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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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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-

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 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)

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