the city centre of Nijmegen, the attitudes differ between participants and non-participants. Participating retailers view the current situation as much more problematic than non-participating retailers. Furthermore, they feel more involved. A summary of the results can be seen in Table 5.3. The statements were measured on a 5-point Likert scale.

Table 5.3 Attitudes towards current transport situation in the city centre

Items	Mean scores participants	Mean scores non-participants
There is too much traffic in the city centre.	4.71	3.02***
I think that customers avoid the city centre during the morning due to the amount of traffic.	3.89	2.28***
The time windows are too narrow.	2.56	2.96
The local government should do more to enforce the time windows.	3.53	2.60*
The current transport situation in the city centre is a problem.	4.24	2.77***
I think that city centre residents are hindered by the amount of traffic in the city centre.	4.29	2.83***
The quality of life in Nijmegen city centre is very important to me.	4.59	3.68***
It is important that the air quality in Nijmegen city centre improves.	4.39	3.45***
It is important that the accessibility of Nijmegen city centre improves.	4.56	4.15*
The quality of life in Nijmegen city centre means a lot to me.	4.28	3.82*
I notice that there is less freight traffic in my street due to Binnenstadservice.nl.	3.06	2.09**
I see that the city centre becomes more attractive due to Binnenstadservice.nl.	3.44	2.28***
Satisfaction with current transport situation in Nijmegen city centre	2.38	3.22**

Mean is significantly different from mean of participants at * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Other results from the survey are mostly in line with the findings from the interviews. Participating retailers report a high level of satisfaction with Binnenstadservice.nl. Furthermore, logistics service quality provided by Binnenstadservice.nl is perceived as good to very good. Participants trust Binnenstadservice.nl and feel affectively committed. The main reason for participating are not the benefits to their own stores (calculative commitment). The retailers are very loyal to the initiative and they spread the word among other retailers. The mean scores on these variables are presented in Table 5.4. The scores on the separate dimensions of logistics service quality (in italics) are also provided. Furthermore, scale reliabilities are reported. They are all above 0.7, indicating good reliability.

Table 5.4 Participating retailers' scores on satisfaction, logistics service quality, trust, commitment, loyalty and word of mouth

Variable	No. of items	N	Cronbach's alpha	Mean scores (on 5-point Likert scale)
Satisfaction	3	18	0.957	4.4
Logistics service quality	11	14	0.955	4.4
Personnel contact quality	3	18	0.880	4.4
Order accuracy	2	17	0.859	4.6
Order condition	2	17	0.918	4.5
Order discrepancy handling	2	15	0.879	4.5
Timeliness	2	18	0.711	4.2
Trust	3	18	0.980	4.5
Affective commitment	2	18	0.983	4.1
Calculative commitment	2	18	0.827	2.2
Loyalty	3	18	0.882	4.3
Word of mouth	3	17	0.977	4.5

The most important reason for retailers to participate in Binnenstadservice.nl is an expected decrease in freight traffic in the city centre as a result of the initiative (score of 6.7 out of 8). The second and third most important reasons are an expected improvement in air quality (score 4.3) and a more attractive city centre for people who come to shop (score 3.7). The other four reasons are expected benefits to the stores: less deliveries by logistics companies (because of goods consolidation), convenience, collection of packaging materials by Binnenstadservice.nl, and the possibility to store goods at Binnenstadservice.nl.

We asked participants to choose the most important benefits of Binnenstadservice.nl to their own stores. The most important benefit (chosen by 72.2% of the respondents) is the possibility to arrange the time at which goods are delivered. Consolidation of goods is the second most important benefit (38.9%). Third in line are the possibilities to store goods at Binnenstadservice.nl, to have goods delivered to customers by Binnenstadservice.nl, and to have packaging materials collected by Binnenstadservice.nl (all were chosen by 27.8% of the respondents). The last two benefits are time savings (22.2%) and less toting of goods (16.7%).

Participants also reported on the (potential) disadvantages of the initiative. The first potential disadvantage are future costs of Binnenstadservice.nl (reported by 61.1% of the respondents). As was stated before, the basic service is provided for free now, but participants worry that they will need to start paying in the future. Another disadvantage (indicated by 33.3%) is that goods are delivered at a later time than before. Some retailers also feel that they need to put in a lot of effort to make sure their supplier delivers their goods to Binnenstadservice.nl instead of their stores (16.7%). The same is true for making logistics companies use the right delivery address (11.1%). The task of changing the delivery address itself at suppliers/logistics companies also requires some effort (11.1%). Finally, Binnenstadservice.nl's communication is not always seen as sufficient (5.6%).

Related to retailers' worries about the costs of Binnenstadservice.nl is the willingness to pay. Sixty-seven percent of the participating retailers are not willing to pay for the basic service provided by Binnenstadservice.nl, while only 22% is willing to pay. However, if retailers had to pay less to suppliers or logistics companies if their goods were delivered at Binnenstadservice.nl instead of the city centre, then they would be willing to pay (part of) these savings to Binnenstadservice.nl (score of 4.1 on a 5-point Likert scale ranging from totally disagree to totally agree). Suppliers and logistics companies do not (yet) differentiate with regard to tariffs between delivery at Binnenstadservice.nl and the city centre.

Of the non-participating retailers, 48.1% stated that they are not familiar with Binnenstadservice.nl, 40.3% reported that they are familiar (11.6% is missing). We described Binnenstadservice.nl in the questionnaire and then asked for an opinion about it. About one third (34.9%) of the non-participants is positive about the initiative. Another 21.7% is moderately positive; they think it is a good initiative, but they have some concerns with regard to costs and feasibility. Furthermore, many of them think it is not relevant to their own situation. Finally, 16.3% has a negative attitude towards Binnenstadservice.nl. They think that it is unnecessary and cumbersome and would like to keep things the way they are.

Although not all non-participants are positive about Binnenstadservice.nl, many of them think the initiative has potential benefits. The most important potential benefits to non-participants are a decrease in freight traffic in the city centre (indicated by 78.2% of the respondents) and an improvement in air quality (57.3%). Another potential benefit (33.6%) is that logistics companies are not limited by time windows anymore, because they can make deliveries to Binnenstadservice.nl during the whole day. Only a few non-participants think that Binnenstadservice.nl could lead to benefits to their own stores.

The most important potential disadvantages reported by non-participants are longer delivery times (delays) and high costs (both 66.1%). The retailers also think that there is higher chance that something goes wrong and they are not very fond of adding an extra party to the supply chain (both 60.7%). Other potential disadvantages are large deliveries of goods to their stores at once (because of consolidation) (28.6%) and the small size of Binnenstadservice.nl (21.4%), thereby expecting only limited effects on the amount of freight traffic and the environment.

Some of the disadvantages are closely related to the reasons why these retailers do not (yet) participate. The most important reason is that they are satisfied with their current situation (62.6%). The logistics service quality provided by their most important logistics service provider or supplier operating its own transport is rated as high. Details on logistics service quality of and satisfaction with non-participating retailers' most important logistics service provider or supplier operating its own transport can be found in Table 5.5. As we reported before, non-participants do not see the current transport situation in the city centre as very problematic. Other reasons for not participating are that they expect longer delivery times (39%), they are not familiar with Binnenstadservice.nl (35.8%), they have enough space to keep their stocks at the store (30.9%), they are afraid that something goes wrong with the goods (30.1%), they think that the costs of Binnenstadservice.nl will be high (28.5%), the head office will not agree with participation (22.8%), their number of deliveries is too small (21.1%) and a lack of confidence in Binnenstadservice.nl (5.7%).

Table 5.5 Non-participating retailers' scores on satisfaction and logistics service quality

Variable	No. of items	N	Cronbach's alpha	Mean scores (on 5-point Likert scale)
Satisfaction	3	116	0.908	4.13
Logistics service quality	11	108	0.927	4.00
Personnel contact quality	3	116	0.828	3.97
Order accuracy	2	115	0.835	4.20
Order condition	2	115	0.910	4.10
Order discrepancy handling	2	115	0.883	3.84
Timeliness	2	115	0.789	3.94

We asked non-participants if they intended to become a participant in Binnenstadservice.nl in the future. The majority says that they do not intend to become a participant (59.5%), while only 5.8% says that they do. Another 33.9% indicates that they might become a participant. We also asked the question: Imagine that you participated in Binnenstadservice.nl, would you then be willing to pay for the basic service? Only 9.3% answers with 'yes', 45.7% says 'no', 3.1% says 'maybe' and 41.7% give other answers. Also in the case that their logistics service providers or suppliers lowered their transport costs if they had to deliver to Binnenstadservice.nl instead of the city centre, the retailers would not be willing to pay (part of) these savings to Binnenstadservice.nl.

5.2. Logistics companies

Before we interviewed logistics companies, we first interviewed the two largest Dutch logistics industry organizations, TLN (Transport and Logistics Netherlands) and EVO (Organization for suppliers operating their own transport). According to them, distribution in city centres causes many difficulties. Local governments want to limit urban freight traffic, but stores need to be supplied, so it is not a solution to further narrow down time windows. There have been many initiatives with regard to city centre distribution. According to TLN, initiatives enforced from outside the industry (for example by local governments) are often problematic. Furthermore, two important questions with regard to city centre distribution initiatives that need to be clearly answered are: 1) who is going to pay for it and 2) where does a logistics company's responsibility for the goods stop. Often, initiatives fail because one of these points is not clear, thereby causing stakeholder unwillingness to participate. Both TLN and EVO are very positive about Binnenstadservice.nl, because it is initiated by retailers from the city centre and it is supported by the local government. According to EVO, it is necessary to receive financial support from the local government if such an initiative is to be started. However, after some years, it should generate its own revenues. Both EVO and TLN think that retailers and the local government will benefit the most from Binnenstadservice.nl and therefore they should pay for it, but they are not sure whether the initiative is financially viable. They also think that Binnenstadservice.nl is not suitable for all retailers and logistics companies. For example, there is no need to take over full truck loads that are delivered to some retail outlet. Furthermore, some goods require special transport or some suppliers want to deliver to the stores themselves, because of customer contact.

The interviews with key informants within the logistics companies largely confirmed the information that was provided by TLN and EVO. All logistics companies experience difficulties with city centre distribution caused by time windows. If these time windows did not exist, they could operate more efficiently. A great advantage of Binnenstadservice.nl is that logistics companies can deliver goods to Binnenstadservice.nl during the whole day. However, to gain real benefits in terms of time savings and efficiency, the delivery addresses of all retailers that they need to supply in a city centre should be moved to Binnenstadservice.nl. Furthermore, Binnenstadservice.nl would become much more attractive if it operated in many cities. Then, logistics companies could spread their transport movements during the day and congestion could be decreased. Most logistics companies think that both logistics companies and retailers can benefit from Binnenstadservice.nl. Therefore, both groups should pay for it. However, they think that retailers are not very willing to pay, because transport costs are not visible to them. Now, they do not pay separate transport costs, so why would they pay if they participated in Binnenstadservice.nl? They also think that the local government has an important role in providing (financial) support to the initiative. Without support, it will be very difficult to finance it.

The express delivery companies do not expect many benefits to their own companies, because they already work very efficiently in city centres. Furthermore, they guarantee deliveries within 24 hours to customers and this might not be possible if they deliver through Binnenstadservice.nl. Their willingness to pay for Binnenstadservice.nl is low. Another disadvantage reported by logistics service providers and suppliers operating their own transport is that they will lose contact with customers (retailers). Now, truck drivers have an important role in receiving feedback or they even provide special services (e.g. assembly). This cannot be done by Binnenstadservice.nl.

6. DISCUSSION

6.1. Conclusions

The attitudes towards Binnenstadservice.nl are mixed among the different stakeholders. Participating retailers are very positive about the initiative, while many non-participating retailers still have some reservations. Logistics companies are also quite positive towards the initiative, because it could be a solution to the difficulties experienced with regard to city centre distribution (especially time windows and congestion). In general, the different stakeholders think that Binnenstadservice.nl could lead to less freight traffic in city centres and thereby to a cleaner environment. Especially the participating retailers and logistics companies think that the situation in city centres should be improved. The participating retailers and logistics companies see several benefits of Binnenstadservice.nl to their own businesses. For the retailers these are mostly related to convenience, for logistics companies Binnenstadservice.nl could lead to an increase in efficiency. An important question is, however, who is going to finance the initiative. Retailers' willingness to pay is very low. They do not see direct financial benefits of Binnenstadservice.nl to their own stores and therefore, they are unwilling to pay. Logistics companies do see financial benefits (if certain conditions are met: all retailers should participate and many cities should operate a Binnenstadservice.nl), but their margins are low, so they are only willing to pay a small amount to Binnenstadservice.nl.

6.2. Managerial implications

Describing a new and innovative case of sustainable goods distribution in the city centre of Nijmegen may lead to valuable insights for other cities. Many cities are faced by problems with regard to urban freight transport and the problems are still increasing (Ljunberg and Gebresenbet, 2004). Governments, retailers and logistics companies can use the insights from this case to develop or improve their own initiatives with regard to sustainable goods distribution in city centres.

It is very important that both retailers and logistics companies are involved if an initiative to improve city centre distribution is to succeed. Initiatives that are enforced by parties outside the supply chain, for example a local government, are likely to fail. However, to get an initiative started, it is very important to have the support of the local government. Without some first financial support, it is difficult to get started. Two important questions that should be thought of before an initiative like Binnenstadservice.nl is started are: 1) who is going to pay for it, and 2) who is responsible for the goods. One of the reasons that Binnenstadservice.nl receives support from both retailers and logistics companies is that they are very clear about responsibilities: once the logistics companies deliver the goods to Binnenstadservice.nl, the logistics companies are no longer responsible. Retailers give Binnenstadservice.nl a mandate to sign for delivery. Furthermore, it is very important to present clear benefits to all the stakeholders involved, because only then, they are likely to participate. An overview of potential benefits and costs to logistics companies and retailers are provided in this study.

6.3. Limitations and suggestions for further research

This paper is a practical description of a new way in which city centre distribution can be organized. Insights are provided into the attitudes towards the initiative and the (potential) costs and benefits for retailers and logistics companies. An interesting area for further research would be to explore different business models for an urban consolidation centre. What are the potential costs, benefits and disadvantages of the different options? Another suggestion for further research is to include other stakeholders besides the ones that were part of this research (retailers and logistics companies). It would be interesting to research the attitudes among local governments and retailers' customers, for example. Do these customers value the fact that some retailers participate in an initiative aimed at sustainable distribution? Would this influence the choice for buying at particular stores? Furthermore, the methodology used in this paper to research logistics companies was limited to in-depth interviews. It would be interesting to expand this research and conduct a broad survey among logistics companies, once Binnenstadservice.nl is better known by this group.

Another suggestion for further research is to take a more theoretical angle towards this research and to develop a conceptual model to explain certain attitudes and behaviour in the context of such an initiative. Why do some retailers participate and others do not? Willingness to participate would be an interesting construct to explore in this regard. Furthermore, logistics service quality is an interesting construct to explore further, especially in relation to satisfaction and loyalty. How important is logistics service quality if you want your clients to be satisfied and loyal? We hope this paper will motivate researchers to continue the search into the area of city centre distribution and supply chain relationships.

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