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Improving home delivery efficiency by using principles of address intelligence for B2C deliveries

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Abstract

This research shows how to use historical delivery data to predict future delivery results by applying address intelligence. The application of multiple linear regression techniques supports the development of address intelligence identifying and predicting the improvement potential (rework) for other zip code areas. The research has been successfully applied for a logistics parcel service company. In our case the application of address intelligence has shown that pre-delivery contact with the customer about the delivery time window seems to be the most promising concept to guarantee efficient delivery.

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Keywords: Parcel delivery, Last Mile, Address Intelligence, Multiple regression

1. Introduction

The retail industry is changing rapidly due to the changing shopping behavior of customers (Meints, 2013). Internet deliveries of packages to consumers have grown over 25 % per year over the past ten years (Boyer et al., 2009). Internet deliveries require a physical distribution structure, either in-house or outsourced to a third party that delivers the products to the customers (Agatz et al., 2013). The competition among parcel delivery services is severe giving them hard challenges to operate cost-efficient and meanwhile perform more sustainable, especially for the last mile deliveries in our cities (Fabian & Christian, 2012).To survive in parcel delivery business it is clear that cost-efficient fulfillment is particularly challenging in the case of attended home deliveries (Agatz et al., 2013).

Gevaers et al. (2009) describe different problems with home deliveries. One of the described problems is the high degree of failed deliveries. A failing consumer-delivery results in extra costs, kilometers, and emissions (Gevaers, et al., 2009). The last mile of home-delivery to consumers is observed as ‘one of the biggest challenges in B2C e-

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commerce' (Punakivi, et al., 2001). The objective of this research is to develop a method for parcel service providers to decrease the redeliveries in the last mile. The following research question is addressed:

How can parcel delivery companies reduce the high degree of failed deliveries for the B2C-market?

This question will be answered by researching theoretical concepts followed by a method to test the future concepts in. To answer the research question, the following sub-questions are raised:

1. How is the process of delivering to a customer organized and how is the delivery efficiency measured?
2. Which concepts in literature have potential to improve the delivery efficiency of a parcel service provider and which ones can be tested given data availability?
3. How is it possible to estimate the 'potential' of the concepts and which one is considered the most promising concept?

This research will show how to use historical delivery data to predict future delivery results by using address intelligence. A specific case of a parcel delivery company is worked out to show the opportunities and possibilities of delivery data to improve their performance. The research is carried out for DHL; this means that some results are just partly shown due to confidentiality reasons.

The section 2, the process of parcel delivery, contains a description of the parcel delivery process and the related problems according to the growth of e-commerce. Section 3, Literature review on delivery efficiency improvement, provides directions for improvement based on suggestions found in literature. Section 4, developing address intelligence, shows how address intelligence can be obtained by the use of multiple regression technique. Section 5, estimating the rework potential, shows the results of applying address intelligence to estimate the rework reduction potential. Section 6 concludes with the main findings of this research.

2. The process of parcel delivery

In the last decade, the e-commerce market has experienced strong growth resulting in an upsurge in business-to-consumer (B2C) deliveries (Gevaers, et al., 2011). Combined with the problem of failed deliveries (at the first time of delivery) this gives the operations of parcels services rework which should be reduced in a competitive market.

The regular distribution structure is shown in Fig. 1, where the order is picked up at the shipper and transported to a 'nearby' terminal (Departure Terminal). Then the goods are transported by (FTL) Line haul to another terminal (Arrival terminal) and the 'last mile' parcel delivery is done where 'the last mile is the last stretch of a business-to-consumer (B2C) parcel delivery to the final consignee (consumer) who has to take reception of the goods at home or at a cluster / collection point' (Gevaers et al., 2009).

Fig. 1. Framework of Parcel delivery processes (Gevaers et al., 2009).

When a consumer is not at home, the courier returns to the terminal and often the next day or a at a chosen customer delivery moment the courier will deliver again (red processes in Fig. 1). This is at maximum four times repeated and then the goods are returned to the shipper or the consumer can pick up their goods at the terminal or at a nearby collection point. This 'rework' results in additional parcel handlings and thus causes additional costs. To determine the extent of the problem of customers 'not at home' or shops that are closed, results of the year 2013 are used. Because of confidentiality the results are partly shown (de Goffau, 2014ab). According to Song et al. (2009)

the proportion of first-time home delivery failure is 25%. To measure the delivery-efficiency it can be defined in terms of parcels or stops:

Delivery Efficiency [parcels] = (amount of parcels successfully distributed)/ (amount of parcels distributed) (1)

Delivery Efficiency [stops] = (amount of successful stops)/ (amount of stops) (2)

Of course: the efficiency of delivery could also be described in terms of fuel use, labor use, or other KPI's. However, the focus in this research is on reducing rework and increasing the ratio of successful stops / parcels deliveries. The definition of delivery efficiency in this way is also due to the fact that in B2Cthe underlying indicators rely on better data availability. Most parcel service providers operate in business-to-business (B2B) segments and business-to-consumer (B2C) segments. Consumer and business logistics requirements regarding speed, service quality, convenience and reliability are becoming more and more similar. On the whole, the level of demand is rising (Ducret, 2014). In the Netherlands the number of parcels delivered by the parcel service providers has grown from 130 million up to 190 million per year during the period 2005 – 2013 (see Fig. 2). To give some reference the forecast 2014 in the UK is about 890 million online orders dispatched by UK retailers (www2, 2014) The expectation is that by the end of 2014 that 65% of the market will be 'to consumer' and 35% will be 'to business'. The number of total stops has grown in eight years with more than 50 %. The B2C market has grown but also the C2C-market is growing strongly due to popular market-websites (www1, 2014).

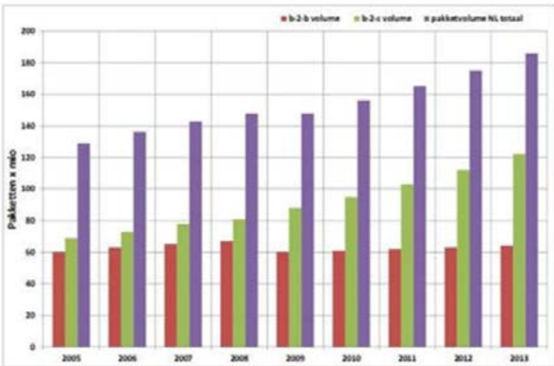

Fig. 2. Number of delivered parcels (in millions) from 2005-2013in the Netherlands (www1, 2014).

There are considerable differences (Du et al., 2005) between these segments. In B2B market, the buyers and sellers are business-oriented which implies that they operate as business partners: usually planned, repeatable and reliable. For that reason, the business partners have often long-term relationships (Du et al., 2005) where most logistics service providers are delivering on a structural basis. One can imagine that the delivery efficiency is much higher than the delivery efficiency in B2C, because companies have reliable working hours, and are often waiting for delivery to process it in their own business. Contrary, the B2C-networks are quite different. Mostly, the parcels are small in size, instantaneous, ever changing and placed by numerous consumers (Du et al., 2005). The demand in these networks is less predictable and more fluctuating, like in promotional periods as Christmas and Valentines' day (Becerril-arreola et al., 2013). Because of fluctuations, there is the need of having a quick-response vehicle dispatching system (Du et al., 2005). It can be concluded that the B2C deliveries are more challenging to improve the delivery efficiency.

According to Gevaers et al. (2009) the following five main 'problems can be observed with attended home deliveries:

1. The high degree of failed deliveries. People not at home are the most important reason for this. This implies rework, which generates extra costs, extra kilometers, and extra emissions.

2. The high degree of ‘empty running’. The distances are longer, one delivery in the past, are now twenty deliveries directly to consumers.
3. Security-problem: sometimes, a signature is needed. This can result in discussions between the supplier of the parcel and the consignee.
4. The critical mass for generating an efficient route is sometimes too small for some regions.
5. Most door-to-door deliveries are done by small vans, implying that the carbon footprint per kg is higher than transport by a larger truck.

This research focuses on the first problem because it is the main category and data availability is best. Furthermore, for the parcel service providers the problem of empty running is not really a problem, because more deliveries will result in more work and better routing of the trucks/vans. Security is already tackled by the working-methods of parcel service providers, using digital signatures. Because of the expected growth in B2C-deliveries the critical mass problem will decrease automatically. The CO2 emission is an important influencing factor in the fleet management process. Other research (Hogenelst, 2011; van Duin et al., 2013) have shown directions how to improve this. The issue of people not being at home is one of the most challenging because of the dependence on the final consumer resulting in an unwanted uncertainty and failing deliveries. Table 1 gives an impression of the problem of failed deliveries for a internet shop servicing minimal delivery options.

Table 1. First Time Right deliveries for a web shop with minimal delivery options (www1, 2014; data provided by Selektvracht).

	Delivery Options	Web shop with an option for delivery at an alternative location
First Time Right (address)	Receiver is at home for 1st delivery	75%
First Time NOT at Right (address)	Delivery is given to neighbors	15%
First Time Not delivered	Back to depot and prepared for 2nd delivery	10%

It is clearly that the First Right Time delivery is just 75%. The other 25% can be observed as failed deliveries Failed deliveries are an important challenge for Internet retailers in common (Agatz et al., 2008a). Due to those failing deliveries, the convenience and time savings of online shopping may not be realized (Xu, et al., 2008). Also, these failing deliveries have direct influence on the costs of the delivery process, because failed deliveries will result in rework, and the number of needed deliveries will increase (Deketele et al., 2011). Especially for B2C-deliveries, which are mostly ‘attended home deliveries’, this appeared to be the main problem.

3. Literature review on delivery efficiency improvement

In literature, several contributions to improve the last mile delivery in B2C-markets can be found (Lee & Whang, 2001; Gevaers et al., 2009; Gevaers et al., 2011). The following contributions are clustered by different directions of improvement:

1. Change in location (e.g. (Xu, Jiang, & Wang, 2014));
2. Change in time (e.g. (Campbell & Savelsbergh, 2006));
3. Change in route [within given timeframe] (e.g. (Agatz et al., 2013));
4. Change in behavior (e.g. (Agatz et al., 2008a)).

Each direction of improvement will be explained in detail in the next subsections.

3.1. Change in location

Parcel service providers achieve very high first-time delivery rates if parcels are left on alternative locations, like at neighbors or service-points/drop-off-points (McKinnon, 2003). Table 1 shows that delivering to neighbors increases the delivery efficiency with 15%. Gevaers et al. (2011) gave an overview of the possible deliveries at different locations: unattended deliveries (delivery on address, without need of a present consumer / occupant), neighbors-deliveries, and deliveries at pick-up points or collection points.

Changing attended deliveries (where the consignee should be present) in unattended deliveries could increase the delivery efficiency. Unattended reception allows a greater operating efficiency without influencing the service level (Punakivi et al.; 2001). However, this concept is only applicable for products that can be safely deposited, e.g. in customers mailbox (Agatz et al., 2008c). A customer that invests in a reception box gains total independence of the delivery time windows and logistics service providers (Punakivi et al., 2001). Using these boxes, a home delivery service could be offered at a fairly low price (Punakivi & Tanskanen, 2002). The boxes eliminate the redelivery costs when customers are not at home at the moment of delivery (Jones, 2000). However, security stays an important issue for those boxes (Gevaers et al., 2009).

Having a delivery to-door, while the consignee is not present, is also possible when the parcel is delivered to the neighbors (Weltevreden & Rotem-mindali, 2009). This option could be very successful in situations that the attended home delivery fails (Edwards et al., 2010; *see* Fig. 3). According to results from surveys, it appeared that 84% of the online shoppers would be happy when a neighbor receives their delivery on their behalf (IMRG, 2008).

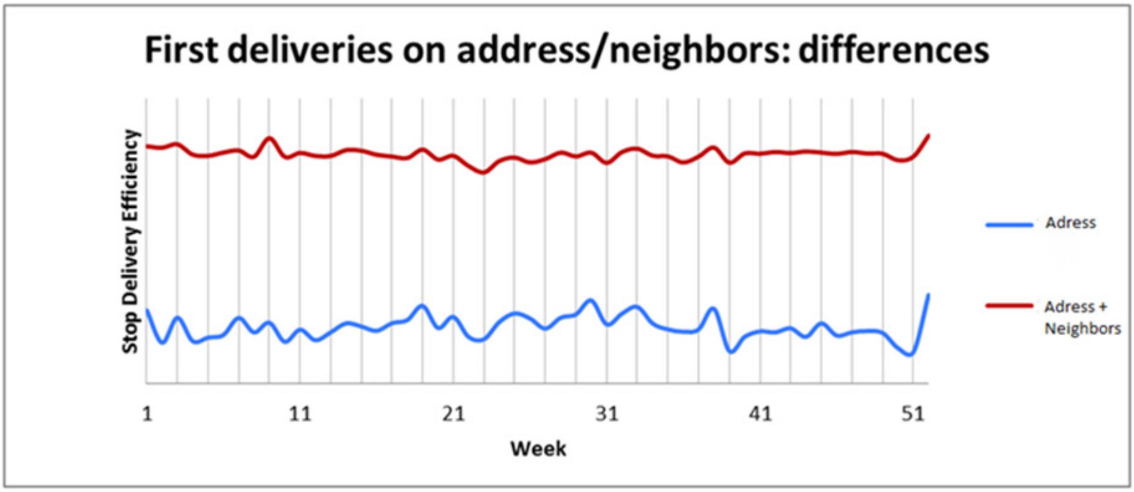

Fig. 3. Number of delivered parcels (in millions) from 2005-2013in the Netherlands (www1, 2014).

For bridging the last mile, the use of pickup-points or drop-off points is also a good solution to reduce rework (Daduna & Lenz, 2005). Physical in-store pick-up points (petrol-stations, groceries, supermarkets, etc.) are common alternatives for customer home delivery (Agatz et al., 2006). The concept of collection and delivery points (CDP's) has been developed very well. The option to bring (failed) deliveries to local collection/delivery points is described as an emerging option to tackle the problem of failing home deliveries (McLeod et al., 2006).

Several advantages of these pick-up/collection points are:

- The consumer can collect their failed deliveries locally rather than having to collect them from a depot or terminal, what might be further away (McLeod et al., 2006);
- Higher consumer satisfaction (Edwards et al., 2010);
- A secure delivery is maintained (McLeod et al., 2006);
- Reducing wasted mileage as a result of redeliveries (McLeod et al., 2006) ;
- The environmental impacts could be lower, because of less additional vehicle trips are necessary for the delivered parcel (Edwards et al., 2010). On the other hand, this will not always be the case, because trips of consumers (to pick up their parcel) will also have environmental impacts.

After delivery at the CDP, the customer is mostly informed about this delivery, and could collect the parcels with proof of identity (McLeod et al., 2006). Using the CDP-concept helps to increase the service level. The main advantage is that 100% of the parcels are delivered. This method is not described as a solution for all cases, because the distance traveled to the CDP could result in more costs than a redelivery of that parcel. From a case description in Mcleod et al. (2006) it was shown that the failure rate should be around 20% to be more efficient when using CDPs.

3.2. Change in time

Consumers not being at home at the moment of delivery are responsible for inefficiency in the last-mile processes (*see* Fig.s 4a & 4b).

a b

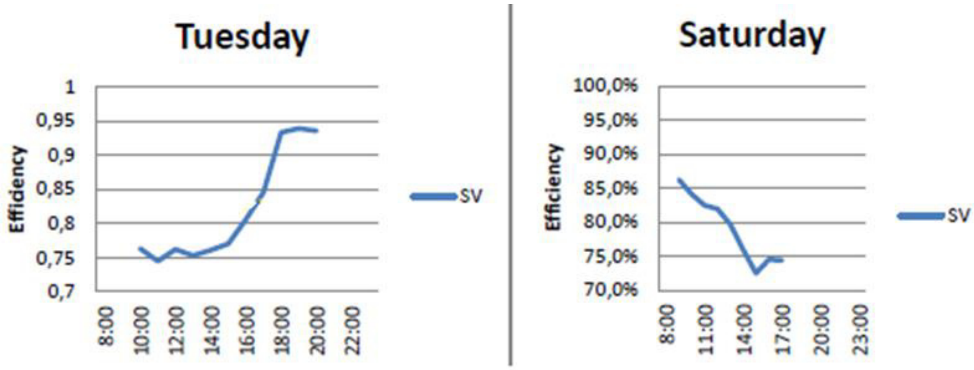

Fig. 4a. Delivery Efficiency Tuesday (on address)

Fig. 4b. Delivery efficiency Saturday (on address)

Source: DHL-NL

However, it is possible that the consumer could be at home at another delivery moment. Cambell & Savelsbergh (2006) distinguish the three major streams in changing time:

1. Order promise: deciding at a delivery time, while using timeslots (demand management)
2. Order delivery: assigning efficient delivery schedules.
3. Agreed upon timeslot in direct customer-courier contact.

Lots of parcel service providers do not offer an option for consumers to choose a delivery-time slot (Deketele et al., 2011), although a couple of parcel service providers offer an option to their customers (web shops etc.). However in practice online web shops often do not choose to offer that option to their final customers because it distracts their attention from the core buying process. There are different options, for providing timeslots to consumers. It appears that it is a trade-off between demand clustering and demand smoothing. With demand clustering it is possible to minimize the distance between successive stops, and minimize travel costs. However, the disadvantage is a potential underutilization of the vehicle capacity (Campbell et al., 2009). With demand smoothing, the prices are flexible, and used to smoothen the demand and utilize the vehicle capacity. For attended home delivery services it is customary to agree on a narrow delivery window or time slot (Campbell & Savelsbergh, 2006). When managing demand, this could be organized in two ways (Agatz et al., 2008d):

1. Capacity allocation (geographical changes to increase routing-efficiency and demand clustering).
2. Pricing, changes in behavior (customer contact e.g.) are needed to smoothen the demand.

It is also possible to change the order delivery, and have efficient schedules based on the proposed timeslots. The reason for this is that timeslots are not only used as a promise for the consumer, but also for designing an efficient delivery schedule (Campbell & Savelsbergh, 2006). For that reason, while making changes in time, timeslot design is based on the following decisions (Agatz et al., 2008a):

1. The service requirements and delivery charges for a zip-code-area.
2. Assign specific time slots to each of the zip-codes.

Different sets of time-windows can be offered, e.g. based on the zip-code of the delivery location (Agatz et al., 2013). This could be used, to balance regional differences in demand volumes. Incorporating intelligence into designing delivery schemes enhances the performance of a network (Campbell & Savelsbergh, 2006). Intelligence or experience in certain zip-codes is in literature hardly taken into account to design an efficient schedule.

The agreed upon-timeslot has strong potential to improve the delivery efficiency because the customer is more likely to be available to receive the parcels (see Fig. 5). In a consumer delivery survey 2011 of the IMRG a question was raised whether someone is at home to receive a delivery during daytime. Around 45% of the population confirmed the presence, 35% of the population said sometimes and 20% of the population said no one is at home (www2, 2014).

Fig. 5. First time delivered on address: marked and significant (www3, 2014) differences between stop delivery efficiency, with or without customer contact (Source: Delivery data DHL-NL).

3.3. Change in route

Changes in route are strongly related to changes in time. The timing of offered slots impacts the route efficiency (Agatz et al., 2013). When the route is changed, but the delivery time is kept the same at an 'unsuccessful' address, it will be unsuccessful again. The main difference is that a change in route could optimize the delivery efficiency.

About vehicle routing problems in B2C-deliveries a lot of literature is available from the operations research (Eksiglu et al., 2009). Dynamic Routing in B2C-deliveries is difficult, because the orders are changing in volume, unpredictable and dynamically changing (Du et al.; 2005). Algorithms are often used, to design the best route, static or dynamic (Kallehauge, 2006). Dynamic Vehicle Routing (DVR) allows vehicles to update services based on renewed information: the existing vehicle routing algorithms are often used for repeated and planned orders (Du et al.; 2005). Also, time dependent information (about traffic jams for example), should be considered by logistics service providers (Fabian & Christian, 2012). Due to these last minute changes, it is difficult to schedule and plan the last mile into detail. Smaller timeframes are needed resulting in more uncertainty due to planning difficulties and traffic uncertainties.

The average traveled distance per stop / per parcel is influenced by the time-window used. Smaller time-windows result in more miles per consumer (Gevaers et al., 2011). Also, rerouting is an option, when it is possible for consumers to change (e.g.) the destination of their parcel during the delivery day (Gevaers et al., 2009). The use of communication tools and dynamic routing tools is unavoidable. It can be concluded that most research about routing in the last mile is focusing on efficient routing, but the dynamic routing based on efficient deliveries is a new interesting trend (Pillac et al., 2013).

3.4. Change in behavior

A lot of information is available about influencing the consumer behavior in the delivery process. A topic already discussed is the change of a different time window for which the person is at home. On the other hand a consumer could also be triggered to stay at home, or change his behavior, based on the idea of changing pricing as an example of revenue management (e.g. (Agatz, et al., 2008a)). In their article: 'What internet retailers can learn from revenue management' the idea of revenue management is explained as the idea of service differentiation in the internet-retail sector. This idea could be applied to logistics service providers doing the last mile delivery. With the use of different prices, an increase of capacity could be performed, flexibility could be increased, the underutilized capacity could be balanced, and efficient routes could be stimulated. This is done by triggering consumers to choose certain characteristics, because they are cheaper than others (Agatz et al., 2013).

3.5. Investigated concepts

In our research not all the suggestions from literature are possible to investigate. Based on the delivery-experience and data availability these directions for improvement have been combined and reduced to the following six future concepts:

1. Zip codes: morning- or afternoon- timeframe? (Change of routing)
2. The potential of evening consumer-deliveries (Change in behavior and change in time)
3. The potential of deliveries on Saturday (Change in time and a change in behavior)
4. The potential of consumer-contact (Change in behavior)
5. The potential of neighbor-deliveries (Change in location)
6. The potential of service-point-deliveries (Change in location)

4. Developing address intelligence

Based on the available data it was observed that the delivery efficiency differs strongly between the zip code-areas. To obtain knowledge from the delivery data it was tested whether a relationship exists between (demographic) characteristics of a region and the delivery efficiency. A regression model was developed to investigate the relation between the delivery efficiency and the variables shown in Table 2. The regression model is developed for three purposes:

- Estimate the delivery efficiency in postal code areas with not enough observations to have reliable data.
- Estimate the potential of concepts for which no data is available.
- Explain the differences in delivery efficiencies.

In the Netherlands 4033 zipcode-areas exist (Statline, 2013). For the presented characteristics not all data is available, therefore the number of missing values are also presented in Table 2.

Table 2. Measured Characteristics based on 4033 zip codes

Characteristic	Available values	Missing values	Percentage missing (%)
Average age	4024	9	0.22
Benefit recipients	3676	357	8.85
Cars per Household	3582	451	11.18
Children	4025	8	0.20
Distance to Supermarket	3840	193	4.79
High-rise	3773	260	6.45
Household Size	4033	0	0.00
House Value	3549	484	12.00
Income recipients	3715	318	7.88
Monthly income	3550	483	11.98
Native population	4026	7	0.17
Population density	3866	167	4.14
Retirees	3747	286	7.09
Status score	3499	534	13.24
Students	3270	763	18.92
Urbanity	3946	87	2.16

The regression analysis showed for the variables retirees, urbanity and employment no significance. For this reason these variables were abandoned from the final regression model. Table 3 shows a high regression fit with adjusted R Square of 0.61.

Table 3. Regression results explaining the delivery efficiency

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.781	.61	.608	.041900263

Table 4. Estimated Coefficients with T-values and multi-collinearity statistics explaining the delivery efficiency.

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	.764	.029		26.125	.000		
PopulationDensity	-8.487E-007	.000	-.039	-2.152	.031	.371	2.699
HouseValue	1.499E-007	.000	.203	9.540	.000	.273	3.659
MonthlyIncome	-2.501E-005	.000	-.183	-7.812	.000	.226	4.421
Children (< 5 years)	-.378	.067	.096	-5.600	.000	.419	2.388
NativePopulation	.096	.011	.187	8.935	.000	.282	3.545
HouseHoldSize	.042	.005	.200	7.916	.000	.194	5.148
AverageAge	.001	.000	.061	2.811	.005	.263	3.809
Highrise	-.055	.007	.163	-7.325	.000	.249	4.009
AssistenceRecipients	-.82	.024	-.060	-3.445	.001	.406	2.463
StatusScore	-.153	.012	-.247	-12.368	.000	.310	3.226
Students	-.166	.031	-.100	-5.378	.000	.356	2.808
DistanceSupermarket	.011	.001	.238	18.448	.000	.746	1.341
CarsPerHousehold	.003	.002	.026	1.965	.049	.703	1.422

Table 4 shows that the distance to a supermarket has the most significant influence on the efficiency (highest t-value). The distance to a supermarket relates strongly to the population density, which has a small negative influence on the efficiency. It seems remarkable however that in practice it is the truth that cities have lower delivery efficiency rates than smaller villages. The distance to supermarket could also be interpreted as 'distance to city center'. Table 4 also shows that a higher status score means a lower efficiency rate (t-value is -12.37). Another positive influence that could be identified is Household Size. This seems to be logical: when more people live in a household, the chance someone is at home is probably higher. Remarkable variables are House Value and Monthly Income which have contradictive effects on the efficiency. This seems to be unexpected. A possible explanation for this is, that elderly people who earned lots of money in their lives, stay more at home and live in expensive houses. As a final conclusion it is important to realize that lots of characteristics are closely interrelated. The collinearity could be extremely high. For that reason, variables with a VIF-value close to 10.0 should be excluded from the regression model. In our research it was not necessary to eliminate variables based on collinearity, because household size has the highest VIF-value (5.146). As a part of verifying the regression results the ten zipcode-areas with the lowest delivery efficiency were selected. It was found that all these areas are located in big cities, with high urbanity and small households.

5. Estimating the rework potential

For all six concepts presented in section 3, the next formula is used to test the potential in the zipcode-areas:

$$\text{Rework Reduction Potential} = \text{delivery efficiency of concept (estimated value)} - \text{delivery efficiency without performing the concept (current value)} \quad (3)$$

where the estimated value is based on the linear regression line specified in section 4.

Applying the concept of delivering neighbors (when the consignee is not at home), and having customer contact before delivery are the most promising concepts. Evening deliveries are observed as a quite useful concept to reduce rework combined with customer contact. However, the costs and logistic consequences for evening deliveries are much higher and therefore this concept is only advised for areas having a high rework potential. Service-point deliveries are having the highest potential, but are not always most desirable from the consumer’s perspective. Delivering on Saturday is more successful than delivering on weekdays, however the differences are small. Changing a route within a timeframe has small effects, and could also result in lower delivery efficiencies. The final results for all concepts are presented in Fig. 6. The average rework reduction potential is around 11% (st.dev = 6.4) for deliveries and 9% (st. dev. = 5.4) for zip codes.

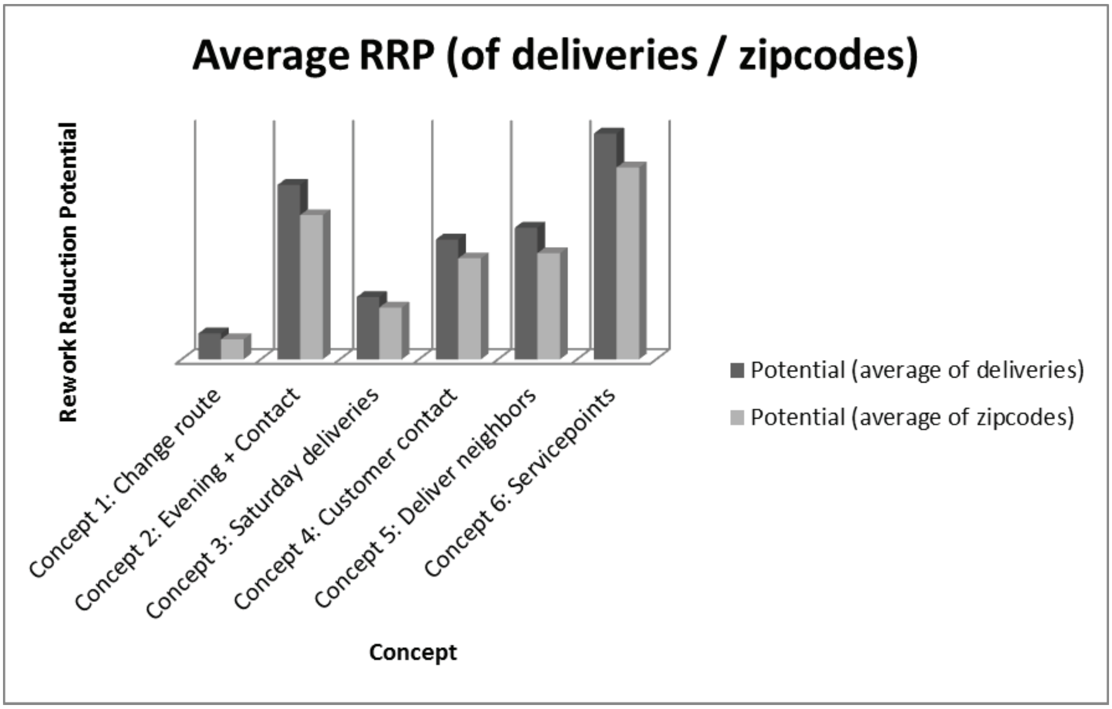

Fig. 6. Rework Reduction Potential of investigated concepts to increase the stop delivery efficiency (varying from marginal to significant potentials (www3, 2014)).

6. Conclusions

To conclude our research we have found that it is possible to increase the delivery efficiency of parcel delivery services by applying changes in the last mile: changes in location, time, route and behavior. It clearly appears that the delivery efficiency is closely related to (demographic) characteristics of an area by the application of multiple linear regression techniques to develop address intelligence out of the big data with deliveries (only 21% of the delivery data was used). Based on the validation with customer contact it has proven been that it worked well in practice; the delivery rates and the rework reduction potentials are well estimated for other areas. In future more research is needed towards the variance and reliability of the estimated models. Another interesting result should be reflected on the work of Boyer et al. (2009). They addressed as future research to more exact mapping of the relationship between efficiency and customer density. In their paper they show the decreasing miles per customer as the consumer density is increasing. Therefore the related delivery costs are also decreasing with increasing customer density. As long as a 100% percent delivery as assumed this relationship holds. However, in our research a strong relationship between low first delivery rates for zip codes with high densities and high delivery rates for zip codes with low densities were found. Therefore it is very important to consider all the related costs, i.e. the cost of rework for the second/third time deliveries. Integration of the rework cost leads to completely different relationship between cost and customer density.

Based on the address intelligence new concepts can be derived for area-specific solutions to increase the first time delivery. Our case research has shown that contact with the customer seems to be the most promising concept which could be adapted by parcel delivery services and web-shops to remain efficient.

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