



Dein**Depot**

Potential assessment for the implementation of a central depot
with the aim of an eco-friendly and bundled parcel delivery on the last mile

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[SHORT VERSION]

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DeinDepot

Potential assessment for the implementation of a central depot with the aim of an eco-friendly and bundled parcel delivery on the last mile

[SHORT VERSION]

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1 Introduction

Aims of the project

The project aimed at creating a broad potential assessment for the implementation of a central depot for an eco-friendly and bundled parcel delivery on the last mile. Here the main focus was put on planning, economic but also legal factors. The interdisciplinary potential assessment was processed so that their practical application is transferrable without any restriction on location.

Background

While the online share in 2005 was at approximately 1.5 percent, it already increased to 4.8 percent in 2010, and in 2017 and 2018 was at almost 10 percent. Though yearly growth rates in retail were at low single digit rates (in the years 2002, 2003 and 2007 even negative), online trade grew in double-digit rates every year. According to HDE-online monitor 2019 (IFH Köln GmbH) the yearly growth rates since 2014 in online trade center around 10 percent. This shows that the share of online trade in total retail sales increases: from 0.3 percent in the year 2000 to almost 11 percent in the year 2019.

In order to reach end customers, many courier-, express- and parcel service providers (CEP) drive similar routes, especially on the last mile. A more effective and therefore more sustainable solution for this could be the bundling of routes on the last mile. However, this poses the challenge of potentially non-cooperative parcel service providers. This problem could be circumvented with an end-customer-initiated delivery to a district-central depot. End customers would then state the depot's address as their shipping address so that parcels would be sent to the so-called DeinDepot (engl. "YourDepot"). By choosing this approach the challenging involvement of parcel service providers is not necessary. Delivery on the last mile would then be bundled and environmentally friendly.

Research Questions

- What is the state of research? Are there any implemented projects and what were the criteria for their implementation?
- What needs does an end customer have during a parcel delivery?
- How much willingness to participate can be expected from such a concept?
- What are chances and risks from the perspectives of CEPs, shippers, retail communities and urban depot operators?
- What logistic and planning challenges have to be taken into account?
- What economic concepts can be developed as a basis for a practice-oriented direction?
- What transport laws and framework conditions of private and public law are to be respected when introducing the concept?
- What legal challenges arise with regard to the design of contracts and other agreements?
- What boundaries are set by the competition law when introducing a central depot?
- What means of protection can be provided for customers, depot operators and couriers (especially insurance solution)?

2 The concept „DeinDepot“

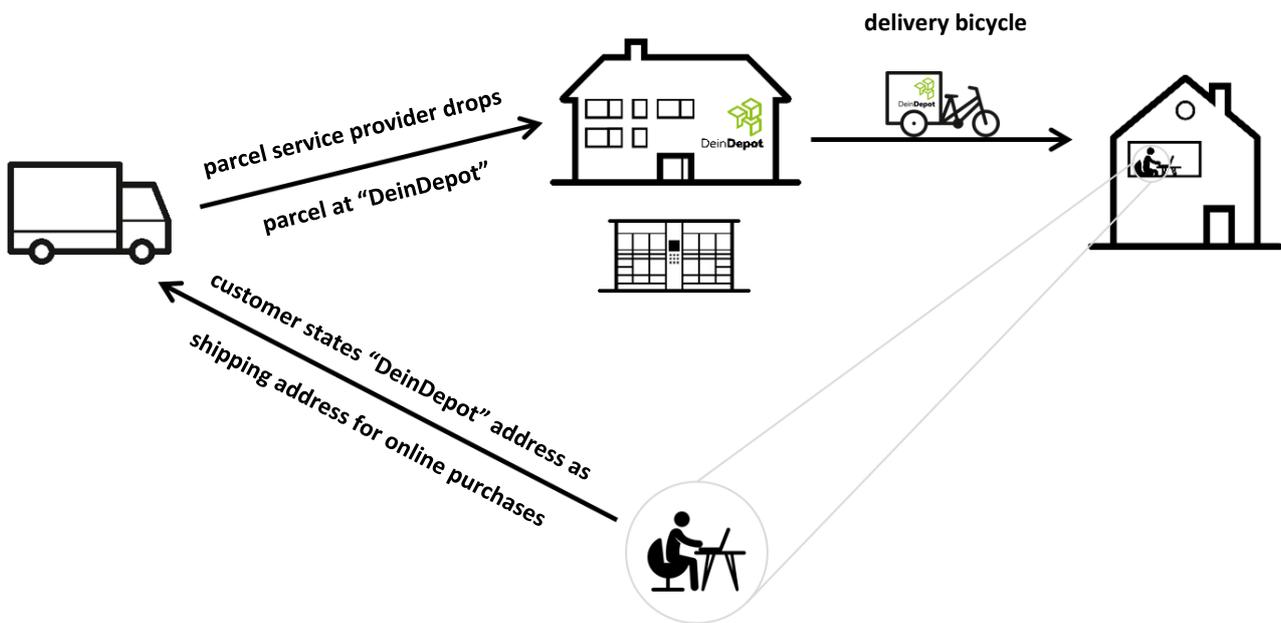


Figure 1: DeinDepot scheme (own portrayal)

The concept of DeinDepot will be communicated with the residents of the district after adequate structural, organizational and digital structures have been established. If an end customer is interested in the concept of DeinDepot he can register online or in person. When ordering online in the future, the end customer enters the address of DeinDepot as the delivery address. This way several parcel service providers are obligated to drop off their articles at the appropriate location. Successful implementation of the concept would mean a high number of residents participating in the project. DeinDepot offers three options of delivering/providing parcels to the end customer. The end customer can communicate individual preferences with the depot operator (for example through an app):

- Firstly, the end customer can collect their parcel at a local retailer (shipping address) during regular opening hours.
- The second possibility offers a “parcel terminal” which is located in direct periphery of the respective retailer. If the customer prefers this possibility, the parcel will be placed there accordingly. The recipient can then collect the parcel with appropriate access control (digital) at any time.
- The third option includes a delivery bicycle. Here the end customer has the possibility of choosing a specific time frame for the parcel delivery. If the parcel cannot be delivered it can be deposited at a DeinDepot-retailer or in the parcel terminal.

3 Methodology

Literature review

Due to the interdisciplinary direction of this research project, the literature and source analysis likewise was conducted in an interdisciplinary way. For one thing, the literature research built upon classic library system research. This way laws, law commentary, books as well as scientific articles about logistics could be analyzed. Secondly, several internet documents were analyzed. By doing this, some report analysis about practice-, model- and research projects as well as an already conducted trial could be enter the source analysis. Due to the current relevancy of the topic, newspaper articles were also taken into account as sources of information.

Quantitative survey

Within the research project DeinDepot a quantitative online survey with 2.017 panel participants was conducted by a big German survey company from September 4th to 13th 2019. The survey was targeted to adult residents of German cities (inhabitants > 100.000). In order to ensure gender and age representation of German cities the online-survey was conducted by a survey company with access to a big consumer panel.

In order to analyze binary dependent variables such as e.g. a "willingness to use DeinDepot" sophisticatedly according to areal and personal features and to correct possible non-representability with regard to age and gender of city residents, a multinomial probit model was applied. In order to analyze dependent variables with more than two forms, such as e.g. the variable "willingness to pay for DeinDepot", a multinomial probit model was applied.

By means of a conjoint analysis the evaluation of various parcel delivery services by participants of the quantitative survey is analyzed. For this conjoint analysis a part of Schneider's (in 1998) introduced, pragmatic and analytical method, the "conjoint-poor-man-method" was applied.

Quantitative expert interviews

In addition to the quantitative survey, expert interviews were conducted. The aim was to gain knowledge from the works and research projects of stakeholders from the fields of economy, politics, research and advocacy groups. In total 13 guided phone interviews were conducted between July and November 2019.

4 Results of the quantitative survey

The following information about the population in German cities was gathered through a representative sample.

Previous utilization of online trade

Only 3.7 % of all people have never ordered online. Around 93% of respondents who have ordered online have already ordered products on Amazon. Of those, around 45% use Amazon's premium model Amazon Prime. In three months they receive 3.7 goods shipments valued at 170€ on average. Solely 15% return more than 10% of the ordered items.

90% state their home address as the shipping address when ordering. Only 19% of recipients are very pleased with the delivery to their home address. However, over 30% of recipients who state alternative addresses (e.g. their workplace) are very pleased with the delivery. From a recipient's perspective this shows the potential for improvement for home delivery.

The most frequently mentioned reason for discontent is that the "package is dropped off at ParcelShops unsolicitedly". This, as well as "depositing package in front of house or apartment door" is considered most irritating by recipients.

Most important for recipients is communication with the delivery company as well as the delivery in a certain timeframe. Less important is delivery at night or environmentally friendly transport.

DeinDepot user potential

The majority of city residents would use "DeinDepot" if it existed: The user potential is at 60.5%. However, only 36% have a positive willingness to pay (0,5€ or more).¹

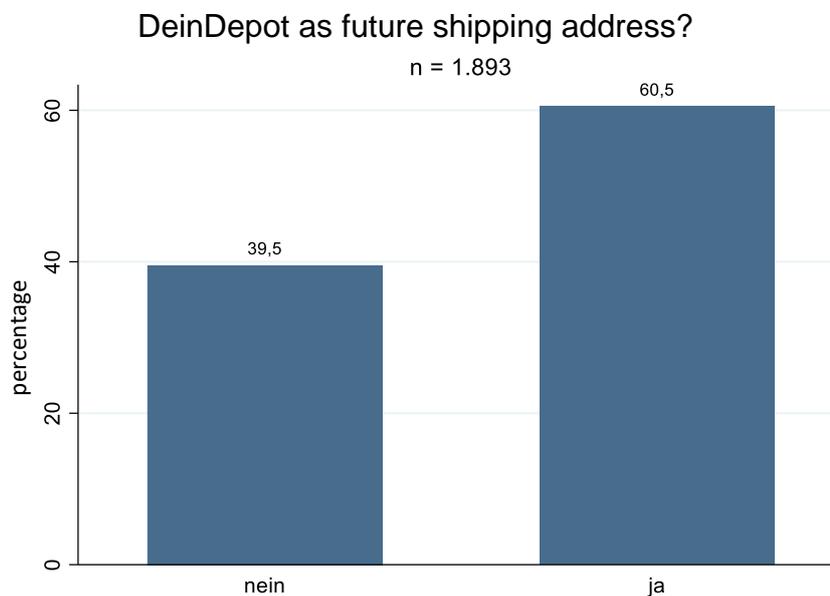


Figure 2: Using DeinDepot as future shipping address (own portrayal)

¹ 100% = DeinDepot concept understood (n = 1.893)

Potential DeinDepot users and non-users differ significantly. For example, potential DeinDepot users are younger, were longer in school, university or vocational training and use public transportation more often. They often live in the city center and rarely in residential areas. On average they receive more consignments of items ordered online and more often they already use alternative shipping addresses.

The user potential is highest with 69% in urban apartment-complexes and lowest in pure residential areas with 53%. In cities with more than a million inhabitants the user potential is slightly below average with 58% and in cities between 200.000 and 500.000 inhabitants slightly higher.

The user potential in the age group from 18 to 29 years is significantly higher with 76%. In the age group from 40 to 49 years the potential is at 66%, in the age group above 60 years the potential is at 43% and with that significantly below average.

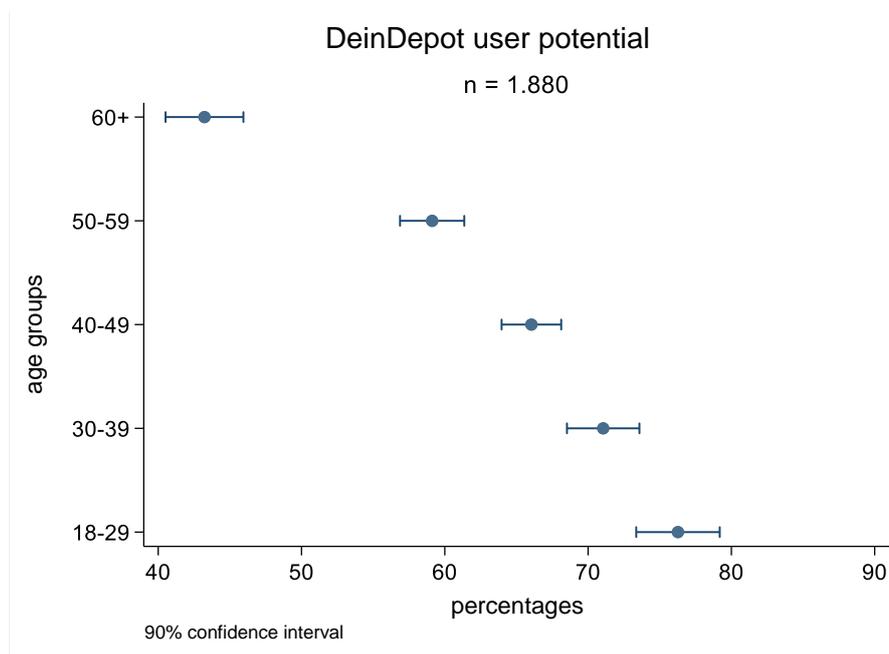


Figure 3: DeinDepot user potential according to age groups (own portrayal)

Willingness to pay

The average willingness to pay amongst potential DeinDepot users is 0.72€ per shipping. This complies with the average public willingness to pay which is 0.43€. The part of the population with a positive willingness to pay is highest in the city (41%) and lowest in pure residential areas (33%). In accordance with that the average accepted price per shipment is 0.48€ in the city and 0.39€ in residential areas.

The share of positive willingness to pay amongst the population is at 53.3% amongst 18 to 29-year-olds. Amongst above-60-year-olds the share is only at 21%. The average accepted price per shipment for 18 to 29-year-olds is at 0.63€ and decreases with increasing age to 0.25€ for above-60-year-olds.

The more important "communication with delivering company" is to respondents, the higher their willingness to pay is – from 0.52€ (very important) to 0.23€ (not important). The more important "environmentally friendly transport" is to respondents, the higher their willingness to pay is – from 0.68€ (very important) to 0.21€ (not important).

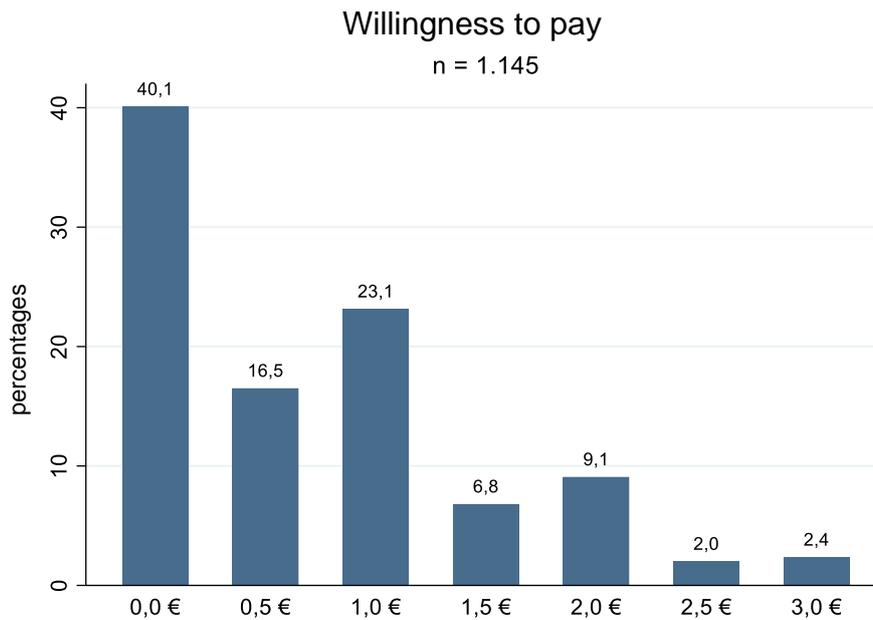


Figure 4: DeinDepot willingness to pay [percentage of potential DeinDepot users] (own portrayal)

Potential monthly profits for DeinDepot through recipient payments

An extrapolation for two exemplary districts of Frankfurt am Main shows the potential profit from payments of the recipients:

- Frankfurt Nordend (urban area): ca. 39.000 €;
- Frankfurt Heddernheim (residential area): ca. 10.000 €.

5 Results of the qualitative expert interviews

Besides a quantitative survey qualitative expert interviews were conducted. The results were then grouped into the categories economy, traffic and law. The following results contain information gathered from expert interviews:

In order to evaluate the economic efficiency and the economic success of the DeinDepot concept aspects such as delivery reliability, acceptance by the customer, costs of the last mile and willingness to pay are considered relevant. Further significant factors are a certain flexibility, the use of public space as well as maintenance and repair work of delivery bicycles. A less important aspect, especially for the recipients, is sustainability.

For the evaluation of traffic factors, a case-by-case assessment of the respective district is necessary. This includes the analysis of e.g. package capacity and recipient structure. The traffic infrastructure should be largely suitable for delivery bicycles. Furthermore, the depot should be easily accessible with public transport but also for CEP service providers.

From a logistical standpoint, the transshipment location must present a suitable dimensioning. For this a case-by-case assessment is necessary as well. A cooperation in between CEP service providers seems to be too difficult in the existing system.

Civil law aspects such as contract design, liability issues and insurance have to be respected especially. Regarding competition law, a distinction between a purely commercial design and public inclusion is necessary.

6 Legal assessment

Conclusion of contract

A conclusion of contract between DeinDepot and the end customer must be ensured. For this, an online conclusion of contract seems suitable which can take place on a DeinDepot homepage or app. Furthermore, packages from unregistered customers should not be accepted. There is no legal obligation to accept them and therefore, such packages should immediately be rejected. In case a package by an unregistered customer is accepted nonetheless, implementations of non-contractual liability for storage contract must be respected.

Contract design

Because the contract is most likely a mixed type contract, services offered must be clearly regulated by DeinDepot. This way contractual obligations can be distinguished better in case of dispute or individual issues. It is recommended to offer the end customer a number of services. This way the respective service type is clearly defined.

Competition law

When designing DeinDepot processes of the competition law must be respected. In case DeinDepot is considered a competitor to CEP service providers, information sharing must be prevented. Equally, processes that ensure that information cannot travel in between various CEP service providers through DeinDepot must be implemented. This also includes avoiding simultaneous delivery by multiple CEP service providers.

Insurability

Before concluding a contract, DeinDepot must define the tangible need for insurance. For this, the previously described variations and possible contractual features should meet the needs. A specialized insurance intermediary can determine those requirements.

7 Transport and logistical aspects

When searching for a suitable quarter for DeinDepot the following aspects regarding a delivery by bike should be analyzed:

- package volume;
- recipient structure;
- dimensioning of streets, sidewalk and cycle path;
- topographical circumstances.

The depot itself must offer space for maneuvering, holding, parking and loading. This concerns space for the delivery by delivery vehicle as well as delivery bicycles. For the dimensioning of those spaces the following questions must be answered:

- How many people/CEP service providers use the depot?
- How many and what kinds of vehicles travel to the depot?
- How can the different time slots for delivery and shipment be managed?
- Are defined zones for delivery necessary?

8 Further need for research

The research project DeinDepot was able to identify the customer’s willingness to pay for a respective concept. In addition to that, the project was able to show what infrastructural, contractual and legal requirements are necessary for the conduction of such a concept. On that basis the extent of costs can be analyzed which can then lead to a comprehensive assessment for the operation of DeinDepot.

9 Conclusion

The research project DeinDepot was able to identify the interdisciplinary potential for the implementation of a central depot with the aim of an environmentally friendly and bundled parcel delivery on the last mile. It shows that challenges in traffic can possess high relevancy. However, with extensive planning traffic factors should not be a big obstacle for a potential implementation. From a logistical standpoint particularly area-relevant factors must be taken into account. This relates to the depot’s storage area as well as all necessary external surfaces. In addition to that, urban infrastructure is an important factor in site planning. The results of the economic analysis show the customer’s willingness to pay. A comprehensive economic analysis of the proposed concept is possible only by including other stakeholders and analyzing the extent of costs in detail. The legal analysis shows that the DeinDepot concept affects a number of legal categories. Nonetheless explicit recommendations for action can be made. The findings of the research project DeinDepot therefore form a highly relevant and interdisciplinary basis for all stakeholders that plan to implement such a concept.

II. List of references

Cameron, Colin A.; Trivedi, Pravin K. (2005): *Microeconometrics. Methods and Applications*. Cambridge: Cambridge University Press.

IFH Köln GmbH: *Online-Monitor 2019*. Hg. v. Handelsverband Deutschland (HDE). Berlin. Online available at <https://einzelhandel.de/online-monitor>.

Schneider, Dietmar (1998): *Produktoptimierung und zielorientierte Kostengestaltung mit Conjoint Measurement - ein pragmatisches Verfahren zum Produkt-Engineering*. In: *Zeitschrift für Unternehmensentwicklung und Industrial Engineering*, p. 24–27.

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