INCREASE URBAN FREIGHT EFFICIENCY WITH DELIVERY AND SERVICING PLAN: STATUS, METHODS AND UK CASES

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ABSTRACT

Delivery and Servicing Plan (DSP) is a concept aiming at a more rational organisation of deliveries from the point of view of the receiver of the goods. It was expected that DSP would help reduce externalities and lead to substantial reduction of costs. A new tool was developed to calculate the benefits of different DSP options presented to business leaders. Substantial impacts above 50% reduction in costs and externalities have been demonstrated in few cases. Remaining difficulties in the concept are organisational issues, lack of knowledge, need to give external advisory support for shop owners, and limited number of successful applications.

Keywords: Delivery and Servicing Plan, urban freight transport, green logistics, impact assessment, supply chain management.

INTRODUCTION

The paper presents the impacts expected from an innovative approach to retail deliveries based on the Delivery and Servicing Plan (DSP) concept. What is a DSP? "DSPs are intended to provide a framework to better manage all types of freight vehicle movement to and from individual buildings" including retail shops, offices, factories, or depots (Browne et al. 2012). The managerial concept is focusing on the receiver end of the supply chain. DSPs were developed in London similar to travel plans for businesses and the DSP programme is now an integral part of the London Freight Plan (TfL 2008). One of the key ideas behind the concept of increasing the efficiency of the delivery from the receiver perspective consists in "adjusting the conventional working methods of some of the stakeholders" (Verlinde et al. 2012).

In this paper we use an extended definition of a DSP. This include any measure aiming at a more rational and efficient use of freight transport for business supplies and deliveries in urban area, organised and managed from the point of view of the final receiver of the goods. From an organisational point of view, the main DSP actor can be a receiver of goods, or a group of clients with similar business interests. According to this definition, a single shop can start a DSP, or it could be an administration or a large group of networking stakeholders in an urban area. The set of potential measures of a DSP includes classical and innovative freight efficiency and carbon reduction actions, among others

1. reduce the number of suppliers
2. group the deliveries of the supplier
3. reduce the number of deliveries per week
4. change the supplier and selecting a less distant one or a carrier with a less distant depot
5. order less frequently
6. centralise purchasing
7. purchase collaboratively with other businesses
8. use a shared consolidation centre
9. use clean vehicles.

Usually the decisions about the configuration of deliveries are taken by logistics companies, the headquarters of large groups, or by the suppliers, but rarely by the shop itself. This makes it difficult for the shop manager to decide about how the deliveries to its premises take place, and how to change it. This conceptual problem and the difficulty to decide are perhaps due to a lack of knowledge or other reasons. This problem and questions are inherent to the DSP concept and so it was expected at the start of the work that one result of this piece of research would be to find a better understanding and possibly a solution to this problem. Such an innovative way to deal with the goods supplies from the perspective of the shop owner and the end receiver, and to solve the problem of lack of knowledge, at least partly, would be to provide free assistance to the shop owners and the potential future customers of a DSP. In order for this assistance to be powerful and immediately accepted by businesses, it would be necessary to have a tool that would demonstrate clear benefits and monetary effects of the different potential DSP solutions. Therefore, another expectation of this project was to obtain a more practical tool that would show the impacts of different business solutions dealing with deliveries from the point of view of the practitioner. However, even if this tool should have the capacity of being understood quickly and intuitively, it would be needed to correspond to the framework of previous impact assessment research, such as Browne et al (2011). For example it would need to be compatible with the before-after approach of freight impact methodology, and with the most up to date carbon footprint calculation method.

The purpose of this study is to present this new tool that help demonstrate benefits. These benefits are expressed for the businesses in terms of costs reduction and for the public sector in terms of reducing the carbon emissions and the external costs of freight transport in the urban environment. The innovative development involves using a calculation methodology and decide to apply different practices that allow the shop owner or the shopping centre manager to manage its deliveries in a more efficient way. The chapter on methodology below explains also the process of applying the business solutions that were proposed to the DSP actors presented in the paper. The aims of the paper are:

- To present the development of a DSP analysis tool. This tool is used to calculate the impacts of a decision potentially leading to change the supplies, deliveries or collections of a retail business in urban area
- To assess the benefits of such decisions for the receiver of goods
- To show in some cases, large and small business, the practical use and the benefits of the applied DSP
- To demonstrate the case of DSP from a large employer point of view such as University in a medium size compact city setting

METHODOLOGY

Research approach

The DSP analysis tool was developed in an initial pilot case in a medium-sized UK town. Then it was applied by following several steps. First it is needed to have an initial interview with the retail manager in order to take a decision about the envisaged DSP efficiency measures. Then the DSP implementation and evaluation steps consists in data collection, calculation, developing options, deciding on implementation details for the selected option, collecting evidence on implementation, and finally calculate the internal and external costs impacts. During the first DSP cases, the initial tool and calculation method was refined and readjusted to the specific business situation. The tool was then reused and the same methodology consistently applied for several other businesses and an institution in medium-sized UK cities. The project is still on-going in 2013.

Data collection

Key data on the main supplies are collected and central questions answered. To assess DSP changes, following key information and questions needs to be considered:

- What are the 'before' and potential 'after' business situation? What are the supply contracts that could be possibly changed? Is it possible to change the waste service provider contract?
- What are the current sources of the main supplies? Where is the depot of the supplier or the depot of the goods carrier located?
- Size of the 'typical' deliveries in cubic-metre and in kilogramme
- Frequency of the deliveries: how many deliveries are received per week, how many working days per week?
- Vehicle types and changes in fleet: are vans or trucks in use? Which is the approximate capacity of the main delivery vehicle?
- What is the real annual fuel use, or what is the average fuel use expected from this type of vehicle and the annual distance covered?

Analysis: first calculation of current situation ('before' DSP implementation)

After the data collection, the current or "before" situation is analysed, the most important analytical step being the cost calculation of internal and external impacts of transport. These impacts are calculated together with fuel use, fuel costs, and the external costs CO_2 emissions, air pollution, accidents, congestion and noise. The main objective of all survey and calculation efforts is to provide an estimate for overall costs per delivery that are paid by the receiver. As a proxy for all transport costs, fuel costs are calculated, knowing that in urban context the fuel cost amount to 10-30% of total transport costs. In order to make this fuel costs calculation, following main formula [1] is used, together will the other equations [2] to [4].

$$fC_{del} = (D_{del}/100) * f * n * c \qquad [1]$$

where:

fC_{del} = fuel cost per delivery, expressed in £ per delivery per year

D_{del} = distance per delivery, in km
f = fuel use, in litres per 100 km
n = number of deliveries received per year
c = average fuel price, in £ per litre

To be able to obtain the values, further formula [2] to [4] are needed. For calculating f, the fuel use is converted from mpg average values, using the formula [2]:

$$285.2/y \text{ mpg} = x \text{ l/100km} \qquad [2]$$

In case the fuel use is unknown, the average UK fuel use for trucks is assumed to be 8 mpg, and for vans 25 mpg.
The distance per delivery (D_{del}) is calculated using the formula [3]:

$$D_{del} = D * a \qquad [3]$$

where:

D_{del} = distance per delivery, expressed in km
D = vehicle trip distance from depot of supplier or from depot of carrier to retail shop in km (converted from miles using the conversion factor 1 mile = 1.609344 km)
a = load allocation factor or % of truck capacity used at departure from depot by volume or by weight.

For the calculation of the load allocation factor *a*, expressed in equation [4], and in case the load factor was unknown, the average UK truck capacity by weight was set at 12,000 kg, and by volume at 30 m^3. Van capacity by volume was set at 10m^3. Van capacity by weight was not used for calculations of *a*. Capacity utilisation at departure from depot is assumed to be 100%, unless specified. This approach is much simpler than the DEFRA (2012) approach, since it is not the purpose here to be very exact with the load factor, due to the uncertainties in the annual business cycle and other variable parameters. The delivery trip measured in D is assumed to be a typical round trip with empty return, so the trip distance from shop to depot is multiplied by 2. To obtain D, the software google maps itinerary is run for the shortest route between the known location of the depot and the shop. It is assumed that the trip is starting from the depot of the carrier or the supplier that is located in shortest distance to the shop.
The load allocation factor formula is [4]:

$$a = l/v \qquad [4]$$

where:

a = Load allocation factor, in %
l = Load volume or load weight of the observed delivery, expressed in m^3 or in kg
v = Vehicle capacity, expressed in m^3 or in kg

As an example, if the load allocation factor is 0.5, this means that it is assumed in this study that the deliveries are using half of the van capacity at departure from the depot, as an

average during a year. Therefore, only half of the total trip distance is accounted for the calculation of D_{del} (distance per delivery) and fC_{del} (fuel costs per delivery).
For the calculation of CO_2 emissions, the values of fuel use per delivery per year are multiplied by the DEFRA emission (conversion) factor for 'grand total greenhouse gas' and 'average biofuel blend' in UK (DEFRA 2012) according to following formula [5]:

$$e = 3.1672\ f_{del} \qquad [5]$$

where:

e = total greenhouse gas emissions of the delivery, expressed in kilogramme CO_2 equivalent per year (kg CO_2e/year)
f_{del} = annual diesel fuel use (with average biofuel blend in UK) expressed in litres per delivery per year

CO_2 emissions and mileage reduction can be used as indicators for reduction of other external costs such as air pollution, accident, congestion and noise. There is no exact conversion factor per mile/km available in UK for all these parameters, but air pollution and emission tend to be accounting for about 8-14% of total external costs of freight transport in UK (Piecyk et al 2010). Therefore CO_2 costs would correspond to 1/7 of total external social costs. The economical value of 1 tonne of CO_2 was set at extreme different levels in the past (McKinnon et al 2012). Many governmental documents use a value of £200/tonne of CO_2e. One possible average value is £50/tonne of CO_2e. This was suggested by the UK government in a report from the Cabinet Office (Cabinet Office 2009). If, for example, the mileage reduction observed in a DSP would lead to a reduction of one tonne of CO_2 that can be estimated to be valued at about £50 social costs, then it seem conservative to estimate that all the external costs of this mileage reduction would amount £350. The formula used is therefore:

$$E_{del} = (e/1000) * E_{CO2} * 7 \qquad [6]$$

where:

E_{del} = Annual external (social) costs of delivery expressed in £ per year
e = total greenhouse gas emissions, expressed in kilogramme CO_2 equivalent per year (kg CO_2e/year)
E_{CO2} = External costs of CO_2 emissions, expressed in £ per year

The total fuel costs that can be calculated for the current situation of each DSP correspond to the sum of the fuel costs of all deliveries received by a business during a year ($\sum fC_{del}$).

Analysis of possible future developments: second calculation 'after' DSP implementation

As next step of the DSP methodology, different scenarios of changes are developed based on the data obtained in previous step. The starting point is referred to as the 'before' situation. In all cases, the total fuel costs of all deliveries were not known by the retailers and managers, since the transport costs are included in the price of the goods and service. Based on the catalogue of potential measures mentioned above, scenarios of possible future developments are then calculated for the 'after' situation, when changes envisaged in the DSP would lower the total costs of the supplies. These scenarios are discussed together with the business manager and a decision is made on the details of the implementation. In most cases, it is envisaged to change a contract with one or many very distant suppliers.

RESULTS

The DSP concept was applied in different locations in medium sized cities in United Kingdom, and in different fields of logistics businesses, but always centred on office parcels and shop deliveries and waste collection. Five cases were analysed more in-depth and are presented in overview in Table 1 below. At the time of publication, the plans are partly implemented and results are based on estimates and observations.

Table 1: Overview of the DSP cases observed, results and impacts expected

Case	Business name	Main DSP measure	Results *Reduction before-after in %*		
			for internal costs per delivery (*fC_{del}*)	for distance per delivery (*D_{del}*)	for external costs (*E_{del}*)
1	Small café shop	Change suppliers	£370 savings /year	-21%	-
2	Servicing business with own fleet	Fleet management optimisation	£3,700 savings/year (-28% of fuel)	-20%	-20%
3	Shopping centre management	Optimised waste management	£1,700 savings/year	-51%	-51%
4	Shopping centre waste collection	Change waste contracts		-74% of km of recycling trips	-74%
5	University	Use of UCC and hybrid vehicles	Expected reduction (-15% of fuel)	Expected reduction through UCC	Expected reduction

Case 1: In a scenario for a small café shop, it was calculated what would happen if the retailer would change one supplier, which would be making the deliveries of the same goods, but starting from another depot located 20 miles from the shop instead of the 180 miles that was currently the case. Reducing the vehicle trip distance (D) between depot and shop by 160 miles for one delivery would lead in this case to a £370 annual cost reduction (fC_{del}). This case was made for this small independent shop owner and it demonstrates the general applicability of the DSP concept and the costs saving effects, even if the size of the business is very small and the solution has a very limited scope. There is however a business difficulty in so far as it is difficult to find a supplier for the exact same product at a competitive price but at a much shorter distance. In most case the long distance supplies are motivated either by price or by quality. Here it was possible to identify a new supplier satisfying the specifications and the needs of the business, and these conditions would need to be met for any change in the supply chain of a shop. By changing this very distant supplier, the fuel cost reduction corresponds to minus 21% and this is due solely to the distance reduction of origin of the purchase trip for one supplier.

Case 2: In another case, the business is using an own fleet of four vans for servicing its clients located in one medium sized town and two small towns in UK. The vehicles are also used to dispatch and transport goods between three small high street stores. For the DSP, it is decided to reduce the annual mileage of each vehicle by at least 20% with different strategies such as driver training, log book entries for trips and fuel purchases, waiting for more servicing orders before starting a long round trip, and multiple use of the vans. Nothing change for the clients from the point of view of the quantity and quality of products delivered. Additionally, it was decided to change two contracts of very distant providers, asking them to supply the store with another, more efficient carrier with a local depot. Here again, no change in the product is occurring, only a change in the location of the carrier depot is made. The long distance trip to the depot is made by large truck with a much more efficient fuel use per unit delivered. This effect is also leading to substantial fuel use reduction for the shop owner. The envisaged total fuel cost reduction is about £3,700/year. This savings is corresponding to about 28% of total annual fuel costs faced by this business. The distance reduction being 20%, and the external cost reduction being a product of the distance, the DSP of this case shows a reduction in external costs of transport of 20%. The business condition of an owner of a business that is as the same time owner of a vehicle fleet makes it easier for the DSP to trigger an impact on a somewhat larger scale. This case also demonstrates the applicability of the DSP concept for own account vehicles, and for the inclusion of more fleet management oriented solutions.

Case 3: In another case, the shopping centre manager was changing all its waste collection service contractors and contracts. A calculation was developed and the new scenarios of possible improvements were implemented for the Shopping Centre. The number of waste collection service providers decrease, the frequency of the collection trips were adjusted according to the type of waste and separate bins were introduced. As a result, the overall distance of all waste collection trips decreases strongly. It demonstrated benefits of about £1,700/year and the much lower fuel costs (-50%) of a new waste collection system, in 2012. The changes in the contracts were leading to much higher annual cost reductions than the sole fuel costs.
The application of the DSP methodology was leading to changes in decision-making, and the DSP impacts on the recycling and waste collection practices is hereby demonstrated with this case. It shows that the DSP is not only suitable for the optimisation of deliveries, but also of waste collection.

Case 4: Another large shopping centre was also planning to change its waste collection services. The analysis of the trips made by different waste and recycling material collection services was leading to the discovery that one waste service provider was sending the waste much further away than originally thought. Some recycling waste and materials were shipped to distances over 130 miles. The new contract with a local waste service provider distant from 9 miles would be reducing the annual fuel costs by about 74%. The distance savings correspond to 74% of the annual mileage in this case, and the external costs savings are also reduced by 74%. For this DSP, the analytical tool is used to decompose the different transports and trips taking place out of a shopping centre. Thereby the tool makes it possible to identify the location of the next depot. The last leg of the urban freight supply chain is usually the most cost intensive, and in this case the first leg of the waste collection transport chain is assumed to be as well the most cost intensive. By identifying the depot that is the most distant and the type of contract that is leading to the least effective transport, the DSP tool demonstrates its practicality. After this, it was necessary to find another service provider and to take the decision to change the contract. These conditions could be met in this case. However, in 2013, the new contract have not been finalised and the DSP is on-going.

External costs of cases 1 to 4: The reduction of external costs was calculated for the cases 1 to 4 using formula [6]. Even if the small shop was saving only about 0.9 tonne of CO_2 per year, the other cases were above 2 tonnes savings per year, with a maximum of 8.4 tonnes in case 2. This is leading to annual external cost reductions above £100 for greenhouse gas emissions for most cases. The total external costs being 7 times higher, the total annual external cost savings are in each case above £700/year. The maximum annual external costs savings, for the most effective DSP case observed, were about £420 for greenhouse gas emissions. These would be corresponding to about £2,940 total freight transport external costs savings per year for this best case. Even if these are modest sums, the percentage reduction was more than 20% savings.

Case 5: The case of the University as a receiver that potentially can be benefited through a DSP has similarity to the case of a large shopping centre as discussed above. However, due to the high number of building locations and the size of this case, it was decided to extend the range of DSP interventions. While there is an on-going research on looking at many aspects that causes variable freight traffic around the (City) University Campus as reported in Zunder et al (2012), the data drawn for this paper focuses on one freight operation among internal University organisations. Newcastle University owns a fleet of light goods vehicle to runs its business including facilities management, catering, offices and classrooms, gardening, etc. One of the vehicles (Ford Transit 85 T260s Fwd, Panel Van – fuel efficiency: 39.2l/100km (Vanfueldata 2013)) is dedicated to serve the library that has a huge volume of books and associated office / classroom goods (chairs/tables/etc.). An extra storage place (we named it University Consolidation Centre - UCC) is located just over 5 miles away from the University main campus buildings at the city centre of Newcastle and is in use to support the main library and to transport and store books. Daily trips are taking place between library and UCC (see Figure 1).

In the academic year 2011/2012 (from August 2011 to July 2012), the vehicle has recorded an annual fuel consumption of 1,748 litres diesel. The distribution of fuel use in each month can be seen in Table 2. The total direct GHG emission impact per year is estimated at 4,381.28 kg/CO_2e (based on the 2012 emissions factor given from DEFRA for diesel – 100% mineral – fuel).

Table 2 Fuel data of University vehicle dedicated to serve the library (in litres)

Aug-11	Sep-11	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12
249.55	257.63	81.72	67.68	224.87	163.80	95.64	118.14	95.88	116.70	132.15	145.01

Source: (Energy manager 2013)

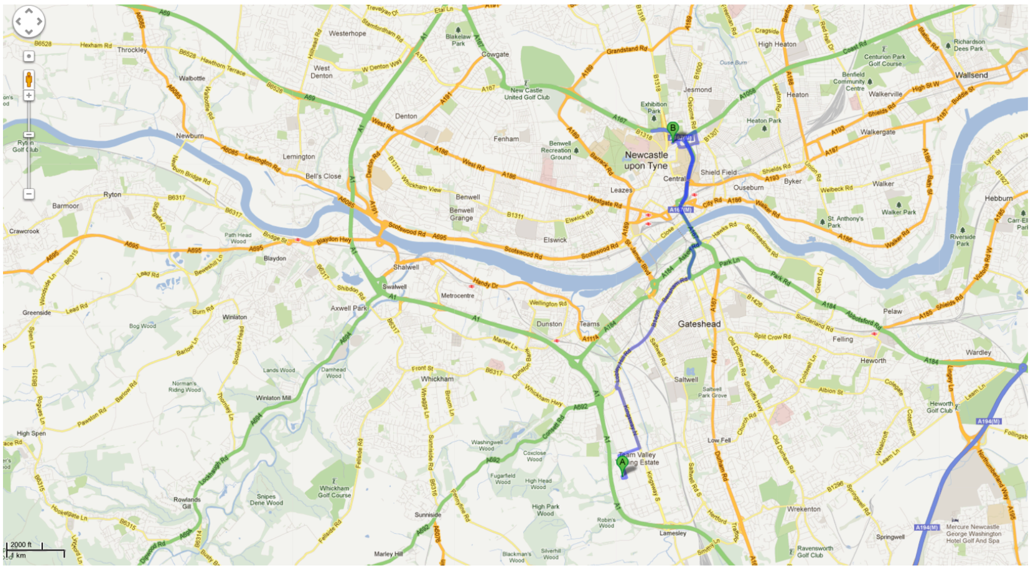

Figure 1 Route from the University consolidation centre (A) to the main University library (B)
Source: Google maps 2013

A semi structured telephone interview was conducted with the University vehicle operator to gain a better understanding of the link between reported fuel use and the vehicle operation. The frequency of the vehicle delivery between the University and the consolidation centre is usually once a day, with the vehicle remaining parked at the main campus university at night. It leaves the university at 9am loaded with normally around 20% load factor, mainly books and other printed materials. The van is also used for carrying passengers, so the allocation factor for freight is assumed to be corresponding to the 20% load factor. The vehicle returns back to the University around 1 or 2pm afternoon. In a month time there is about 5 times' occasion where the vehicle is running twice between the University and the consolidation centre, based on demand.

The variable fuel use among some months can be explained with a busy period for the library due to occasional projects (the months with over 200 litres of fuel used as seen in Table 2). But this is not predicted to occur in the future according to the interviewee. The normal month would have seen the fuel use amount for less than 100 litres diesel. Additionally, the excessive fuel use in some months were due to the bill from a hired truck that runs many times between the university and the consolidation centre at 100% loading factor.

Assuming that the normal month of fuel use is 100 litres of diesel with 1 delivery in 260 working days in a year plus extra 1 delivery per week, makes up to 312 deliveries per year. Distance per delivery is 5 miles one way (10 miles return trip); average fuel price is £1.40, the estimated annual fuel cost of the delivery is:

$$D_{del} = D * a$$

$$D_{del} = 16.09344 * 20\% = 3.218688$$

$$fC_{del} = (3.218688/100) * 39.2 * 312 * 1.4$$

$$fC_{del} = £551.12$$

Note that if the load factor of the van is assumed to be 100%, for example if it would be the case that the van is used only for freight deliveries for the University and not used to carry passengers or to make other servicing activities, then the fuel cost of the delivery per year would be multiplied by a factor 5, about £2,750/year.

There is an on-going discussion of the implementation of the coherent campus strategy that includes the uptake of a number of freight planning intervention. The first one is the adoption of hybrid/electric truck to substitute diesel van delivery, the second is the designated parking area for freight and freight delivery planning using consolidation centre. Raising the issue of the fuel cost of delivery on University library activity is certainly interesting to the University strategic planning but to the point when this paper is written there is nothing can be reported that can demonstrate the benefit gain by the DSP.

DISCUSSION AND LIMITATIONS

The scenarios calculated with the planning tool show reductions in overall distance travelled, emissions, direct transport costs for the business, and external cost for the public sector, fulfilling the objectives of the study. Besides using the tool, the modification of the supply network and the decision taken by the businesses in the supply chain were key factors for the successful implementation and the benefits of the DSP.

Two main freight transport efficiency effects were the cause for the savings observed:

- A better loaded vehicle on average
- A reduced overall distance per delivery

Besides these effects that are genuinely related to very common urban freight and CO_2 efficiency discussions, the reasons for success lies in managerial decisions and preparation. The willingness to change a contractor and the willingness to use the tool as a help for decision were key. The ability and willingness to take action was by far the most important condition to be fulfilled in order to start a DSP. More behavioural, decision making oriented factors, were influencing the results. The presence of an awareness deficit from the side of the manager, and the willingness to perform the assessment of the supplies and goods transport operations were conditioning positively the outcomes.

In each case, the data could be easily collected and at least one scenario could be developed. There was no case for which a DSP was started, developed, the correct data collected, the calculation tool used, and no scenario could be found on how to reduce the delivery costs, and no implementation decided. All business cases have led to real changes in the business. Parts of the delivery framework planned for the University, however, are been finalised.

When a DSP was decided and started, it was always possible to develop scenarios with the manager for which some benefits will occur, and to get the manager to decide about details of implementation. In some case, the implementation was fast and smooth, in other it took longer; for example when searching for a new provider, many months were necessary in one case. In another case that is still ongoing, the implementation is not possible as long as the new goods provider has not been found.

However, several difficulties were hampering a smooth DSP development and implementation. There were many cases in which it was decided not to start a DSP after only few minutes of talk.

- Many local shop managers refused to start thinking about a DSP, stating that it is not their domain of responsibility, since their company headquarters are in control.
- Many retailers were convinced that there is nothing to optimise in their deliveries and that no cost reduction is possible.

In both cases the DSP were not envisaged, not because it was proven impossible to find a good scenario and good solutions for the costs reduction, but because the managers were thinking in advance that this would not work. Another possible explanation to this limitation is that it could be a consequence of the typical situation of a refusal to get external support, and this negative statement is probably not always to be interpreted as a refusal to apply a DSP. This typical barrier could be overcome by including DSP solutions to managerial practices so that the shop owners would be able to apply these solutions without the need of external support.

After the DSPs were started, and after scenarios were developed, some cases were focusing only on one single activity, and many pathways to potential savings were not followed. So despite having demonstrated theoretically that some savings would be easily feasible, the business reality was in most cases limiting the number of applicable decisions.

There is also a central problem with the representative sample of this DSP study at this stage. Out of several businesses contacted only eight DSP cases were developed. In two cases, the shopping centres were counting 60 and 29 businesses, which were included in the perimeter of the DSP. The retail sectors observed in the cases are cafe, shopping centres, and jewellery. It is therefore not possible to make at this stage a general statement about the applicability, appropriateness and potential magnitude of impacts of the DSP in all retail, logistics and economic sectors, more than to say that it seems promising.

One of the more fundamental limitations of the DSP is that it is intended to increase the efficiency of freight transport, but that for now its primary effects are tending more towards a reduction, not an economic growth in the logistics sector.

The Newcastle University main campus and its internal consolidation centre as part of the DSP case has demonstrated a new avenue of DSP application in a non-business environment. The DSP definition in Newcastle case is not simply looking at efficiency of one leg of delivery route that can be optimised but it is an embedded strategy of a big planning measure encompassing the coherent campus strategy involving a number of interventions/measures being taken into account to promote sustainable urban freight.

CONCLUDING REMARKS

This article refers to DSP as an innovative managerial tool for business receiving deliveries, aiming at organising freight in a more efficient way. The tool developed is decision oriented and was tested under different business conditions in UK. It helps quantifying scenario of future changes for different supplies received, and the impacts these potential solutions would have on the business costs, on traffic generated, and on externalities. The DSP, the 'before-after' data collection and the scenario method developed can be replicated. It can be used to calculate the impacts of scenarios on future costs of deliveries for businesses receiving goods. This research has implication for the urban freight policy debate, for the field of green logistics research, and for the debate on efficient supply chain management. To apply such a method in supply networks would be potentially beneficial for the public and private sector in terms of traffic reduction, emissions reduction and cost savings for deliveries.

The DSP as a potentially generalise approach would also potentially change the practice of network relationships, giving a slightly more important position to the end-receiver of goods, a market actor that is traditionally less involved in design and planning of supply networks (with the exception of the very powerful supermarket chains). The willingness to start a DSP together with an independent advisor is a basic condition that was to be fulfilled at this experimental stage. As long as the Delivery and Servicing Plan (DSP) is not an established managerial tool helping the retail businesses and other sectors to better plan and manage their deliveries, it will remain necessary to have a cooperative approach between researcher/ consultant and retail manager in order to obtain the desired cost reduction.

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