



## Interdisciplinary Recommendations for Operating Micro Depots

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**Abstract.** The planning and construction of an urban logistic concept requires a holistic approach. The research project “DeinDepot”, funded by the Federal State of Hesse, was designed to create corresponding scientific and practical knowledge. The findings of the project result in the presentation of potentials and challenges of a bundled and environmental friendly last mile parcel delivery concept. In addition, a research gap was closed by assessing both the customers’ willingness to use and willingness to pay for a customer-driven micro depot concept from customers’ perspective.

### 1 Background

A continuing increase in the volume of B2C e-commerce is leading to an increase in less bundled direct-to-consumers deliveries, which causes costs and emissions especially in urban areas. Hence, stakeholders in the context of last mile deliveries are interested in implementing efficient, innovative, and ecological last mile concepts. Such concepts must additionally fulfil the expectations of online customers because last mile delivery is the critical link between an online purchase and the shipment to the delivery address stated by the customer (Esper *et al.*, 2003).

During the last years, so called “central micro depots” (CMD) got installed in several city centres all over the world. CMDs can be interpreted as a type of urban consolidation centre (UCC) which are situated in relatively close proximity to the geographic area they serve (Allen *et al.*, 2012 and Janjevic and Ndiaye, 2014). Factors that influence the nature of a UCC are described in Browne *et al.*, 2005. The initiative to act is often triggered by single parcel service providers or by political need for action. Because of the corresponding pressure of time and budget, inter-disciplinary analyses were not carried out. This has led to the fact, that a lot of micro depots were not successful in a long-term way.

The planning and construction of an urban logistic concept requires an holistic approach. The research project “DeinDepot”, funded by the Federal State of Hesse, was designed to create corresponding scientific and practical knowledge. Within the framework of a potential analysis, expert interviews were conducted, consumers were questioned and legal aspects were analysed. The following abstract provides an excerpt of relevant findings.

### 2 The concept of DeinDepot

DeinDepot is a bundled and environmental friendly concept of last mile parcel delivery.

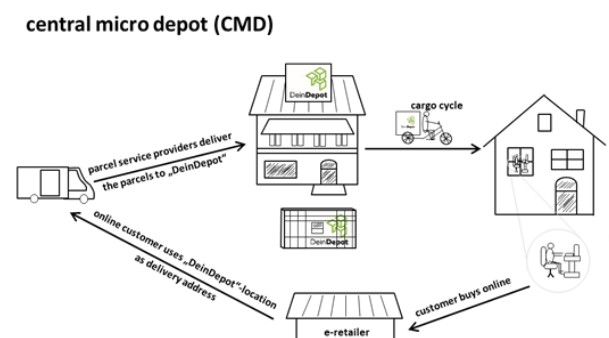


Figure 1. Flowchart of DeinDepot

A characterization of DeinDepot with regard to the factors influencing the UCC nature can be found in Hagen and Scheel-Kopeinig, 2021.

By convincing people using the local DeinDepot as a delivery address, parcel service providers are forced to deliver the parcel to DeinDepot. Therefore, parcel service providers are not involved in the concept, which can be an advantage since their cooperation has turned out to be challenging. DeinDepot could be integrated in a retail shop for example. The customer can choose out of three delivery options. Home delivery by cargo bicycles, personal pick-up at DeinDepot (during opening hours) or personal pick-up at a parcel terminal at any time. Applying that system, individual last mile deliveries from several service providers would be reduced. DeinDepot is a customer-driven concept because customers trigger the delivery to the micro depot. They are acting while all other stakeholders in the context of last mile delivery are reacting (Hagen and Scheel-Kopeinig, 2021).

### 3 Quantitative analysis

To identify the general willingness to participate (acceptance) in such a concept and the willingness to pay in addition to delivery costs per parcel, a quantitative analysis was carried out. The results are based on an online-survey, which is representative for adult inhabitants in German cities with more than 100.000 inhabitants. The sample consists of 2,017 observations. The online-questionnaire included questions about socio-demographic characteristics, information about previous online purchases, experiences with last mile deliveries as well as perceived importance of different delivery services.

After an introduction of the DeinDepot concept respondents were asked three key questions. Namely, whether the respondents understood the concept, would use DeinDepot for deliveries in the future, and would be willing to pay for it.

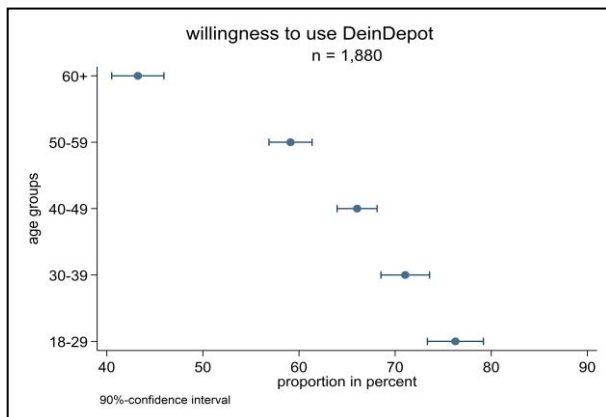


Figure 2. Willingness of use by age groups

60% of respondents who understood the concept of DeinDepot would be interested of using this

service in the future. A differentiated analysis by spatial and personal characteristics showed for example that there are significant differences depending on the types of district the respondents are living in. 70% of persons living downtown would use DeinDepot. The fraction within mixed used areas is 62% and just 53% in residential areas. As shown in Figure 2: with increasing age, the proportion of potential users decreases dramatically.

Respondents were asked: "In addition to the delivery fee charged by the seller, how much would you be willing to pay per parcel? Nothing, €0.5, €1.0, €1.5, €2.0, €2.5 or €3.0?". 60% of potential users have a positive willingness to pay (WTP) with a mean value of €1.2 per parcel (Figure 3).

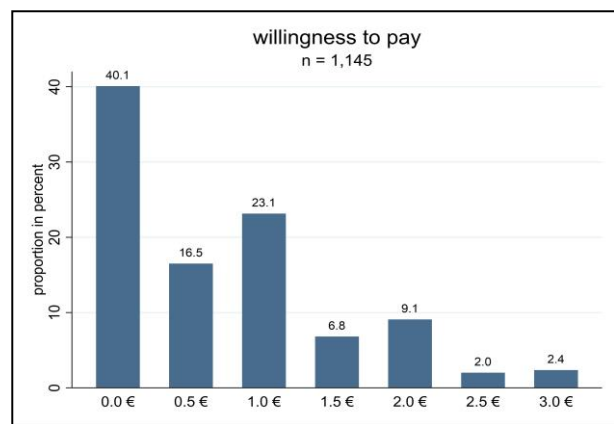


Figure 3. Willingness to pay (potential users)

Adding the group of people who are convinced of DeinDepot, but not ready to pay for the service, the average willingness to pay is €0.72 per parcel. For the entire population in German major cities, including those who stated not to be a potential user, only 36% have a positive WTP with a mean value of €0.43.

A differentiated analysis by spatial and personal characteristics shows that 45% of persons living down-town would have a positive willingness to pay for DeinDepot. The fraction within mixed used areas is 36% and just 30% in residential areas. Furthermore, the probability of a positive willingness to pay for the service of DeinDepot is driven negatively by the age.

See Hagen and Scheel-Kopeinig, 2021 or Hagen *et al.*, 2020 for further results regarding online customers' willingness to use and willingness to pay for DeinDepot from a customers' perspective.

### 4 Legal aspects

The conception of DeinDepot should preferably be based on contractual provisions. The DeinDepot services can be subsuming under the contract types of the "Lagervertrag" and the "Frachtvertrag". Both

types are commercial law contracts and therefore regulated in the HGB. One main characteristic of both contract types is that there is wide leeway in the drafting of contracts. As a result, it is very advisable to create comprehensive contractual provisions. The main legal tasks are provisions concerning the liability of DeinDepot and contractual obligations DeinDepot has to fulfil. Moreover, it has to be observed that the contractual provision DeinDepot is using must be regarded as AGB. In German Law this leads to the application of §§ 305 ff. BGB, the so called "Inhaltskontrolle". Despite the rules mentioned above, DeinDepot will be regarded as a CEP-service company. Based on this DeinDepot has to observe postal law rules and data protection rules as well. In addition, the German courts have developed some special rules for CEP-service companies during the last years. This jurisdiction has to be observed as well. In practice DeinDepot has to ensure that it implements a practicable procedure to conclude a contract with its consumers. It seems to be advantageous to use a DeinDepot-Homepage or App for the conclusion of the contracts.

## 5 Transport and logistics aspects

The location of DeinDepot should have good (public) transport connections and offer different vehicle types and sizes sufficient space for access, parking, loading and unloading. For the utilisation of

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cargo bicycles, parking facilities and a well-developed bicycle infrastructure must be available. Depending on local conditions, a decision should be made on the size and final design of DeinDepot on a case-by-case basis. Both, the parcel terminal and the depot, must be protected against weather, vandalism and theft. Digital infrastructure must also be in place to enable shipment registration and tracking. The depot should also have adequate facilities such as a toilet and a staff room.

## 6 Recommendations

Findings in our research project have closed a research gap by examining the acceptance and WTP for an alternative customer-driven micro depot concept. Based on a quantitative analysis, interviews with experts as well as legal assessments we are able to give detailed recommendations, which are formulated in the following areas: district and site selection, depot and storage, delivery, (electronic) handover, pricing, and law (Hagen *et al.*, 2020).

Further research could investigate if potential DeinDepot users would accept a monthly DeinDepot-flat rate. A comprehensive cost analysis should also be carried out.

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