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Customer Acceptance of Urban Logistics Delivery Concepts

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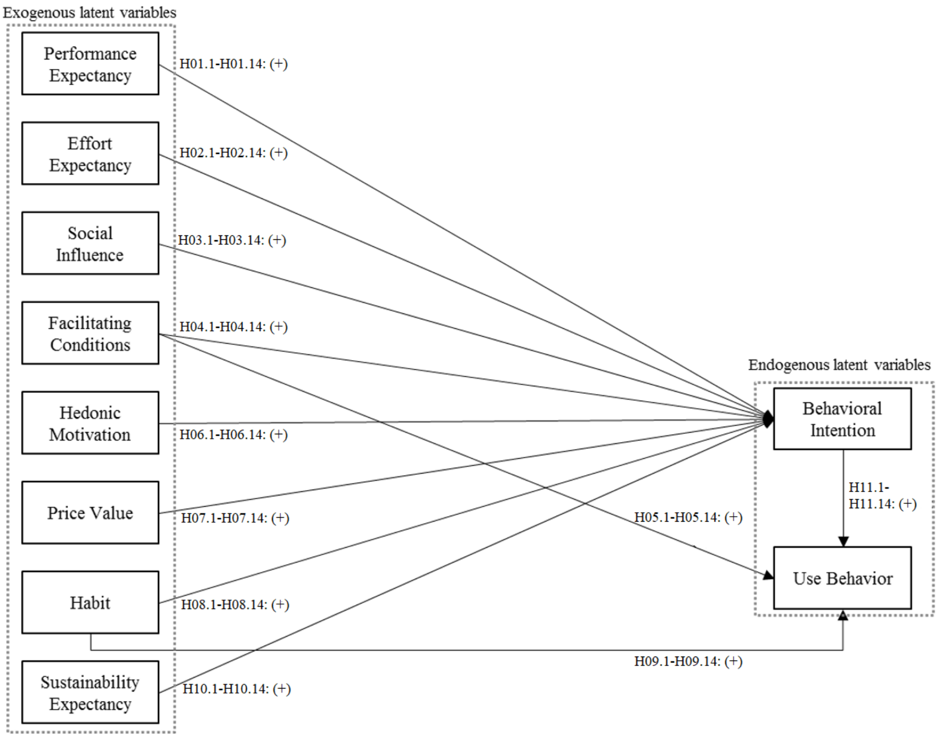

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Abstract

Urbanization as a global trend leads to a rapid increase of urban freight transports in cities, particularly on the last mile. Additional trends such as the increasing importance of electronic commerce and the associated growth in business-to-customer deliveries aggravate the situation even more. In view of the resulting challenges such as traffic congestion and air pollution, especially public authorities are obliged to react. An implementation of optimized urban logistics concepts is therefore necessary in order to improve the efficiency and sustainability of delivery processes on the last mile. The final realization of these concepts requires the support of various stakeholders. Hence, the purpose of this discussion paper is to investigate potential acceptance factors for urban logistics concepts from an end customer perspective. In doing so, the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) model was used and extended. By means of an online survey, the impacts of the different constructs on the behavioral intention (BI) and usage behavior (UB) of customers towards 14 different urban logistics concepts were examined in Germany. The results indicated that performance expectancy (PE) is the most significant antecedent of end customers BI. Further, it was pointed out that the actual UB of customers to utilize urban logistics concepts was exclusively positively influenced by habit (HT) of customer towards urban logistics concepts. With respect to customers UB, HT revealed a strong significance for thirteen of the included concepts.

Keywords

Urban logistics, city logistic, urban freight transport, last mile delivery, sustainability, e-grocery, customer acceptance, UTAUT2

1 Introduction and Motivation

The importance of urban logistics has continuously increased in recent years. Various global trends such as rising urbanization and the growing importance of the internet are the main reasons for this. As a result of online retailing, every private household in urban areas is now a potential recipient of products. This poses particular challenges for the logistics sector. Accordingly, transport management by logistics service providers in urban areas has been aggravated by the high number of orders from customers. This is also linked to an accumulation of urban freight traffic. The consequences of this development are related to increasing environmental pollution, noise nuisance and traffic congestion (Taniguchi et al., 2014). Integrated concepts that enable cities to cope with the traffic situation as a result of the numerous shipments are not sufficiently available yet. Hence, urban stakeholders from politics and industry are committed to finding a solution. A demand-oriented and modern offer of logistics services is also a significant location factor for the urban economy (Erd, 2015). Consequently, growing urban conurbations require an efficient and flexible supply of alternative shipment options that are also compatible with the needs of the inhabitants and the environment. With regard to alternative delivery methods, a successful implementation primarily depends on the acceptance and application of end customers (Wang et al., 2018).

Regarding scientific research, publications on end customer acceptance of urban logistics concepts is limited. To date, only four articles dealing with the end customer acceptance of urban logistic delivery concepts. Niehaus (2005) firstly analyses various delivery-services in the business-to-customer (B2C) fraction of e-commerce. A survey was used to investigate the acceptance of early box systems without the use of information and communications technology in contrast to customary home delivery. Another acceptance study is conducted by Ehrler and Hebes (2012) on the use of electro mobility in urban areas. In this article, extensive interviews enable an in-depth analysis of user needs, user expectations, and user acceptance by vehicle drivers, vehicle buyers and end customers (Ehrler and Hebes, 2012). In order to better understand online shoppers' attitudes towards new delivery services, de Oliveira et al. (2017) analyzed the potential demand of automatic delivery stations. For this purpose, a survey according to stated preference and revealed preference methods and assessed potential users considering two delivery services was developed: home delivery and automated delivery stations. This study offers an approach in interpreting the preferences of end users in terms of designing innovations on the last mile (de Oliveira et al., 2017). Wang et al. (2018) examines the acceptance of customers for the use of an automated parcel station. In this process, the acceptance behavior of customers is validated by means of a survey. To conclude, research on the acceptance of urban logistic delivery concepts is quite rare.

The overall objective of this discussion paper is to examine potential acceptance factors for urban logistics concepts from an end customer perspective. Considering this, findings will be developed and formulated on the basis of an acceptance analysis. In order to present an adequate scientific approach, an appropriate research question (RQ) is necessary to accomplish the objective of this work.

Therefore, our RQ guiding the whole discussion paper is:

Which factors influence the acceptance of urban logistics concepts among end customers?

The remainder of this discussion paper is structured as follow: in the second section, the investigated delivery concepts are introduced. The methodology and the creation of the survey is part of section three. Subsequently, the results of the empirical investigation are presented. The fifth section discusses the conducted approach and offers recommendations. Limitations are part of section six, while conclusions and outlook closes the discussion paper.

2 Urban Logistic Delivery Concepts

Urban Logistic delivery concepts are in this discussion paper understood as alternative delivery method using new technological or infrastructural elements during the delivery process. The focus does not lie on intelligent transport systems using GPS for traffic management (Ranieri et al., 2018) neither on the replacement of traditional vehicles through electrified ones.

To improve the chances of successful deliveries, customers are already being provided with various delivery options in numerous locations (Moroz and Polkowski, 2016). At this point, the deployment of collection points is one of the most wide-spread solutions. The recipient receives the order at a certain location and is given the opportunity to collect it there (Schnedlitz et al., 2013). In order to offer the customer a certain degree of convenience here, preference is given to facilities that have long opening hours or are in locations with good transport connections. Typically, these places are shops, parcel machines, package boxes or post offices. Automated parcel machines and package boxes stations are also preferably installed at locations with high population density and good accessibility (Moroz and Polkowski, 2016). Such an approach to the delivery of parcels is useful in many respects. As the driver delivers his consignments to one destination, the number of kilometers is reduced (Erd, 2015). The tours will consequently become shorter, more coordinated and more cost-efficient. This is accompanied by a reduction in the volume of traffic and environmental and noise pollution (Taefi et al., 2016). Furthermore, the recipient is no longer restricted to the delivery times of the courier, express, and parcel (CEP) services. This provides greater flexibility with regard to when the parcel is collected. If ordered goods are shipped to a pick-up point or automated parcel machine, the customer will be informed about the delivery. This allows the customer to pick up the stored items, for example, on the way home from his workplace without any additional time expenditure (Schnedlitz et al., 2013). In the context of home deliveries, there are several possible scenarios that can occur during delivery. If the recipient is at home at the time of delivery, the order will be handed over immediately. Thus, the delivery process is completed successfully. If the recipient cannot be found at the first delivery attempt, the consignment will be delivered repeatedly within a new delivery attempt or left behind by the courier at the neighbors or at the door. Figure 1 visualizes the delivery methods mentioned above.

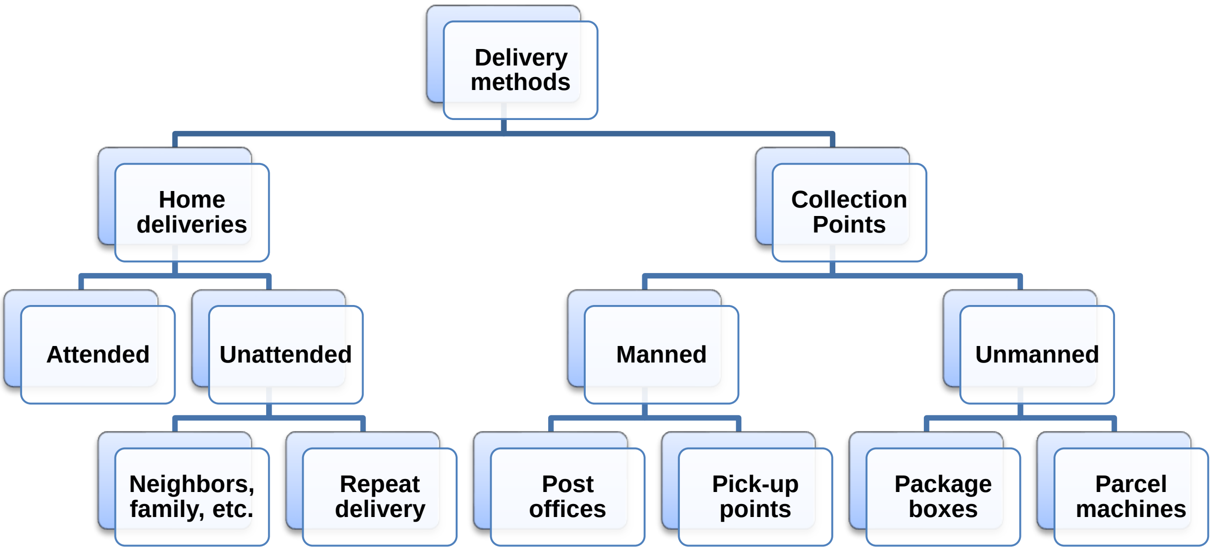

Figure 1: Delivery Methods according to Moroz and Polkowski (2016)

In the following, the investigated delivery concepts were introduced and briefly analyzed in terms of resulting impacts. Most of them (concept one to nine) tackle the CEP delivery services as well as other (concept ten to 15) focus on e-grocery delivery activities. This solution of food supply poses a major challenge in the last mile. The quality requirements for transport and delivery service quality are high. The need for permanent refrigeration during the delivery process requires companies to invest in mobile refrigeration technology. B2C deliveries of fresh goods also require the presence of the customer, which makes home deliveries inconvenient in this sector (Heiserich et al., 2011).

2.1 BentoBox

As an innovative approach for urban distribution and collection systems, the BentoBox concept is intended to serve as a new logistics solution. The aim is to enable low-emission and traffic-reduced distribution of consignments, particularly in densely populated urban districts. The special feature of the BentoBox is its capacity for different shipment sizes. The concept consists of a steel housing accommodating small mobile containers of various formats and one user terminal. These containers are removable and mobile. Therefore, they can be used depending on the requirements and size of the packages. The use of the BentoBox does not entail any additional costs for private customers. In contrast, the shipping companies that use the BentoBox must pay a fixed fee for each consignment stored (Cepolina and Farina, 2015).

While CEP service employees use the BentoBox as a consolidation depot, recipients access individual compartments directly. With the help of the BentoBox, CEP service providers are expected to improve their service quality, delivery efficiency and sustainability of the transport systems used (Dell'Amico and Hadjidimitriou, 2012). This is done in multiple ways for CEP services. On the one hand, shipments can be collected in the BentoBox for a specific target area in order to be redistributed from there on a small scale. In this context, for example, load wheels are to be used in particular. On the other hand, the BentoBox allows shipments to be collected from the target area and then transported to destinations outside the area (Cepolina and Farina, 2015).

In the future, the BentoBox is to be implemented primarily in shopping miles and residential areas. The only requirement is a free-access area for customers and service providers as well as an electricity supply. As part of the Citylog project, the BentoBox has already been tested in practice (de Oliveira et al., 2017).

Thereby, the BentoBox reduces the volume of traffic and demonstrably improves the delivery rate on the last mile. One of the main advantages highlighted by the end customers was the flexibility in terms of time when picking up the goods. In addition, CEP services noted that the low volume of traffic reduces general travel times. This would also decrease fuel consumption and the resulting environmental pollution (Cepolina and Farina, 2015).

2.2 Parcel Station with Delivery Service

With the concept of the Parcel Station with integrated Delivery Service, shipments are no longer delivered directly to the customer's home. In order to be able to explain this concept more effectively, an existing company is used as an illustration. At this point, companies such as i-bring, for example, offer themselves to receive customers' parcels and store them for a while. The customer is then offered the opportunity to select an individual date for delivery. This is intended to give the customer full control over the delivery time (i-bring, 2019).

After successful registration on the website, the customer receives the authorization to use the service of i-bring and to have corresponding shipments delivered to the so-called i-depot. Once the delivery arrives at the i-depot, the customer receives a notification. Preferred address delivery will be made within a previously selectable time window throughout the desired day. The recipient will be charged a flat rate of approximately 6 € for each consignment. Depending on the size or the time of the shipment, further costs will be incurred. For example, a shipment of two parcels in a selected delivery period of four hours would cost approximately seven €. The idea is based on the challenge that delivery by conventional parcel services usually takes place in time windows when most customers are not at home. This concept is intended to tackle this issue. The delivery times are deliberately set flexibly by i-bring to be able to meet the demands of the customers more efficiently. On the one hand, customers who use this concept do not have to invest extra time and effort in picking up the parcel from the parcel shop or their neighbor. On the other hand, this is also in the interest of the parcel carriers, since the deliveries initiated by i-bring increase the successful delivery rate considerably. This reduces fuel consumption and the associated costs for delivery companies. Besides, i-bring relies on existing fleets of local logistics service providers for the execution of its deliveries. They also use, for instance, electric vehicles and load wheels for delivery. An ecological motivation is therefore also part of this concept (i-bring, 2019).

2.3 In-Car Parcel Delivery

In-Car Delivery describes a concept that customers can select as an additional delivery option when ordering online goods. Several companies are currently testing the delivery of parcels into the trunk. These include DHL, Amazon, VW, Volvo and Audi. In this respect, vehicles with specific equipment are used, which have a special locking and opening mechanism in the trunk. Using a car as a mobile delivery address is intended to be an alternative, also for commuters. For each delivery into the trunk a charge of 2.99 € will be added (DHL, 2017).

During the ordering process, customers specify the location of their vehicle as the shipping address. Service of In-Car Delivery also includes the carriage of returned goods. A smartphone app gives the carrier both the exact location of the vehicle and access to the trunk of the respective car. Moreover, if the courier is in the immediate area, a temporary digital access authorization is granted which allows the trunk to be opened. Access to the other doors of the car is denied. As soon as the parcel has been inserted, the trunk is automatically locked again. Subsequently, the vehicle owner receives confirmation of successful delivery via app (Hofmann, 2018). This delivery concept enables customers to receive their shipments without great effort. It offers a smooth and cost-reduced process for the CEP service provider as well. If the recipient is not at home, the In-Car Delivery saves a multiple journey or a delivery in the parcel shop. Thereby, traffic volume and emissions are reduced (Rakel, 2016).

2.4 Parcel Drone Delivery

A Parcel Drone is used to deliver shipments that depart from a stationary depot to their final destination. According to the plan, Parcel Drones will bring their loads to the customer by air. This concept is currently being tested by Amazon. Amazon Prime Air is the name of the campaign and will deliver shipments from the air to the recipient within 30 minutes. As the concept is still in the testing phase, no final prices for deliveries have yet been fixed (Murray and Chu, 2015).

After receipt of the customer's order via smartphone app, the Parcel Drone is equipped with the corresponding shipment by employees of the Amazon depot. Thanks to an intelligent loading device, the Parcel Drone is able to land autonomously anywhere where sufficient space is available. The drone is driven electrically. It also delivers orders up to a maximum of 2.5 kg. The smartphone app informs the customer that the shipment is impending before the Parcel Drone arrives. During delivery, the drone releases the parcel for the customer and automatically returns to the respective base station (Shavarani et al., 2018).

The Parcel Drone offers potential for improving urban logistics in many ways. On the one hand, it is cheaper than conventional means of transport and could therefore have a decisive cost-reducing effect for transport service providers. Furthermore, it is more environmentally friendly than the motorized delivery vehicles. In addition, the suitability for the dispatch of urgently needed articles is to be emphasized. Here, for instance, medicines could be transported quickly to their destination in case of emergencies (Prümm et al., 2017). An expansion of the delivery concept is also currently being developed. Accordingly, it could be conceivable in the future that Parcel Drones could be driven closer to the corresponding target area with a delivery vehicle in order to reach the respective destination from there (Murray and Chu, 2015).

2.5 Parcel Robot Delivery

The CEP service provider Hermes is currently testing the use of parcel robots. As part of the delivery process of this concept, consignments are first stored in a parcel shop before being transported to the recipient by the parcel robot. Since such shipments usually have to be picked up directly by the customer, this concept is intended to enable fast and careless delivery. The Hermes Parcel Robot has six wheels and is electrically driven. In addition, the Robot is able to transport consignments of up to 15 kg. In this case, the order is placed by the customer using a smartphone app. Furthermore, the scheduled time of delivery is 30 minutes. After receipt of the customer's order, the Parcel Robot is filled by the employees of the parcel shop and sent to the destination. For each delivery, Hermes charges the recipients a surcharge of 1 to 2 € (Tripp, 2018).

On its way to the receiver, the robot preferably uses the sidewalk. Roads or cycle paths are only passed if an operator approves them. The operator is a Hermes employee and has a constant overview of the parcel robot. An integrated GPS satellite navigation system continuously informs the Hermes headquarters about the location of the robot. This also gives the operator a merged 3D image of the robot's journey. The parcel robot automatically detects pedestrian routes, zebra crossings, and traffic lights. Moreover, it is able to bypass obstacles and brake them if necessary (Altmeyer, 2018). Each parcel robot transports its consignments in a securely locked compartment. Customers can only unlock the compartment via an individual opening link. The recipient receives this link on his mobile device just before the robot arrives. In case of unauthorized access or other unscheduled irregularities, a noisy alarm signal is automatically triggered. On this occasion, the Hermes headquarters will be informed immediately. After successful delivery, the parcel robot automatically returns to the parcel shop (Bendel, 2017).

2.6 Parcelbox

The concept of a parcel box is basically a kind of large mailbox for parcels. These can be either containers that are firmly anchored in front of or to the house or mobile systems that can be attached to the apartment door if required. Currently, there are already a large number of different systems on the market. The Bundesverband der Kurier-Express-Post-Dienste (BdKEP), for example, lists around 45 different parcel boxes and boxes (BdKEP, 2019). Although these differ in their composition and function, they all serve the same purpose: the successful delivery of items, even if the recipient cannot be found at home. This means that there is no additional traffic due to a second or third delivery attempt by the parcel service or collection from a post office or neighbor by the recipient (Edel, 2018). In addition to increasing customer convenience and efficiency gains for the shipping service providers, the reduction in journeys also has a positive effect on the environment (Bogdanski, 2017).

2.7 Concierge Service at Workplaces

The term concierge originates from the French and designates a porter or gatekeeper. In the field of urban logistics, a concierge service means a process by which employees can receive their private parcels at their workplace. The idea is based on the problem that delivery by parcel services usually takes place in time windows in which most employees are at their workplace and therefore cannot be found at home. In larger companies, there are permanently manned reception areas or company-owned post offices during the day, which can guarantee successful delivery. For this purpose, a corresponding parcel point is set up at a location defined by the company. At this point, the employees' parcel is delivered, stored, and registered with the help of software. The relevant employee then receives a notification of receipt and can pick up the item at the parcel point. The software also verifies the employee's identity during collection to prevent misuse. In addition to reception, employees' returns can also be submitted at the parcel point, which are then picked up by the appropriate shipping service provider. The advantage of using such a system is that guaranteed delivery can take place at the first attempt, so that multiple trips by the shipping service provider for the same shipment become obsolete. Staff journeys to pick up undeliverable parcels from e.g. post offices are also eliminated. By delivering all individual items bundled to the company address, it is also prevented that the parcel services have to travel to the employees' different home addresses individually. This has a positive effect on traffic volume and environmental pollution. In addition, employees save time and do not have to think about accepting shipments. Accordingly, this can also have a positive effect on their work performance (Logistics Group International GmbH, 2018).

2.8 White-Label CEP-Service

The delivery of parcels is usually carried out by several homogeneous and competing parcel services, which serve the same areas simultaneously. Each of these services uses its own delivery network, which leads to unnecessary redundancy (Prümm et al., 2017). This redundancy could be prevented with a white label CEP service.

The term white label refers to a product or service that is marketed under different brand names, while the original manufacturer usually does not appear (Vertical Media GmbH, n.d.). With regard to logistics, this refers to a neutral delivery service that handles distribution over the last mile across all companies. Instead of a daily separate parcel delivery of individual shipping service providers, these shipments are bundled and a neutral delivery service delivers the parcels of e.g., Hermes, DHL, and UPS to the recipient together.[8] Another possibility would be to divide the delivery areas between the existing delivery services in terms of time or space. The parcels of all logistics service providers would also be bundled here and delivered collectively by one of the providers. If the packages are divided according to days of the week and service providers, Hermes on Monday, DHL on Tuesday, UPS on Wednesday, etc. could take over the delivery of all packages. On the other hand, a geographical distribution would mean that, for example, Hermes in municipality A, DHL in municipality B, UPS in municipality C, etc. would deliver both their own shipments and those of the other shipping companies. The effect to be achieved with this concept is also to reduce the volume of traffic. This would have positive effects on the costs of the service providers as well as on the environmental balance. Furthermore, an increase in comfort is achieved from the customer's point of view. On the part of the dispatch service providers, however, this approach could meet with rejection, as the competing companies would have to cooperate. Most suppliers will not approve of disclosing parts of their own corporate structure and strategy to their competitors. Accordingly, it is assumed that this concept cannot be implemented on the free market, but that cooperation between companies must be enforced by the public administration through restrictions such as import restrictions (Arndt, 2017). This would have a positive effect on the recipients of parcels, but in this case they would not be able to decide freely which service provider would ultimately carry out the final delivery.

2.9 Unattended In-Home Delivery

The delivery of a shipment to the recipient's home without the recipient having to accept it personally is referred to as unattended in-home delivery. With the help of

[8] The companies mentioned serve only as examples.

special technologies, the carrier can be granted short-term access to the recipient's house or apartment in order to deposit the parcel. Walmart and Amazon are particularly pioneers in this field (Green, 2017). The concept of unattended in-home delivery is described in more detail below using Amazon Key as an example:

To use the service, the recipient's apartment door must be equipped with a smart lock. Furthermore, a camera directed at the door is installed inside the apartment. If these requirements are met and the customer is registered with the system provider for in-Home delivery, he can select delivery to his own home when placing an order in the online shop. In the course of delivery, the courier will first try to deliver the parcel personally. If nobody is found, the smart door lock at the entrance door can be opened by the deliverer via a mobile app. As soon as the door is opened, the surveillance camera automatically switches on and transmits a live image to the customer's smartphone. This enables the customer to follow the delivery. After the deliverer has placed the shipment in the entrance area, he closes the door again via the app. Each opening is documented with the corresponding time and the camera's image material is saved. In addition, the customer receives an announcement via the app shortly before the planned delivery as well as a notification after the delivery has taken place. In addition to parcel delivery, the system can also be used to allow other service providers, such as cleaning services or friends independent access to the home (Amazon, 2019).

When considering the goals, customer comfort is the first priority. But also the dispatch service providers and the environment profit, as with the other concepts, from the guaranteed delivery with the first attempt, because thus repeated delivery attempts are not necessary.

2.10 Neighborhood Supply of Groceries

Supply through neighborhood purchasing describes a process in which neighborhoods jointly organize their procurement through division of labor. Procurements refer to mutual food purchases carried out for other neighbors. The aim of the joint organization is to link up paths in which neighbors perform purchases that occur on their way home. Preferably, one neighbor carries out multiple groceries of several other neighbors. This type of work sharing is organized via a mobile app.

Once the app has been installed, residents are assigned to a suitable neighborhood circle. Eventually, orders are placed and executed via the app. When placing an order, the recipient determines the charge for delivery and additionally specifies a place and time for handover. Reward points are awarded for every purchase made by a neighbor. These are then credited to the app. The bonus points are distributed according to the volume and quantity of the completed order. Once a certain amount of points is reached, they are redeemed in form of vouchers or discount codes at local grocers. The idea behind this concept is based on the fact that there are fewer private vehicles on the road that would head for the same destination. In this way, for instance, emissions are reduced and traffic congestion is relieved.

2.11 Click & Deliver of Groceries (Multichannel)

Established food retailers such as Rewe, Edeka, or Real rely on offline and online sales can therefore be described as multichannel retailers. Customers order and pay for food in a virtual online supermarket. Products are selected in the online shop on the retailer's website or via an app. In addition to the conventional distribution of goods in the local market, the delivery represents an additional service for the customer, which can usually be used with a varying minimum order value. The delivery to the customers' homes or to an alternatively preferred address is carried out in a previously selectable time window (usually two hours or all day) on the desired day and usually by employees using the supplier's delivery vehicles. The delivery times depend on the opening hours of the market in question. Additional costs for the customer arise only by the delivery fee and amount to between 1€ to 6€, depending on the time window of the delivery and the order value. The lower the order value and the smaller the desired delivery time window, the higher the delivery fee. Established suppliers, such as Rewe or Real, generally reflect their complete local assortment in the online shop in the stores that offer a delivery service and are responsible for the delivery process and the picking of the goods.

Advantages for the end customer result from convenience in food delivery without having to physically visit a market. Time-consuming purchases and long queues at the checkout in highly frequented stores can thus be avoided. Furthermore, they are not tied to store opening hours. On the other hand, the cost surcharge for the delivery is perceived as disadvantageous by customers. Another negative aspect of the concept is the loss of the ability to control the quality and condition of the purchased products in advance. There may also be benefits in terms of last mile impacts. City dwellers who otherwise do their shopping by car contribute to reducing traffic if they do not produce additional vehicle kilometers for further purchases. The possibility of specifying desired time windows or delivery addresses means that multiple deliveries can be avoided and transport kilometers saved (Schnedlitz et al., 2013). There are also opportunities to reduce ecological last mile impacts from home deliveries.

2.12 Click & Deliver of Groceries (Online Pure Player)

The Click and Deliver concept described in 2.11 is also implemented by relevant pure players such as Amazon (Amazon Fresh). Due to the absence of locally accessible branches, these companies supply their customers from a nearby central warehouse, do not yet have their own delivery fleet, at least in Germany, and therefore cooperate with CEP services. Together with named (dis-)advantages in 2.11, end customers can expect online pure players to have access to a wider range of products due to the greater storage capacity. On the other hand, the ordered goods will be shipped from much more distant warehouses resulting in more transport kilometers and corresponding emissions.

2.13 Click & Collect of Groceries

In food retailing, the collection service is often offered to the customer, also known as the Click & Collect service. Since it is a collection service provided in the store, Click and Collect cannot be directly described as a delivery concept in the sense of a traditional delivery service by definition, but it is one of the food supply forms offered by grocers. For the sake of clarity, Click and Collect is therefore included as an e-food delivery concept in the following, also because customers need to purchase foods online. Established food retailers, such as the Rewe Group and Real, thus enable customers to purchase food via the Internet or App and collect the goods themselves from the local market, ready packaged. The customer puts together a virtual shopping basket online. The ordered goods are then picked at the previously selected local store by its employees and made available for collection by the customer. This service is offered for a surcharge of 1 to 2€. By specifying a time window, it is up to the customer when he picks up the goods. She or he receives the purchase ready packed from the employee. The payment of the commodity takes place either online or in the market.

However, the advantages of the convenient and fast online order are thus equalized for the customer, because she or he has to take on additional distance, bears the costs of the last mile and is bound to the shop opening hours. The probability is very high that if a customer has done the week's shopping by car, she or he will also use it to pick up the car her- or himself. This also means that with regard to the last mile problem, this concept contributes less to reducing the negative impact of urban goods transport except of shorter used parking spaces.

2.14 Grocery Pick-Up Station

Pick-up boxes for grocery orders (e.g. emmasbox) at a station have different sizes, are equipped with an electronic locking system, and special freezing as well as refrigeration technology so that foods that require an uninterrupted cold chain do not perish. When selecting a pick-up station, the customer receives an order confirmation together with a pre-selectable pick-up time window, a pick-up code and/or a QR access code to open the box. Depending on the number of items, one or more compartments are reserved, which the customer can open with the pick-up number or the QR access code. The delivery and equipping of the boxes is carried out either by employees using the retailer's delivery vehicles or by logistics service providers. Although the box solution is less convenient at public transport points, the self-pickup effort results in advantages for customers through 24h accessibility and the possibility to receive parcels outside opening and delivery times (Schnedlitz et al., 2013). For example, parcels can be taken home after work, regardless of the time of day, thus avoiding extra vehicle kilometers (Moroz and Polkowski, 2016). Logistics companies or food retailers with their own delivery fleets benefit from a short drop-off time and thus gain in efficiency. Such stations are also promising in terms of ecological sustainability. Kaufland and Edeka are already testing these pick-up stations in the immediate vicinity of the branch. Deutsche Bahn is currently working on a white label solution for railway stations.

3 Methodology

3.1 Acceptance Research of Customers

For the measurement of the acceptance of customers there is a multitude of different methods. Especially with regard to the acceptance of innovations, there have been some notable attempts in the past. In order to maintain a reasonable scope, only three common research models are presented. The Technology Acceptance Model (TAM) and the Diffusion of Innovation (DOI) are established ways of proceeding in this area of research. These two theories are widely considered when it comes to examining the acceptance of innovation and technology by customers (Hanafizadeh et al., 2014).

While TAM considers perceived usability and perceived benefits to be the two most important constructs, it has shown itself to be particularly effective regarding the investigation of the acceptance of IT (Wang et al., 2018). In contrast, DOI examines a broader range of perceived characteristics of the innovation under consideration. These include, for example, the compatibility of innovation with existing systems and technologies, the relative advantage of a given technology over its predecessor, or the obstacles for testing and observing an innovation (Hanafizadeh et al., 2014).

At this point, it remains to be noted, that the present study neither refers to a pure acceptance of technology nor to a pure adoption of innovation. The spotlight of this study lies rather on the customer acceptance of partly innovative delivery concepts. Since aspects such as innovation and technology in this context are only tools for the execution of delivery concepts, neither DOI nor TAM will be consulted for further investigation. Therefore, the UTAUT2 model is included in this study in order to pursue a more holistic approach.

UTAUT2 is a further elaboration of the original UTAUT model. Both models have been part of numerous research projects since their development. UTAUT was originally developed to predict the probability of success for the introduction of a new technology in the corporate context. Venkatesh et al. (2003) describe UTAUT as an empirically validated synthesis of eight technology acceptance models. TAM is also contained in this synthesis (Venkatesh et al., 2003). The UTAUT model has already been used in the context of data technologies (Zuijderwijk, 2015). UTAUT comprises four elementary constructs that serve as indicators of the user's intention to behave. These consist of Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI) and Facilitating Conditions (FC) (Venkatesh et al., 2003). UTAUT2 refers to the customer context and adapts UTAUT to it. The most recent version of this model investigates both the influence of different constructs on Behavioral Intention (BI) and Use Behavior (UB).

As an extension to UTAUT, three new constructs are added. Hedonic Motivation (HM), Price Value (PV) and Habit (HT) finally complete the constellation of the constructs. Additionally, three moderator variables are specified, which affect the constructs. Such variables are needed, for example, in meta-analysis to determine and adjust the magnitude of variables. The moderator variables included in UTAUT2 are based on characteristics such as age, gender and experience (Venkatesh et al., 2012). Figure 2 provides a representation of UTAUT2.

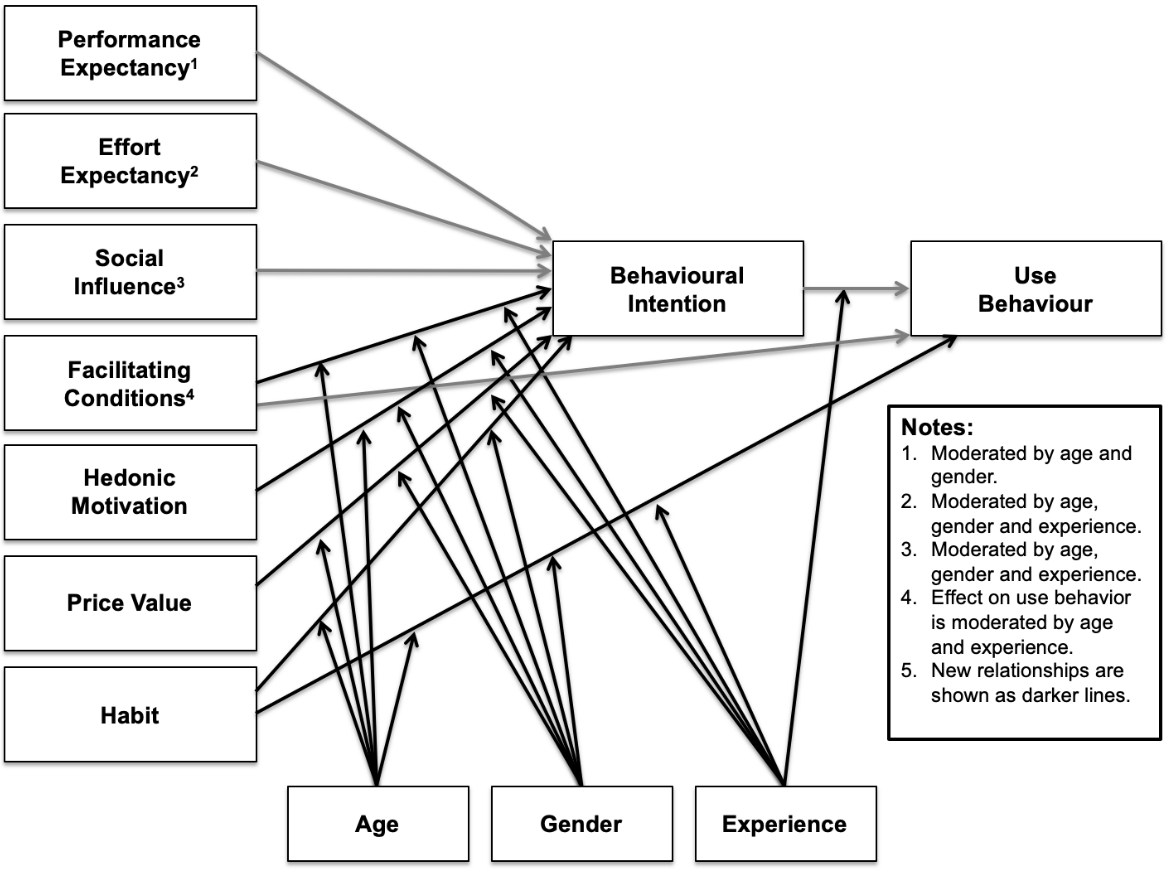

Figure 2: UTAUT2 Model according to Venkatesh et al. (2012)

In order to further adjust the research construct, it is necessary to modify the UTAUT2 model as part of this study. Therefore, the following section deals with the extension of the research model.

3.2 Extension of UTAUT2

The preceding literature review on the topic of urban logistics made evident that the aspect of sustainability is of central importance in this context. Most of the publications dealt with address the issue of sustainability. Especially with regard to the development of innovative freight transport concepts, the urgency of sustainability is taken up without exception. Accordingly, CEP services are also continuously elaborating more sustainable B2C delivery concepts (Erd, 2015). In the present context, it is therefore interesting for logistics service providers to determine whether customers have any expectations of sustainability at all in the investigated systems and to what extent these expectations affect the intended use. There are already some studies that have taken a comparable approach.

Chen et al. (2018) note that the sustainability factor, for example, influences the decision on the use or purchase of a product. Ozaki and Dodgson (2010) have also confirmed within their study on factors influencing the purchase of a hybrid vehicle that the ecological attitude of customers is a decisive. The question of sustainability has been discussed in the field of acceptance research as well. Averdung and Wagenfuehrer (2011) recommended a technology acceptance model for the use of environmentally friendly innovations. In the study, the influence of the ecological attitude on the perceived usefulness of services is emphasized.

Furthermore, Fazel (2014) similarly integrated the ecological attitude as a construct into his acceptance model. This approach was considered in this study on the acceptance of electric mobility. Moreover, Hamari et al. (2016) were convinced that customer preferences have an essential role to play towards sustainable consumerism in the context of collaborative consumption. In their study on the acceptance of sustainable IT products, Kwon and Song (2012) additionally noted that the subjective perceived sustainability of a product affects its acceptance. As the sustainability component is not part of UTAUT or UTAUT2, it is therefore added for a more comprehensive consideration of the topic. Thus, the model is extended by the construct Sustainability Expectancy (SE). Further explanation of the specified items of the research framework is given in the subsequent part. It also describes the relationship between the research model and the hypotheses to be set with the Structural Equation Modelling (SEM) procedure. In addition, the research hypotheses are formulated on this basis.

3.3 Hypothesis Development

Considering the evolving challenges of sustainability and the amount of freight transport in urban areas, it is important to identify efficient and environmentally friendly strategies. The research question posed in the context of this study aims to investigate the factors influencing customer acceptance of urban logistics concepts.

For this purpose, the underlying research model is used to measure factors that could have a significant impact on customers' BI when using a particular delivery concept.

14 different logistics concepts will be tested for their acceptance and their intended usage behavior by means of the underlying research model. The research model is separately employed for each concept. This approach therefore leads to an analysis of 14 individual models. Nevertheless, the identical construct relations are assumed for the treated concepts in the following. For this reason, the hypotheses for every concept are expressed in the same manner. In order to keep the further process in an adequate scope, the formulation of the research hypotheses is thus initially only presented as an example for a single concept. A number assigned to each concept differentiates the hypotheses. Hence, the numerical identification is made according to the chronological order of the concepts presented in section 2. In this way, the first hypothesis is marked *H01.1* for the examination of the BentoBox concept (see 2.1). In consequence, for the investigation of the second concept Concierge Service at Workplaces, the first hypothesis is marked with *H01.2*. Ultimately, this procedure is resumed using the same pattern until the hypotheses are entirely formulated.

PE defines the added value that a customer expects from general usage. It is assumed that a high performance expectation is associated with a high intention of utilization (Venkatesh et al., 2003). A number of publications state that PE is a comparatively strong indicator for forecasting the customer's intention to use a particular service (Tan and Wu, 2010; Liao and Shi, 2009). So, if customers see a greater added value in the BentoBox in terms of receiving a parcel than in the conventional delivery by a CEP service provider, PE has a positive effect on the intention to use the BentoBox. Thus, a customer could have high PE if the benefits of the logistics concept perceived by him outshine the disadvantages. Consequently, the first hypothesis is:

> *H01.1: The Performance Expectancy on the BentoBox has a positive influence on the Behavioral Intention to use the BentoBox*.

EE describes the effort anticipated from using the concept. EE is shaped by the belief in personal abilities and the fear of making mistakes. Moreover, it is assumed that if customers find a service or technology relatively easy to use, they are more likely to use it (Venkatesh et al., 2003). In other words, the easier it is to exploit logistical innovations, the higher is the intention to use them. The following presumption is therefore possible in relation to the application example discussed here. By providing customers easy access and simple usage of the BentoBox, it will enable them to efficiently achieve their shipment reception objectives. The second hypothesis is therefore as follows:

> *H02.1: The Effort Expectancy on the BentoBox has a positive influence on the Behavioral Intention to use the BentoBox.*

SI implies the extent to which people from the customer environment have an influence on the use of a certain concept. It is to be expected that a positive influence of the social environment leads to a higher individual intention of utilization (Venkatesh et al., 2003). There are further studies that have identified SI as a positive factor affecting customer behavior (Tan and Wu, 2010; Tarhini et al., 2016). As the utilization of urban logistics concepts is still unfamiliar to many customers and practical experience is limited, it is expected that customers will probably be dependent concerning important opinions on the performance and quality of such concepts. Hence the third hypothesis derived:

H03.1: The Social Influence regarding the BentoBox has a positive influence on the Behavioral Intention to use the BentoBox.

FC relate to the resources and capabilities of customers required to use the technology or service. It is generally presumed that favorable FC result in customers wanting to use a particular concept solution (Venkatesh et al., 2003). With regard to the research concepts under consideration, FC are the requirements that permit the customer to have access to one of the logistics conceptions. In concrete terms, the FC for customers of the BentoBox are, for example, access to their own locker or knowledge of how to have their consignments delivered to the BentoBox. Furthermore, it is also considered that if a customer is given the possibility to use a concept through the availability of the needed knowledge and resources, either he or she in fact will probably be using it. Curiosity, for that matter, could be a motivating factor (Venkatesh et al., 2012). Accordingly, the following hypotheses are formulated for FC:

H04.1: The Facilitating Conditions regarding the BentoBox have a positive influence on the Behavioral Intention to use the BentoBox.

H05.1: The Facilitating Conditions regarding the BentoBox have a positive influence on the Use Behavior.

HM is defined as the pleasure associated with the use of technologies or services (Venkatesh et al., 2012). In the present setting, HM describes whether a potential customer of an investigated logistics concept combines usability with fun and entertainment. It is supposed that the extent of the perceived joy increases the intention to use urban logistics concepts. An example could be that if a customer has an affinity for innovations and at the same time is dissatisfied with the parcel deliveries by CEP service providers, this might presumably encourage the usage of the BentoBox.

HM is thereby also an indicator measuring customers' BI. Therefore, the related hypothesis is as follows:

H06.1: The Hedonic Motivation regarding the BentoBox has a positive influence on the Behavioral Intention to use the BentoBox.

PV is the individual compromise between the cost of utilizing the technology or service and the perception of benefit. The more positively the perceived value is assessed in relation to the costs incurred, the stronger the intended use is expected to be. PV was added to the UTAUT2 model. This is due to the fact that the issue of customer usage differs from the organizational situation in terms of the absorption of costs. In a purely customer-related context such as UTAUT2, the final customer, unlike in a business-related context, has to pay for the costs on his own (Venkatesh et al., 2012). With regard to the urban logistics innovations presented in this study, it is to be presumed that customers are more willing to use a concept such as the BentoBox if the individual benefits outweigh the associated costs. The corresponding hypothesis is thus as follows:

H07.1: The Price Value of the BentoBox has a positive influence on the Behavioral Intention to use the BentoBox.

HT is defined by the amount of experience that has already been acquired using a certain technology or service. Furthermore, HT also refers to the extent to which individuals tend to perform behaviors automatically (Venkatesh et al., 2012). In the literature, it has been pointed out several times that a strongly pronounced HT has a positive impact on BI and UB (Liao et al., 2012; Venkatesh et al., 2012). From this, it is deduced in the hypotheses for this context that HT has a considerable influence on both determinants when it comes to the use of urban logistics concepts:

H08.1: The Habit regarding the BentoBox has a positive influence on the Behavioral Intention to use the BentoBox.

H09.1: The Habit regarding the BentoBox has a positive influence on the Use Behavior.

In this context, SE emphasizes the extent to which a person considers the use of the presented logistics concepts to be sustainable and environmentally friendly. The problem of sustainability impacts in urban areas caused by freight transport has already been identified several times in the course of this work.

Customers are also becoming increasingly aware of sustainable products and services (Hamari et al., 2016). Since, for example, the implementation of the BentoBox is intended to reduce the volume of traffic, customers could classify the usage of this concept as sustainably valuable. The hypothesis formulated at this point is therefore:

H10.1: The Sustainability Expectancy on the BentoBox has a positive influence on the Behavioral Intention to use the BentoBox.

BI of using a particular technology or a service is considered to be an essential determinant of a customer's actual UB. A positive correlation between a high BI and a resulting strong UB is also underlined in the literature. Moreover, the frequency of the customers use is decisive for a meaningful evaluation of the UB (Tarhini et al., 2016; Venkatesh et al., 2012). Finally, it is expected that a high BI to use a BentoBox has a significant positive impact on actual usage. The related hypothesis is:

H11.1: The Behavioral Intention to use the BentoBox has a positive influence on the Use Behavior.

In Figure 3 underneath, the fourteen research models examined are represented in a common model. This is due to the fact that the items, the constructs and the assumed effect relationships are consistently equal. In addition, this final presentation of the research model illustrates how the causal relationships between the exogenous latent variables and the endogenous latent variables are constructed. In the context of SEM, exogenous latent variables are factors whose characteristics explain or predict the outcomes of endogenous latent variables (Grüning, 2002). The associated moderator variables are not shown in this figure for overview purposes.

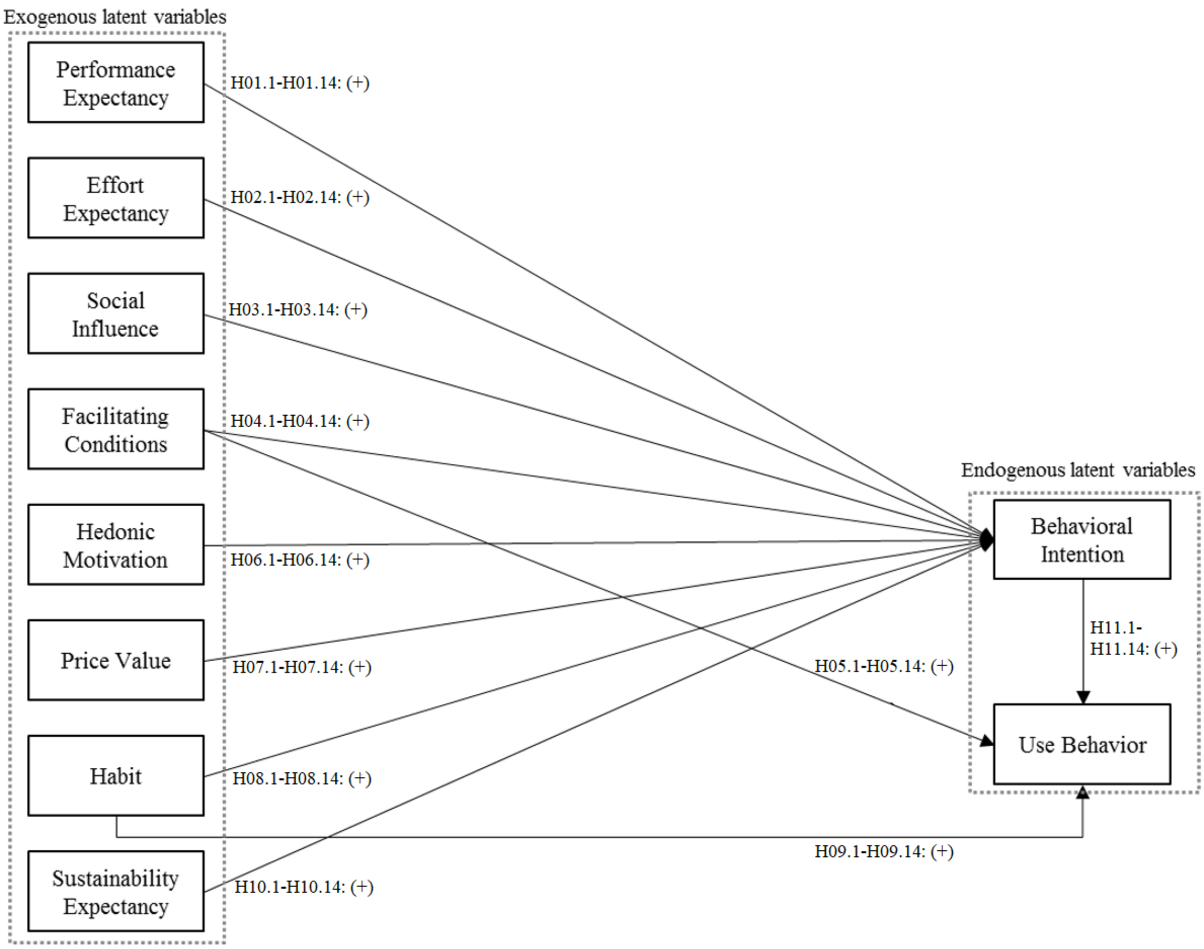

Figure 3: Hypothesis of the Underlying Research Model

3.3 Development and Operationalization

After the constructs to be investigated have been conceptualized they are now operationalized in the next step. Operationalization describes the sum of operations with the help of which a hypothetical construct of observable facts (indicators) is to be recorded and measured. In the context of SEMs, the operationalization corresponds to the formulation of a measurement model, which begins above all with the decision between formative and reflective measurement models. This specification is of particular importance as it has important consequences for the formulation and selection of the items as well as for the test methodology to be applied. The indicators must be tested in context of their direction of specification ("consequence" or "cause").

In reflective measurement models, for example, the constructs represent the cause of the measurement indicators to be collected, which in turn are regarded as observable "consequences" of the effectiveness of a construct (Weiber and Mühlhaus, 2014). After having extensively examined the relationships between constructs and items, stated in the research model, and having considered the corresponding context of delivery concepts as well as theoretical deliberations, all constructs were determined to be of reflective nature.

All constructs except the construct Use Behavior (UB) are multi-item constructs and contain three or four items for measurement. The items used in the survey, which were queried in so-called item batteries for each construct, were already used and validated in previous studies. The concept of multiple items measures a hypothetical construct by querying several reflective indicators in a person in order to compensate for potential biases of individual indicator variables in the mapping of a construct. By means of multiple item queries, it is possible to carry out a suitability test of the items using internal consistency and reliability (Weiber and Mühlhaus, 2014). Only UB is directly measured by customers' information on the frequency of use. A total of 31 items in total were established. In total, 10 constructs will be applied to the 14 research models with regard to the 14 delivery concepts. Eight constructs are serving as exogenous latent variables and two as endogenous variables. In this context, Appendix ii presents the operationalized constructs and items in the context of the e-food delivery concept BentoBox, specifying the theoretical foundations, from which the items were adapted. Simultaneously, these constructs and their respective items represent the questions asked in the conducted survey. Due to the fact the survey participants were provided the survey questions in German, the items were translated as accurately as possible. An overview of the items that were queried to also obtain information about customers' acceptance of the remaining delivery concepts is presented by Appendix ii.

3.4 Sample and Survey Procedure

The methodological focus of this work is based on quantitative data collection by means of an online survey. Hence, no specific target group was interviewed. Each citizen was therefore a potential participant in the survey. This research approach was chosen mainly in order to generate a large number of participants as quickly as possible. This is due to the fact that the circulation of the survey, facilitated by the Internet, is rather simple. At this point, for example, social networks are typically used as well for further dissemination (Bhattacherjee, 2012).

Also, because the collected data is quickly and directly available, eliminating the need for manual data entry, the online survey in this context offers significant advantages in comparison to a telephone or personal survey (Taddicken, 2013). In this respect, the established research model must be used in order to test the hypotheses generated from it. This process is purposeful in the context of an acceptance analysis. Here, the assessment of the concepts is evaluated by the interviewed customers. Thus, useful information is to be derived. The choice of a quantitative research approach also serves to discover non-obvious influences and correlations (Fazel, 2014).

The survey was created and carried out with the online software surveymonkey.com by means of a random sampling procedure. Furthermore, it was completely compiled in German language. Hence, all related items and constructs were translated as appropriate as possible. The questionnaire was shared and distributed across all social networks to generate as many participants as possible. Platforms such as Facebook, Instagram, Xing and LinkedIn were particularly considered in this process. At this point, a hyperlink was provided that guided the participants to the survey. The questionnaire could be completed with any Internet-enabled device. To ensure that the final survey could be conducted smoothly and completely, a test questionnaire was created in advance. Such a process is intended to offer initial insight into the comprehensibility, applicability and completeness of the poll (Raithel, 2008). Accordingly, the test survey was first sent to a small number of test persons. Subsequent to the questionnaire, respondents were asked to submit subjective suggestions for improvement. Particular attention was paid to the feedback on the duration of the poll and the continuity of the response process. After thorough evaluation, the questionnaire was optimized at certain points. Eventually, special consideration was given to an appropriate timeframe for the duration of the survey. At this point, the poll was shortened slightly. Consequently, in order to keep the dropout rate low, care was taken to ensure that the duration of the survey did not exceed ten minutes. Nevertheless, the structure and layout of the survey were preserved. Ultimately, the questionnaire was implemented and relevant data was collected in the second half of 2018.

At the beginning of the survey, the participants were informed about the scientific purpose of the questionnaire as well as the further procedure with an introductory text. This introductory text also referred to the expected time of processing and the anonymity of the participants. The next step was for respondents to provide basic information about themselves. These included questions about gender, age, professional situation and the place of residence. For an initial rough categorization, respondents should also indicate how often they receive parcels per week and which means of transport they prefer in their everyday lives. This was done via a multiple-choice selection. Once these general questions have been completed, the acceptance of the concepts presented in section 2 was examined. For this purpose, the participants were automatically assigned to one of the concepts by random selection. As a result, the participants are categorized into 14 groups as the study progresses. The functionality of the assigned concept was briefly described and illustrated using a concept description or a presentation video (cf. Appendix i). A participant allocated to the BentoBox, for example, could only see and evaluate the items developed for this particular concept. This is also taken into account for the data analysis in following sections, since one data set has to be analyzed for each investigated concept. Subsequently, the individual constructs of the research model established in section 3.2 were queried. All constructs are measured using a seven-step Likert scale with a range from "strongly disagree" (1) to "strongly agree" (7). In this procedure, UB is an exception. Thus, it is directly measured by asking about the frequency of the respondent using a delivery concept with corresponding answers ranging from "daily" (1) to "rarely to never" (7).

In the end, the survey was completely answered by 494 participants during the respective investigation period. Participants who aborted the survey before completion were not included in the data analysis. The corresponding dropout rate is about 39% as 807 participants start the survey without ending it.

Demographics	Overall respondents		Demographics	Overall respondents	
	Total	Share		Total	Share
Participants	494	100.00%			
Gender			***Professional Situation***		
Male	267	54.05%	Pupil, Student, Apprentice	251	50.81%
Female	226	45.75%	Full- & Part-time Employee, Official	212	42.91%
Not specified	1	0.20%	Self-employed	12	2.43%
			other	19	3.85%
Age					
< 18	4	0.81%	***Place of Residence***		
18 - 23	78	15.79%	Urban Center	293	59.31%
24 - 29	322	65.18%	Suburban Area	103	20.85%
30 - 39	44	8.91%	Metropolitan Area	65	13.16%
40 - 49	17	3.44%	Countryside	33	6.68%
50 - 59	22	4.45%			
> 59	7	1.42%			

Figure 4: Demographics of Overall Respondents

In view of the characteristics of the respondents (see Figure 4), it is noticeable that the balance between the genders is nearly even distributed. A total of 267 male and 226 female participants took part in the survey. One respondent has not provided any gender information. Most participants are aged between 24-29 years. With 322 participants and a share of 65.18%, they represent the most relevant age category in this survey. In comparison, only a few respondents older than 39 or younger than 18 years of age completed the survey. Most of the participants belong to the occupational group of pupils, students and apprentices represented by a total of 251 participants and a share of 50.81%. 212 respondents are full- and part-time employees together with officials resulting in a share of 42.91%. Moreover, most of the participants of the survey currently live in the urban center. A total of 293 respondents stated that their present residence is in the center of the city. This accounts for 59.31% of all respondents. In contrast, only 33 participants stated that they live on the countryside.

With a share of 6.68%, this group is the least represented one. In the following, the demographic characteristics of all survey participants are listed and summarized in Figure 4. However, since the participants are grouped independently to each other for every delivery concept, a presentation of the demographic characteristics for any individual concept is also provided within the appendix iii.

3.5 Implementation and Data Preparation

As already mentioned, the hypothetical and causal relationships between the variables of the underlying research models are to be tested within the framework of the SEM. The objective of SEM is to determine the extent to which the research models and hypotheses can be supported by the respective sample data. Two statistical analysis methods can be applied for this purpose, the covariance-based and variance-based SEMs. The empirical analysis in this study is based on the variance-based approach (or multivariate data analysis). In contrast to covariance-based methods, variance-based methods aim to explain variance by maximizing the covariance between latent exogenous and latent endogenous variables. This is done by minimizing the variance of the error terms of the measurement models and the structure model. In this study, the properties of the PLS method are used. In contrast to covariance based method, called CB-SEM, PLS-SEM aims to explain the general model quality by a high coefficient of determination (R^2) and significant t-values (Hair et al., 2017). The objective is, therefore, to maximize the explained variance of the dependent variables by estimating the path coefficients. The advantage of variance-based approaches is that models with high complexity can also be mapped. In addition, according to Nitzl (2010) the investigation of small sample sizes with $n \geq 30$ is possible as well. In this respect, the criterion of the minimum sample sizes for each model with respect to the systems one to 14 fulfill the minimum requirements (Nitzl, 2010). As Hair et al. (2017) claims, with small samples sizes PLS-SEM generally achieves high levels of statistical power (Hair et al., 2017).

The objective of the research study is to develop a model to explain the customer acceptance on e-food delivery concepts and to test it empirically. The basis is therefore the UAUT model and its extended model UTAUT2, which has already been empirically tested and confirmed several times in the past, but was supplemented by a new construct in the context of its application in the present work. Contrary to its previous field of application in information and communication systems, it is now applied in a completely new context. Hair et al. (2012) advise in such an extension of an existing theory to apply a variance-based method (Hair et al., 2012). Another important feature is the ability of variance-based methods to generate concrete index values for constructs within in the course of model estimation based on the sample data. These can then be interpreted directly by the method or used for subsequent analyses. This is necessary to identify the essential drivers for the customers' acceptance on various delivery concepts on the basis of the model constructs. In addition, although variance-based methods can be used to investigate the influence of moderator variables without any problems or restrictions, the sample data do not allow any conclusions to be drawn on account of the sample size and homogenous distribution of the participants' demographic characteristics, which is why the data cannot be used to determine the influence of moderator variables. In this regard, potential moderating effects will not be part of the data analysis. In this matter, PLS-SEM was chosen for the investigations in this study following the recommendations of Hair et al. (2012).

The application of PLS algorithm first involves the division of the research model into the inner and outer model. The outer model describes the predictive relationships between the latent variable and its respective indicators, more specifically its items. The estimation of the outer model, which is performed in the first step, provides first construct values for all exogenously and endogenously measured latent variables as expected values of the indicator variables. The inner model constitutes the relationships (or paths) between all latent variables. In the present context, this includes the 10 latent variables and 11 path relationships between them in each research model containing sample data for the respective delivery concepts. In order to perform the inner-model and outer-model estimation at all, the data must be implemented into the corresponding research model. For this purpose, the analysis software SmartPLS (v. 3.2.8) is used. SmartPLS makes it possible to perform so-called path analyses using the PLS algorithms and to (graphically) display the results in a path model based on available data sets. Therefore, it is necessary to pre-pare the raw data sets from the survey before it can be integrated into SmartPLS. This data preparation process will be described as follows. First, the loaded data needs to be coded, meaning that the data sets need be converted into a numeric format. Since all questions regarding the constructs were queried using a 7-point Likert scale, numeric values were already provided. For reasons of clarity, the items or question texts were also converted. By the fact that all survey questions were obligatory and that participants who cancelled the survey were excluded, as mentioned, no missing values could be detected. For the construct Use Behavior it was necessary to transform its items to be able to soundly interpret them, since they originally ranged from 1="daily" to 7="rarely or never". In this process, the scale of these items was turned around, meaning that every 1 became 7, 2 became 6, 3 became 7 and vice versa, while 4 remained the same. Furthermore, the raw data sets contained placeholders for items and questioning. Therefore, the placeholders were renamed after the corresponding position within the battery of the corresponding constructs, which is also illustrated in Figure 5. Once the data has been prepared, it can be integrated into SmartPLS for analysis ("semicolon separated, .csv format"). The models created with SmartPLS represent the underlying research models in terms of layout and construct-item relationships. Figure 5 illustrates the initial SmartPLS model using the example of the concept BentoBox. The initial models of the remaining delivery concepts look identical, only with other loadings. For reasons of space, only the initial model of concept

BentoBox is presented in Figure 5.

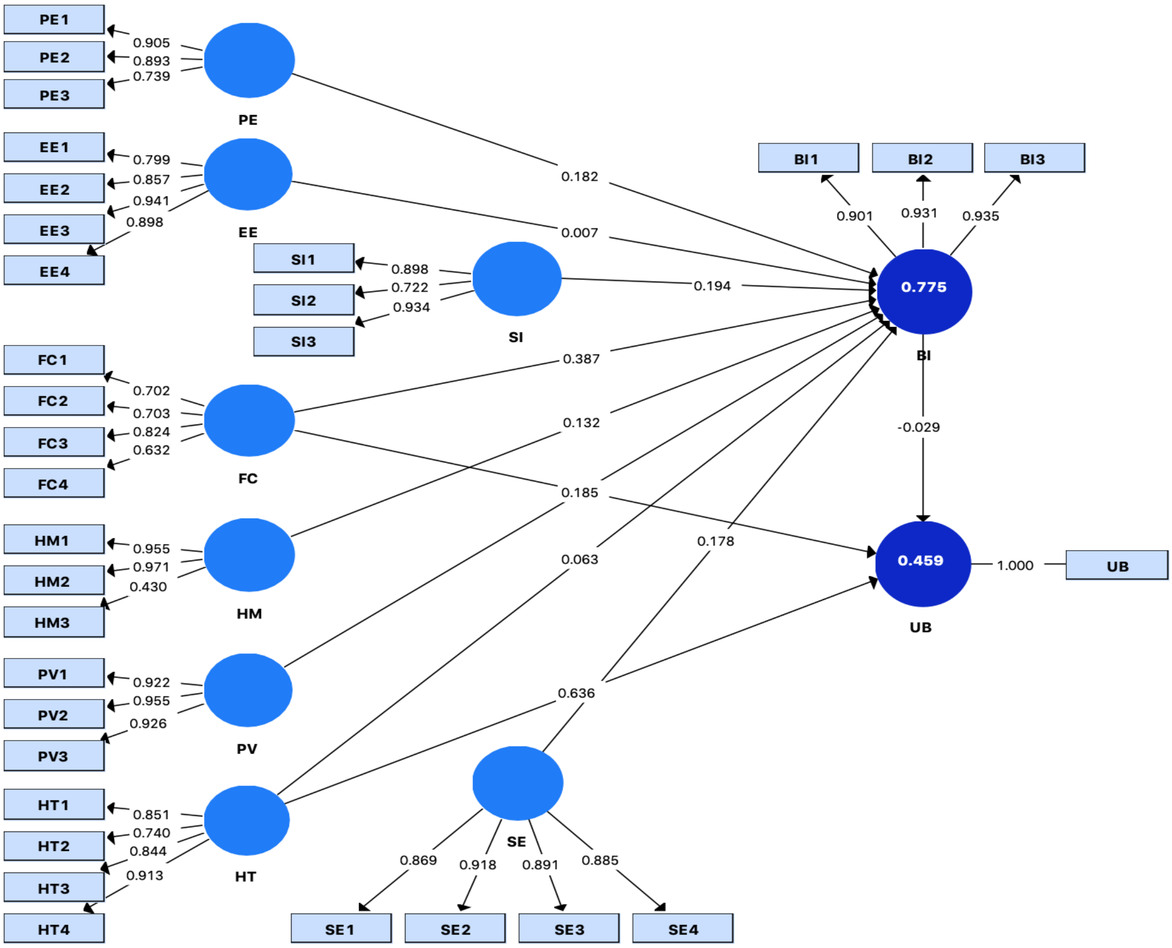

Figure 5: SmartPLS Output (Concept 1: BentoBox)

The SmartPLS default settings were mostly adopted from the recommendations of Hair et al. (2012).For significance testing, the Bootstrapping method was chosen, setting up “no sign changes”. Additionally, 500 subsamples were picked for the Bootstrapping procedure.

The path modeling’s created in SmartPLS represent a reproduction of the established research models. The initial model (see Figure 5) contains the outer loadings (outer model), path coefficients (inner model) and R^2’s (construct-circles) from the BentoBox research model. As being the first step of the setup process, constructs (circles), items (rectangular boxes) and arrow connections were placed and specified. Every modelled construct is reflectively measured, as stated earlier, and contains the respective items.

After the prepared data sets have been implemented in SmartPLS and the relevant path models have been created, the data analysis process will be examined in the following section. This includes its description, the explanation of relevant measures and the presentation of the corresponding results. In this context, the established measurement models will be verified and checked against specific criteria for reflective measurement models using the variance-based approach of confirmatory factor analysis (PLS). This is followed by the structural model assessment and thus the answer to the question which of the established hypotheses hold true or not.

4 Data Analysis, Results, and Empirical Analysis

4.1 Measurement Model Assessment

Reflective measurement models are evaluated with regard to their internal consistency, reliability, and validity. They assume that high correlations exist between the measurement variables and that their causative size represents the considered latent variable. Hence, reflective measurement models are based on a factor-analytical approach (Weiber and Mühlhaus, 2014). A significant criterion to be tested is the indicator reliability (IR). Reliability at the indicator level allows statements to be made about the extent to which each individual item is suitable for a measure of the latent variable. Here, IR is examined on the basis of the outer item loadings of a construct (Nitzl, 2010). Accordingly, items with outer loadings of ≥ 0.7 are acceptable in any case, as these indicate a high degree of suitability for the measurement of the particular construct. Moreover, items with an outer loading between 0.4 and 0.7 have to be investigated more closely, since an elimination of items can be considered here. If the elimination of items with such outer loadings leads to an increased composite reliability (CR) or average variance extracted (AVE) value above the suggested threshold value, this step can be regarded as permissible. Items with outer loadings < 0.4 always need to be removed (Hair et al., 2017).

As part of the investigation of the measurement model, the internal consistency reliability needs to be evaluated as well. As PLS-SEMs categories the indicators according to their individual reliability values, in this context, CR values are considered appropriate for the measurement of internal consistency reliability (Weiber and Mühlhaus, 2014). Other criteria such as Cronbach's Alpha are not taken into account here, as in this case it is presumed that all indicators are evenly reliable (Chin, 1998a). The value of CR ranges from 0 to 1. Thereby, a high value indicates a high reliability. In general, a CR value ≥ 0.6 is considered as acceptable. Values that are smaller suggest a lack of internal consistency reliability (Hair et al., 2017).

The next criterion to be fulfilled in the measurement model is convergent validity. Convergent validity is the extent to which an item correlates positively to other items of the same construct (Nitzl, 2010). An indicator for the convergent validity of reflective constructs are the outer loadings of the items. In addition, AVE values of the constructs are also examined. At this point, the share of the explained variance in relation to the measurement error of a latent variable is described by the AVE values (Hair et al., 2017). Again, the possible value range is between 0 and 1. A value ≥ 0.5 represents a sufficiently high threshold. If this threshold is reached, it follows that at least half of the variance of a construct is explained by the items assigned to it (Nitzl, 2010). An AVE < 0.5 means, in comparison, that more variance remains on average regarding the error of the items than in the variance explained by the corresponding construct (Hair et al., 2017).

As the last criterion, discriminant validity (DV) is checked within the framework of the measurement model. DV examines the extent to which the indicators of one construct differ from those of another construct. Thus, it is the methodological counterpart to convergent validity (Nitzl, 2010). Various approaches exist for testing the validity of discrimination. Among the more established methods are the cross loadings and the Fornell-Larcker criterion. According to the recommendation of Hair et al. (2017) the examination of cross loadings is not considered in this study, since this procedure does not sufficiently indicate a lack of discriminant validity in a PLS-SEM (Hair et al., 2017). Therefore, the Fornell-Larcker criterion is classified as more suitable in this case. A comparison is made here between the square root of the AVE values and the latent variable correlations. Furthermore, the square root of the AVE for each construct should be greater than the highest correlation with every other construct (Weiber and Mühlhaus, 2014). The literature shows that the threshold values, as assumed in this study, are not the only correct ones, but that many different minimum requirements do exist. In the following, the level of requirements for the quality criteria of a measurement model are summarized and being considered and analyzed in the present context:

Table 1: Measurement Model Criteria

Quality Criterion	Requirement Level
Indicator Reliability (IR)	≥ 0.7
Composite Reliability (CR)	≥ 0.6
Average Variance Extracted (AVE)	≥ 0.5
Discriminant Validity (DV)	Fornell-Larcker Criterion

Based on the requirements of the measurement model, the data evaluation is now presented and described for the first concept and then summarized in key figures and chronologically displayed (see Tables 2 to 8) for each of the other investigated concepts.

<u>Concept 1: BentoBox:</u>

First, the item loadings of the BentoBox model for IR are considered. Aside from two items, all item loadings are above the threshold of 0.7. FC4 (0.632) and HM3 (0.430) are below the assumed limit range. Since all CR and AVE values are within the permissible range, the items mentioned are not dropped at first. Subsequently, the discriminant validity is checked on the basis of the Fornell-Larcker criterion. The constraint that each AVE value of the respective construct is bigger than the squared correlations with other constructs, is not fulfilled for the FC construct in this example. Hair et al. (2017) recommend in such cases to remove items that have correlations below the threshold of 0.7 (if present) from the critical construct. Consequently, FC4 is removed from the model and the PLS algorithm is recalculated. The re-examination of the Fornell-Larcker criterion is now satisfactory. Thus, all criteria for the measurement model are met. The following Table 2 summarizes all results of the reliability and validity criteria for the concept BentoBox. The construct UB is not used in this table because it is a single-item construct and the item loading in such cases is always at one. Additionally, the tables for the analysis of the Fornell-Larcker criterion are placed in appendix iv.

Table 2 Summary of Reliability and Validity Criteria for Concept 1 and 2

	Concept 1: BentoBox				Concept 2: Parcel Station with Delivery			
Construct	Item Labels	Item Loadings	AVE	CR	Item Labels	Item Loadings	AVE	CR
PE	PE1-PE3	0.739-0.905	0.720	0.885	PE1-PE3	0.816-0.942	0.755	0.902
EE	EE1-EE4	0.800-0.941	0.766	0.929	EE1-EE4	0.689-0.902	0.693	0.899
SI	SI1-SI3	0.722-0.934	0.733	0.891	SI1-SI3	0.900-0.953	0.865	0.950
FC	FC1-FC3	0.737-0.844	0.626	0.833	FC1-FC4	0.852-0.922	0.767	0.929
HM	HM1-HM3	0.429-0.971	0.680	0.852	HM1-HM3	0.682-0.913	0.701	0.874
PV	PV1-PV3	0.922-0.955	0.873	0.954	PV1-PV3	0.699-0.976	0.709	0.878
HT	HT1-HT4	0.740-0.913	0.705	0.905	HT1-HT4	0.772-0.907	0.700	0.903
SE	SE1-SE4	0.869-0.918	0.794	0.939	SE1-SE4	0.887-0.932	0.841	0.955
BI	BI1-BI3	0.900-0.936	0.851	0.945	BI1-BI3	0.934-0.964	0.898	0.964

Concept 2: Parcel Station with Delivery:

- IR < 0.7: EE4 (0.689), HM3 (0.682), and PV1 (0.699)
- AVE for EE4, HM3, and PV1 ≥ 0.5
- CR for EE4, HM3, and PV1 ≥ 0.6
- DV for EE4, HM3, and PV1: Fornell-Larcker criterion requirements are met
- EE4, HM3, and PV1 are not dropped

Concept 3: In-Car Delivery:

- IR < 0.7: EE3 (0.663), FC1 (0.452) and FC2 (0.599)
- AVE for FC1 < 0.5
- FC1 is dropped
- Recalculation with FC 1 dropped
- IR, CR, and DV: no irregularities

Concept 4: Parcel Drone Delivery:

- IR < 0.7: FC1 (0.689) and FC4 (0.456)
- AVE for FC1 and FC4 ≥ 0.5
- CR for FC1 and FC4 ≥ 0.6
- DV for FC1 and FC4: Fornell-Larcker criterion requirements are met
- FC1 and FC4 are not dropped

Table 3 Summary of Reliability and Validity Criteria for Concept 3 and 4

	Concept 3: In-Car Parcel Delivery				Concept 4: Parcel Drone			
Construct	Item Labels	Item Loadings	AVE	CR	Item Labels	Item Loadings	AVE	CR
PE	PE1-PE3	0.907-0.959	0.867	0.951	PE1-PE3	0.916-0.926	0.849	0.944
EE	EE1-EE4	0.663-0.935	0.652	0.880	EE1-EE4	0.796-0.904	0.730	0.915
SI	SI1-SI3	0.959-0.977	0.932	0.976	SI1-SI3	0.951-0.964	0.919	0.971
FC	FC2-FC4	0.630-0.890	0.586	0.806	FC1-FC4	0.456-0.888	0.552	0.823
HM	HM1-HM3	0.848-0.905	0.775	0.912	HM1-HM3	0.783-0.963	0.816	0.929
PV	PV1-PV3	0.961-0.976	0.938	0.978	PV1-PV3	0.941-0.968	0.919	0.971
HT	HT1-HT4	0.811-0.910	0.752	0.924	HT1-HT4	0.816-0.921	0.740	0.919
SE	SE1-SE4	0.835-0.959	0.834	0.952	SE1-SE4	0.906-0.964	0.866	0.963
BI	BI1-BI3	0.978-0.982	0.960	0.986	BI1-BI3	0.939-0.955	0.902	0.965

Concept 5: Parcel Robot Delivery:

- IR < 0.7: HT3 (0.648)
- AVE for HT3 ≥ 0.5
- CR for HT3 ≥ 0.6
- DV for HT3: Fornell-Larcker criterion requirements are met
- HT3 is not dropped

Concept 6: Parcelbox:

- IR < 0.7: FC1 (0.595), HT2 (0.470), and HT3 (0.571)
- AVE for FC1 < 0.5
- FC1, HT2, and HT3 are dropped
- Recalculation with FC1, HT2, and HT3 dropped
- IR, CR, and DV: no irregularities

Table 4 Summary of Reliability and Validity Criteria for Concept 5 and 6

	Concept 5: Parcel Robot Delivery				Concept 6: Parcelbox			
Construct	Item Labels	Item Loadings	AVE	CR	Item Labels	Item Loadings	AVE	CR
PE	PE1-PE3	0.937-0.949	0.888	0.960	PE1-PE3	0.842-0.895	0.770	0.909
EE	EE1-EE4	0.891-0.945	0.854	0.956	EE1-EE4	0.872-0.979	0.867	0.963
SI	SI1-SI3	0.973-0.988	0.959	0.986	SI1-SI3	0.913-0.966	0.896	0.963
FC	FC1-FC4	0.707-0.727	0.511	0.807	FC2-FC4	0.625-0.860	0.548	0.782
HM	HM1-HM3	0.808-0.926	0.786	0.917	HM1-HM3	0.788-0.844	0.672	0.860
PV	PV1-PV3	0.903-0.965	0.879	0.956	PV1-PV3	0.825-0.930	0.791	0.919
HT	HT1-HT4	0.648-0.933	0.665	0.886	HT1+HT4	0.916-0.932	0.854	0.921
SE	SE1-SE4	0.934-0.966	0.895	0.972	SE1-SE4	0.869-0.942	0.820	0.948
BI	BI1-BI3	0.925-0.959	0.884	0.958	BI1-BI3	0.975-0.979	0.956	0.985

Concept 7: Concierge-Service at Workplaces:

- IR < 0.7: FC2 (0.644) and HM3 (0.684)
- AVE for FC2 and HM3 ≥ 0.5
- CR for FC2 and HM3 ≥ 0.6
- DV for FC2 and HM3: Fornell-Larcker criterion requirements are met
- FC2 and HM3 are not dropped

Concept 8: White-Label CEP-Service:

- IR < 0.7: no irregularities

Table 5 Summary of Reliability and Validity Criteria for Concept 7 and 8

	Concept 7: Concierge-Service at Workplaces				Concept 8: White-Label CEP-Service			
Construct	Item Labels	Item Loadings	AVE	CR	Item Labels	Item Loadings	AVE	CR
PE	PE1-PE3	0.874-0.900	0.769	0.909	PE1-PE3	0.853-0.938	0.804	0.925
EE	EE1-EE4	0.807-0.849	0.685	0.897	EE1-EE4	0.849-0.939	0.792	0.938
SI	SI1-SI3	0.820-0.905	0.756	0.903	SI1-SI3	0.890-0.924	0.828	0.935
FC	FC1-FC4	0.644-0.890	0.589	0.850	FC1-FC4	0.799-0.864	0.699	0.903
HM	HM1-HM3	0.684-0.894	0.649	0.846	HM1-HM3	0.835-0.951	0.825	0.934
PV	PV1-PV3	0.916-0.931	0.852	0.945	PV1-PV3	0.905-0.939	0.844	0.942
HT	HT1-HT4	0.820-0.887	0.746	0.921	HT1-HT4	0.756-0.907	0.737	0.918
SE	SE1-SE4	0.875-0.958	0.826	0.950	SE1-SE4	0.874-0.934	0.837	0.953
BI	BI1-BI3	0.916-0.948	0.870	0.953	BI1-BI3	0.927-0.968	0.907	0.967

Concept 9: Unattended In-Home Delivery:

- IR < 0.7: FC2 (0.568)
- AVE for FC2 ≥ 0.5
- CR for FC2 ≥ 0.6
- DV for FC2: Fornell-Larcker criterion requirements are met
- FC2 is not dropped

Concept 10: Neighborhood Supply of Grocery:

- IR < 0.7: FC4 (0.435) and HT3 (0.620)
- AVE for FC4 and HT3 ≥ 0.5
- CR for FC4 and HT3 ≥ 0.6
- DV for FC4 and HT3: Fornell-Larcker criterion requirements are met
- FC4 and HT3 are not dropped

Table 6 Summary of Reliability and Validity Criteria for Concept 9 and 10

	Concept 9: Unattended In-Home Delivery				Concept 10: Neighborhood Supply of Grocery			
Construct	Item Labels	Item Loadings	AVE	CR	Item Labels	Item Loadings	AVE	CR
PE	PE1-PE3	0.956-0.968	0.924	0.973	PE1-PE3	0.814-0.907	0.762	0.906
EE	EE1-EE4	0.732-0.907	0.679	0.894	EE1-EE4	0.817-0.926	0.737	0.918
SI	SI1-SI3	0.941-0.968	0.903	0.965	SI1-SI3	0.917-0.956	0.875	0.955
FC	FC1-FC4	0.740-0.803	0.538	0.821	FC1-FC4	0.435-0.896	0.610	0.855
HM	HM1-HM3	0.824-0.919	0.768	0.908	HM1-HM3	0.711-0.937	0.746	0.897
PV	PV1-PV3	0.851-0.947	0.833	0.937	PV1-PV3	0.905-0.962	0.883	0.958
HT	HT1-HT4	0.765-0.930	0.728	0.914	HT1-HT4	0.620-0.912	0.645	0.877
SE	SE1-SE4	0.918-0.960	0.890	0.970	SE1-SE4	0.792-0.949	0.759	0.926
BI	BI1-BI3	0.972-0.992	0.962	0.987	BI1-BI3	0.959-0.975	0.932	0.976

Concept 11: Click & Deliver of Groceries (Multichannel):

- IR < 0.7: no irregularities

Concept 12: Click & Deliver of Groceries (Online Pure Player):

- IR < 0.7: FC1 (0.443), FC2 (0.589), HM2 (0.692), and PV1 (0.692)
- AVE for FC1 < 0.5
- AVE for FC2, HM2, and PV1 ≥ 0.5
- CR for FC 1< 0.6
- CR for FC2, HM2, and PV1 ≥ 0.5
- DV for FC2, HM2, and PV1: Fornell-Larcker criterion requirements are met
- FC1 is dropped
- FC2, HM2, and PV1 are not dropped

Table 7 Summary of Reliability and Validity Criteria for Concept 11 and 12

	Concept 11: Click & Deliver of Groceries (Multichannel)				Concept 12: Click & Deliver of Groceries (Online Pure Player)			
Construct	Item Labels	Item Loadings	AVE	CR	Item Labels	Item Loadings	AVE	CR
PE	PE1-PE3	0.902-0.954	0.852	0.945	PE1-PE3	0.731-0.894	0.689	0.868
EE	EE1-EE4	0.912-0.982	0.921	0.979	EE1-EE4	0.779-0.976	0.844	0.955
SI	SI1-SI3	0.922-0.965	0.900	0.964	SI1-SI3	0.971-0.975	0.947	0.982
FC	FC1-FC4	0.753-0.918	0.694	0.900	FC2-FC4	0.589-0.847	0.657	0.783
HM	HM1-HM3	0.810-0.948	0.806	0.925	HM1-HM3	0.692-0.890	0.714	0.880
PV	PV1-PV3	0.974-0.991	0.965	0.988	PV1-PV3	0.692-0.931	0.713	0.880
HT	HT1-HT4	0.761-0.905	0.700	0.903	HT1-HT4	0.804-0.935	0.745	0.921
SE	SE1-SE4	0.925-0.062	0.889	0.970	SE1-SE4	0.841-0.972	0.869	0.963
BI	BI1-BI3	0.965-0.992	0.957	0.985	BI1-BI3	0.915-0.959	0.865	0.950

Concept 13: Click & Collect of Groceries:

- IR < 0.4: FC3 (-0.409) and FC4 (-0.030)
- FC3 and FC4 are dropped without further examination
- Recalculation
- IR < 0.7: HM3 (0.692), PV1 (0.675), SE1 (0,670), FC1 (0.568)
- AVE for HM3, PV1, SE1, and FC1 ≥ 0.5
- CR for HM3, PV1, SE1, and FC1 ≥ 0.6
- DV for HM3, PV1, SE1, and FC1: Fornell-Larcker criterion requirements are met
- HM3, PV1, SE1, and FC1 are not dropped

Concept 14: Grocery Pick-Up Station:

- IR < 0.4: FC1 (-0.138), FC2 (-0.201)
- FC1 and FC2 are dropped without further examination
- Recalculation
- IR < 0.7: FC3 (0.525), EE2 (0.646)
- AVE for FC3 and EE2 ≥ 0.5
- CR for FC3 and EE2 ≥ 0.6
- DV for FC3 and EE2: Fornell-Larcker criterion requirements are met
- FC3 and EE2 are not dropped

Table 8 Summary of Reliability and Validity Criteria for Concept 13 and 14

	Concept 13: Click & Collect of Groceries				Concept 14: Grocery Pick-Up Station			
Construct	Item Labels	Item Loadings	AVE	CR	Item Labels	Item Loadings	AVE	CR
PE	PE1-PE3	0.849-0.914	0.772	0.911	PE1-PE3	0.843-0.911	0.766	0.908
EE	EE1-EE4	0.766-0.996	0.767	0.929	EE1-EE4	0.646-0.929	0.664	0.886
SI	SI1-SI3	0.902-0.944	0.86	0.948	SI1-SI3	0.913-0.953	0.88	0.957
FC	FC1-FC2	0.568-0.962	0.625	0.758	FC3-FC4	0.525-0.975	0.606	0.731
HM	HM1-HM3	0.672-0.928	0.697	0.872	HM1-HM3	0.782-0.963	0.802	0.923
PV	PV1-PV3	0.675-0.942	0.704	0.875	PV1-PV3	0.861-0.930	0.814	0.929
HT	HT1-HT4	0.735-0.891	0.691	0.899	HT1-HT4	0.720-0.898	0.68	0.894
SE	SE1-SE4	0.670-0.912	0.69	0.898	SE1-SE4	0.873-0.944	0.836	0.953
BI	BI1-BI3	0.909-0.926	0.843	0.942	BI1-BI3	0.947-0.978	0.928	0.975

The investigations in the scope of the measurement model assessment revealed that both convergent and discriminant validity can be confirmed in the existing models. Thus, construct validity can now be assumed as a whole in all research models. In addition to construct validity, indicator and internal consistency reliability can also be concluded. In the following, the structural model assessments for each model will also be carried out in order to provide the basis for the interpretation of the established hypotheses.

4.2 Structural Model Assessment and Hypothesis Testing

Subsequent to a conducted assessment of a measurement model of the reflective constructs, the second step is to analyze the structural model. The relationships between the constructs and the predictive capabilities of the model are examined in the course of this analysis. Within this framework, collinearity has to be checked first. Collinearity basically indicates in which ratio constructs are related to each other (Hair et al., 2012). A common measure of collinearity is the variance inflation factor (VIF). In the context of PLS-SEM, a VIF value up to 5 is considered permissible. VIF values that are not within this range suggest a collinearity problem (Hair et al., 2017).

The evaluation of path coefficients in the structural model is another important aspect of this data analysis. These are used to assess the effectiveness of the model. Furthermore, they illustrate the hypothesized relationships among the constructs (Weiber and Mühlhaus, 2014). In this work, the path coefficients are marked with a β. Moreover, standardised path coefficients have a value range from -1 to +1. Values greater than 0.2 indicate significant relationships between the respective constructs (Chin, 1998a). Negative values or values very close to zero suggest weak correlations among the constructs. If a coefficient of one construct is greater than the coefficient of another construct, the effect on the considered endogenous latent variable is estimated to be greater in relative comparison. Whether a coefficient is actually significant depends on its standard error, which is determined by the bootstrapping method. In the context of data analysis, SmartPLS enables the bootstrapping procedure. The bootstrap standard error allows the calculation of the empirical t- and p-values for all associated path coefficients (Hair et al., 2017). If the t- and p-values resulting from the bootstrapping procedure correspond to certain thresholds, it is assumed that the coefficients are statistically significant at a specific error probability (Nitzl, 2010). Thus, the t-values in two-tailed tests should be above the threshold of 1.65 (significance level = 10%), 1.96 (significance level = 5%) and 2.57 (significance level = 1%). Corresponding p-values should therefore be at $p < 0.1$ (10% level), $p < 0.05$ (5% level) and $p < 0.01$ (1% level) (Hair et al., 2017). This study assumes a significance level of 10%.

The coefficient of determination (R^2) is a further essential criterion for the evaluation of a structural model. This coefficient indicates the proportion of declared variance of the exogenous latent variables in relation to the proportion of variance of the related endogenous variables (Weiber and Mühlhaus, 2014). R^2 has a value range from 0 to 1. The higher the value, the higher the resulting explanatory part (Hair et al., 2017). Values greater than 0.67 indicate a significant prediction accuracy. In addition, values above 0.33 are regarded as moderate explanatory values. Finally, values below 0.19 are classified as weak (Chin, 1998b).

Besides the criteria of the structural model presented so far, the predictive relevance (Q^2) is also examined. This procedure refers to the technique of data reuse developed by Geisser and Stone (Geisser, 1974; Stone, 1974). The parametric Stone-Geisser test is performed using the blindfolding procedure running the PLS-SEM algorithm. During the blindfolding test, a part of the empirically collected data is systematically assumed to be missing on the basis of the parameter estimation. This procedure is continued until each data point is omitted once and replaced by an estimation (Hair et al., 2017). Eventually, the associated Q^2 values result from the blindfolding procedure. If the Q^2 value is above zero, the treated model has a meaningful prediction relevance. A Q^2 value less than zero indicates that the predictive quality of the model structure is inadequate. If the value is zero, this means that the model does not predict the original data better than an estimation via mean value (Weiber and Mühlhaus, 2014).

In this analysis, the effect size (f^2) examines whether an exogenous latent variable exerts a significant influence on an endogenous latent variable. The impact of an exogenous variable on an endogenous variable results from the change in the R^2 value of the endogenous variable (Nitzl, 2010). For this purpose, the structural model is considered both with and without the corresponding exogenous variables. f^2 values from 0.02, 0.15, and 0.35 specify whether an exogenous variable has a small, medium, or large influence on the endogenous variable. Values smaller than 0.02 suggest that no significant effect exists (Cohen, 1988). A summary (Table 9) of the quality criteria of the structural model that are considered in this study is shown hereafter.

Quality Criterion	**Requirement Level**
Collinearity	VIF value up to 5
Path coefficients	> 0.2
T-value	> 1.65
R^2	≥ 0.19
Q^2	> 0
f^2	≥ 0.02

Table 9: Structural Model Criteria

Within the scope of this study, a total of 154 hypotheses for the acceptance analysis of end customers with regard to 14 different urban logistics concepts were established. Testing the hypotheses determines which of the hypotheses are supported on the basis of relevant path coefficients and t- and p-values. Likewise, the R^2, Q^2, and f^2 values are used to assess the hypotheses. An individual hypotheses test is conducted for each of the included logistics concepts.

For each hypothesis there is a corresponding null hypothesis, which assumes that there is no positive relationship between the variables. With the help of the collected data, the null hypothesis should be rejected and the research hypothesis confirmed. To disprove the null hypothesis, the path coefficient has to correspond to the presumed direction of action and be statistically significant. If at least one of the conditions is not fulfilled, the null hypothesis has to be accepted and the corresponding counter hypothesis rejected.

Based on the mentioned requirements of the structural model, the second part of data evaluation is now continued chronologically for each investigated concept. Afterwards, the hypothesis were tested accordingly.

Concept 1: BentoBox:

When checking the structural model, it has to be confirmed first that the VIF values of the BentoBox concept are in the permissible range. The VIF values here are between 1.290 and 3.437. At this point, the FC and BI constructs have the highest correlating relationship in this concept with a VIF value of 3.437. The relationship between EE and BI also shows a comparatively high collinearity considering a VIF of 3.158. The weakest collinearity rate occurs between HT and UB with a VIF of 1.3290.

Furthermore, the analysis of the path coefficients shows that not all values are above the 0.2 threshold. The value range for this criterion is between 0.031 and 0.623. In this case, the path relationship between HT and UB indicates a high significance, since β is 0.623 and the corresponding t-value is 5.296. The remaining t-values are all below the assumed acceptance limit. It is therefore to be expected that no other path relationship of the BentoBox concept is significant.

In case of the BentoBox, the results for R^2 are 0.743 for the BI construct and 0.448 for the UB construct. It follows that the R^2 value is interpreted as a significant explanatory value for BI and a moderate explanatory value for UB. Moreover, the blind-folding procedure for this concept shows that the values for Q^2 are above zero. Accordingly, BI has a Q^2 value of 0.528, whereas the respective value for UB is 0.310. With regard to the f^2 values, it is to be emphasized for this concept that solely the effect relationship between HT and UB is relevant. With a value of 0.546, a strong effect relationship is evident here. This also confirms the significance assumed previously with regard to the path relationship between HT and UB. In order to keep this study straight, a summary of all f^2 values is placed in appendix v.

Considering the BentoBox concept, only one of eleven hypotheses has to be confirmed. It emerges that the construct HT (β = 0.623) has a positive influence on the UB. Taking the t-values into account, it has to be noted that there is significance at the 1% level ($t = 5.296$; $p < 0.01$). As a consequence, the null hypothesis for H09.1 is significantly rejected with an error probability of 1% and thus supported by the model. Furthermore, a strong effect size (f2 = 0.546) strengthens this presumption.

The remaining hypotheses are rejected because either the path coefficients or the t-values are too low and no significance is therefore to be ascertained. H03.1 and H04.1 have path coefficient values above 0.2, but the corresponding t-values are lower than the defined limit range of 1.65. Hence, the null hypotheses for all other hypotheses of this model except from H09.1 are not rejected. As explained, the R^2 values for this concept indicate a significant explanatory value for BI and a moderate explanatory value for UB. Thus, approximately 74% of the variance of the BI construct is explained by the associated exogenous variables. In comparison, 44% of the variance in UB is explained by the constructs FC, HT, and UB.

Subsequently, Table 10 lists the values of the path coefficients, t-values, VIF-values, R^2, Q^2 and the resulting hypothesis verification of this concept. For the other 13 concepts, the respective Tables 11 to 23 show the results after they were analyzed in key figures.

Table 10: Overview of Values and Hypothesis Findings (Concept 1)

Concept 1: BentoBox

Hypothesis	Relation	Effect	Path Coeffizent	T-value	VIF	R²	Q²	Verification
H01.1	PE → BI	+	0.154	0.950	2.485	0.743	0.528	Not Supported
H02.1	EE → BI	+	0.108	0.603	3.158	0.743	0.528	Not Supported
H03.1	SI → BI	+	0.223	1.352	1.652	0.743	0.528	Not Supported
H04.1	FC → BI	+	0.231	1.250	3.437	0.743	0.528	Not Supported
H05.1	FC → UB	+	0.114	0.664	1.650	0.448	0.310	Not Supported
H06.1	HM → BI	+	0.103	0.534	1.697	0.743	0.528	Not Supported
H07.1	PV → BI	+	0.200	1.383	2.027	0.743	0.528	Not Supported
H08.1	HT → BI	+	0.070	0.459	1.668	0.743	0.528	Not Supported
H09.1	HT → UB	+	0.623***	5.296	1.290	0.448	0.310	Supported
H10.1	SE → BI	+	0.175	1.048	1.708	0.743	0.528	Not Supported
H11.1	BI → UB	+	0.031	0.145	2.017	0.448	0.310	Not Supported

Concept 2: Parcel Station with Delivery:

- VIF < 5: no multicollinearity
- β > 0.2: PE → BI, FC → BI, HT → BI, BI → UB
- t-statistic t > 1.65: PE → BI, HT → BI, BI → UB
- Path relationship of PE → BI, HT → BI, and BI → UB are presumed to be significant, remaining paths are not significant
- R^2 for BI ≥ 0.67: high significant prediction accuracy
- R^2 for UB ≥ 0.33: moderate prediction accuracy
- Q^2 for BI & UB > 0: meaningful prediction relevance
- F^2 ≥ 0.15: moderate influence of PE → BI and HT → BI
- H01.2 (PE → BI) is supported at the 5%-level
- H08.2 (HT → BI) is supported at the 5%-level
- H11.2 (BI → UB) is supported at the 10%-level
- Remaining hypotheses have to be rejected

Table 11 Overview of Values and Hypothesis Findings (Concept 2)

Concept 2: Parcel Station with Delivery Service

Hypothesis	Relation	Effect	Path Coeffizent	T-value	VIF	R^2	Q^2	Verification
H01.2	PE → BI	+	0.398**	2.206	3.953	0.785	0.588	Supported
H02.2	EE → BI	+	-0.188	0.823	4.205	0.785	0.588	Not Supported
H03.2	SI → BI	+	0.088	0.472	2.845	0.785	0.588	Not Supported
H04.2	FC → BI	+	0.293	1.338	3.719	0.785	0.588	Not Supported
H05.2	FC → UB	+	0.041	0.178	1.388	0.308	0.230	Not Supported
H06.2	HM → BI	+	0.087	0.562	2.396	0.785	0.588	Not Supported
H07.2	PV → BI	+	-0.085	0.576	1.767	0.785	0.588	Not Supported
H08.2	HT → BI	+	0.372**	2.305	1.957	0.785	0.588	Supported
H09.2	HT → UB	+	0.189	0.923	2.057	0.308	0.23	Not Supported
H10.2	SE → BI	+	0.150	0.921	2.565	0.785	0.588	Not Supported
H11.2	BI → UB	+	0.395*	1.876	2.501	0.308	0.23	Supported

Concept 3: In-Car Delivery:

- VIF < 5: no multicollinearity
- β > 0.2: PE → BI, SI → BI, and HT → UB
- t-statistic t > 1.65: PE → BI, SI → BI, and HT → UB
- Path relationship of PE → BI, SI → BI, and HT → UB are presumed to be significant, remaining paths are definitely not significant
- R^2 for BI ≥ 0.67: high significant prediction accuracy
- R^2 for UB ≥ 0.19: weak prediction accuracy
- Q^2 for BI & UB > 0: meaningful prediction relevance
- F^2 ≥ 0.15: moderate influence of PE → BI, SI → BI, and HT → UB
- H01.3 (PE → BI) is supported at the 5%-level
- H03.3 (SI → BI) is supported at the 5%-level
- H09.3 (HT → UB) is supported at the 1%-level
- Remaining hypotheses have to be rejected

Table 12 Overview of Values and Hypothesis Findings (Concept 3)

Concept 3: In-Car Parcel Delivery

Hypothesis	Relation	Effect	Path Coeffizent	T-value	VIF	R^2	Q^2	Verification
H01.3	PE → BI	+	0.330*	1.793	2.740	0.818	0.709	Supported
H02.3	EE → BI	+	0.144	1.443	1.475	0.818	0.709	Not Supported
H03.3	SI → BI	+	0.368**	2.151	3.203	0.818	0.709	Supported
H04.3	FC → BI	+	-0.080	0.555	1.815	0.818	0.709	Not Supported
H05.3	FC → UB	+	0.048	0.211	1.335	0.273	0.104	Not Supported
H06.3	HM → BI	+	0.179	1.155	3.032	0.818	0.709	Not Supported
H07.3	PV → BI	+	0.168	1.350	1.833	0.818	0.709	Not Supported
H08.3	HT → BI	+	-0.017	0.124	2.736	0.818	0.709	Not Supported
H09.3	HT → UB	+	0.522***	2.750	1.811	0.273	0.104	Supported
H10.3	SE → BI	+	0.008	0.076	1.916	0.818	0.709	Not Supported
H11.3	BI → UB	+	-0.038	0.200	1.783	0.273	0.104	Not Supported

Concept 4: Parcel Drone Delivery:

- VIF < 5: no multicollinearity
- β > 0.2: PE → BI, SI → BI, HT → BI, and HT → UB
- t-statistic t > 1.65: PE → BI, SI → BI, and HT → UB
- Path relationship of PE → BI, SI → BI, and HT → UB are presumed to be significant, remaining paths are definitely not significant
- R^2 for BI ≥ 0.67: high significant prediction accuracy
- R^2 for UB ≥ 0.19: weak prediction accuracy
- Q^2 for BI & UB > 0: meaningful prediction relevance
- F^2 ≥ 0.15: moderate influence of PE → BI, SI → BI, and HT → UB
- H01.4 (PE → BI) is supported at the 5%-level
- H03.4 (SI → BI) is supported at the 10%-level
- H09.4 (HT → UB) is supported at the 1%-level
- Remaining hypotheses have to be rejected

Table 13 Overview of Values and Hypothesis Findings (Concept 4)

Concept 4: Parcel Drone Delivery

Hypothesis	Relation	Effect	Path Coeffizent	T-value	VIF	R^2	Q^2	Verification
H01.4	PE → BI	+	0.432**	2.115	3.135	0.743	0.579	Supported
H02.4	EE → BI	+	-0.121	0.685	2.020	0.743	0.579	Not Supported
H03.4	SI → BI	+	0.303*	1.839	2.000	0.743	0.579	Supported
H04.4	FC → BI	+	0.098	0.637	1.752	0.743	0.579	Not Supported
H05.4	FC → UB	+	0.078	0.286	1.113	0.252	0.086	Not Supported
H06.4	HM → BI	+	-0.013	0.095	2.118	0.743	0.579	Not Supported
H07.4	PV → BI	+	-0.018	0.130	1.517	0.743	0.579	Not Supported
H08.4	HT → BI	+	0.208	1.326	1.704	0.743	0.579	Not Supported
H09.4	HT → UB	+	0.545***	3.014	1.508	0.252	0.086	Supported
H10.4	SE → BI	+	0.186	1.121	2.475	0.743	0.579	Not Supported
H11.4	BI → UB	+	-0.105	0.596	1.647	0.252	0.086	Not Supported

Concept 5: Parcel Robot Delivery:

- VIF < 5: no multicollinearity
- β > 0.2: PE → BI, EE → BI, HT → UB, and SE → BI
- t-statistic t > 1.65: PE → BI, EE → BI, and HT → UB
- Path relationship of PE → BI, EE → BI, and HT → UB are presumed to be significant, remaining paths are definitely not significant
- R^2 for BI ≥ 0.67: high significant prediction accuracy
- R^2 for UB ≥ 0.19: weak prediction accuracy
- Q^2 for BI & UB > 0: meaningful prediction relevance
- F^2 ≥ 0.35: high influence of PE → BI and HT → UB
- F^2 ≥ 0.15: moderate influence of EE → BI
- H01.5 (PE → BI) is supported at the 1%-level
- H03.5 (EE → BI) is supported at the 10%-level
- H09.5 (HT → UB) is supported at the 1%-level
- Remaining hypotheses have to be rejected

Table 14 Overview of Values and Hypothesis Findings (Concept 5)

Concept 5: Parcel Robot Delivery

Hypothesis	Relation	Effect	Path Coeffizent	T-value	VIF	R^2	Q^2	Verification
H01.5	PE → BI	+	0.423***	2.823	2.491	0.81	0.627	Supported
H02.5	EE → BI	+	0.254*	1.751	1.960	0.81	0.627	Supported
H03.5	SI → BI	+	0.015	0.089	2.537	0.81	0.627	Not Supported
H04.5	FC → BI	+	0.116	0.879	2.138	0.81	0.627	Not Supported
H05.5	FC → UB	+	0.170	1.048	1.485	0.327	0.167	Not Supported
H06.5	HM → BI	+	0.034	0.214	2.790	0.81	0.627	Not Supported
H07.5	PV → BI	+	-0.067	0.561	1.686	0.81	0.627	Not Supported
H08.5	HT → BI	+	0.151	1.179	2.437	0.81	0.627	Not Supported
H09.5	HT → UB	+	0.556***	4.045	1.310	0.327	0.167	Supported
H10.5	SE → BI	+	0.251	1.207	2.091	0.81	0.627	Not Supported
H11.5	BI → UB	+	-0.108	0.462	1.768	0.327	0.167	Not Supported

Concept 6: Parcelbox:

- VIF < 5: no multicollinearity
- β > 0.2: FC → BI, FC → UB, HM → BI, and HT → UB
- t-statistic t > 1.65: FC → UB, HM → BI, and HT → UB
- Path relationship of FC → UB, HM → BI, and HT → UB are presumed to be significant, remaining paths are definitely not significant
- R^2 for BI & UB ≥ 0.33: moderate prediction accuracy
- Q^2 for BI & UB > 0: meaningful prediction relevance
- H05.6 (FC → UB) is supported at the 5%-level
- H06.6 (HM → BI) is supported at the 1%-level
- H09.6 (HT → UB) is supported at the 1%-level
- Remaining hypotheses have to be rejected

Table 15 Overview of Values and Hypothesis Findings (Concept 6)

Concept 6: Parcelbox

Hypothesis	Relation	Effect	Path Coeffizent	T-value	VIF	R²	Q²	Verification
H01.6	PE → BI	+	0.014	0.073	2.344	0.582	0.557	Not Supported
H02.6	EE → BI	+	-0.067	0.474	2.351	0.582	0.557	Not Supported
H03.6	SI → BI	+	0.104	0.073	2.018	0.582	0.557	Not Supported
H04.6	FC → BI	+	0.206	1.030	2.053	0.582	0.557	Not Supported
H05.6	FC → UB	+	0.351**	2.185	1.652	0.392	0.304	Supported
H06.6	HM → BI	+	0.655***	3.335	2.468	0.582	0.557	Supported
H07.6	PV → BI	+	-0.030	0.220	1.501	0.582	0.557	Not Supported
H08.6	HT → BI	+	0.099	0.474	1.699	0.582	0.557	Not Supported
H09.6	HT → UB	+	0.453***	3.062	1.490	0.392	0.304	Supported
H10.6	SE → BI	+	-0,069	0.394	1.948	0.582	0.557	Not Supported
H11.6	BI → UB	+	-0.058	0.322	1.660	0.392	0.304	Not Supported

Concept 7: Concierge-Service at Workplaces:

- VIF < 5: no multicollinearity
- β > 0.2: FC → BI, HM → BI, HT → UB, and SE → BI
- t-statistic t > 1.65: HM → BI, HT → UB, and SE → BI
- Path relationship of HM → BI, HT → UB, and SE → BI are presumed to be significant, remaining paths are definitely not significant
- R^2 for BI ≥ 0.67: high significant prediction accuracy
- R^2 for UB ≥ 0.33: moderate prediction accuracy
- Q^2 for BI & UB > 0: meaningful prediction relevance
- H06.7 (HM → BI) is supported at the 1%-level
- H09.7 (HT → UB) is supported at the 1%-level
- H10.7 (SE → BI) is supported at the 10%-level
- Remaining hypotheses have to be rejected

Table 16 Overview of Values and Hypothesis Findings (Concept 7)

Concept 7: Concierge-Service at Workplaces

Hypothesis	Relation	Effect	Path Coeffizent	T-value	VIF	R²	Q²	Verification
H01.7	PE → BI	+	0.170	0.981	2.786	0.733	0.586	Not Supported
H02.7	EE → BI	+	-0.029	0.198	2.229	0.733	0.586	Not Supported
H03.7	SI → BI	+	-0.083	0.610	2.151	0.733	0.586	Not Supported
H04.7	FC → BI	+	0.207	1.607	1.364	0.733	0.586	Not Supported
H05.7	FC → UB	+	-0.167	1.110	1.737	0.515	0.475	Not Supported
H06.7	HM → BI	+	0.598***	3.361	3.603	0.733	0.586	Supported
H07.7	PV → BI	+	-0.056	0.368	1.743	0.733	0.586	Not Supported
H08.7	HT → BI	+	0.022	0.152	2.556	0.733	0.586	Not Supported
H09.7	HT → UB	+	0.688***	5.121	1.737	0.515	0.475	Supported
H10.7	SE → BI	+	0.250*	1.991	1.365	0.733	0.586	Supported
H11.7	BI → UB	+	0.143	0.757	2.117	0.515	0.475	Not Supported

Concept 8: White-Label CEP-Service:

- VIF < 5: no multicollinearity
- $\beta > 0.2$: HT → UB and SE → BI
- t-statistic $t > 1.65$: HT → UB, and SE → BI
- Path relationship of HT → UB and SE → BI are presumed to be significant, remaining paths are definitely not significant
- R^2 for BI ≥ 0.67: high significant prediction accuracy
- R^2 for UB ≥ 0.19: weak prediction accuracy
- Q^2 for BI & UB > 0: meaningful prediction relevance
- H09.8 (HT → UB) is supported at the 5%-level
- H10.8 (SE → BI) is supported at the 10%-level
- Remaining hypotheses has to be rejected

Table 17 Overview of Values and Hypothesis Findings (Concept 8)

Concept 8: White-Label CEP-Service

Hypothesis	Relation	Effect	Path Coeffizent	T-value	VIF	R^2	Q^2	Verification
H01.8	PE → BI	+	0.186	0.923	3.512	0.691	0.604	Not Supported
H02.8	EE → BI	+	0.079	0.437	2.687	0.691	0.604	Not Supported
H03.8	SI → BI	+	0.140	0.909	2.627	0.691	0.604	Not Supported
H04.8	FC → BI	+	0.143	0.931	2.250	0.691	0.604	Not Supported
H05.8	FC → UB	+	0.187	1.034	1.409	0.247	0.22	Not Supported
H06.8	HM → BI	+	0.100	0.501	2.714	0.691	0.604	Not Supported
H07.8	PV → BI	+	0.149	0.757	2.452	0.691	0.604	Not Supported
H08.8	HT → BI	+	0.108	0.611	2.288	0.691	0.604	Not Supported
H09.8	HT → UB	+	0.430**	2.607	1.690	0.247	0.22	Supported
H10.8	SE → BI	+	0.242*	1.845	2.468	0.691	0.604	Supported
H11.8	BI → UB	+	0.025	0.153	1.857	0.247	0.22	Not Supported

Concept 9: Unattended In-Home Delivery:

- VIF < 5: no multicollinearity
- β > 0.2: SI → BI, FC → BI, HM → BI, HT → UB, and BI → UB
- t-statistic t > 1.65: SI → BI, HT → UB, and BI → UB
- Path relationship of SI → BI, HT → UB, and BI → UB are presumed to be significant, remaining path are definitely not significant
- R^2 for BI & UB ≥ 0.33: moderate prediction accuracy
- Q^2 for BI & UB > 0: meaningful prediction relevance
- H03.9 (SI → BI) is supported at the 5%-level
- H09.9 (HT → UB) is supported at the 1%-level
- H11.9 (BI → UB) is supported at the 10%-level
- Remaining hypotheses have to be rejected

Table 18 Overview of Values and Hypothesis Findings (Concept 9)

Concept 9: Unattended In-Home Delivery

Hypothesis	Relation	Effect	Path Coeffizent	T-value	VIF	R²	Q²	Verification
H01.9	PE → BI	+	0.183	1.072	1.516	0.565	0.559	Not Supported
H02.9	EE → BI	+	0.171	0.836	1.795	0.565	0.559	Not Supported
H03.9	SI → BI	+	0.408**	2.145	2.183	0.565	0.559	Supported
H04.9	FC → BI	+	0.252	1.417	1.382	0.565	0.559	Not Supported
H05.9	FC → UB	+	0.087	0.422	1.313	0.443	0.368	Not Supported
H06.9	HM → BI	+	0.354	1.609	3.479	0.565	0.559	Not Supported
H07.9	PV → BI	+	-0.009	0.032	3.392	0.565	0.559	Not Supported
H08.9	HT → BI	+	-0.108	0.410	4.074	0.565	0.559	Not Supported
H09.9	HT → UB	+	0.513***	3.709	1.289	0.443	0.368	Supported
H10.9	SE → BI	+	-0.228	1.181	1.581	0.565	0.559	Not Supported
H11.9	BI → UB	+	0.293*	1.998	1.566	0.443	0.368	Supported

Concept 10: Neighborhood Supply of Grocery:

- VIF ≥ 5: Indicator for multicollinearity in case of HM → BI
- Test on multicollinearity: R^2 and t-values reveal no abnormalities for HM → BI
- Analysis is continued
- β > 0.2: PE → BI, FC → UB, HM → BI, and HT → UB
- t-statistic t > 1.65: HM → BI, and HT → UB
- Path relationship of HM → BI, and HT → UB are presumed to be significant, remaining paths are definitely not significant
- R^2 for BI ≥ 0.67: high significant prediction accuracy
- R^2 for UB ≥ 0.33: moderate prediction accuracy
- Q^2 for BI & UB > 0: meaningful prediction relevance
- F^2 ≥ 0.35: high influence of HT → UB
- F^2 ≥ 0.15: moderate influence of HM → BI
- H06.10 (HM → BI) is supported at the 5%-level
- H09.10 (HT → UB) is supported at the 1%-level
- Remaining hypotheses have to be rejected

Table 19 Overview of Values and Hypothesis Findings (Concept 10)

Concept 10: Neighborhood Supply of Grocery

Hypothesis	Relation	Effect	Path Coeffizent	T-value	VIF	R²	Q²	Verification
H01.10	PE → BI	+	0.270	1.335	4.322	0.763	0.617	Not Supported
H02.10	EE → BI	+	0.083	0.438	2.327	0.763	0.617	Not Supported
H03.11	SI → BI	+	0.033	0.210	2.077	0.763	0.617	Not Supported
H04.10	FC → BI	+	-0.165	1.121	1.744	0.763	0.617	Not Supported
H05.10	FC → UB	+	0.233	1.067	1.014	0.395	0.246	Not Supported
H06.10	HM → BI	+	0.595**	2.132	6.826	0.763	0.617	Supported
H07.10	PV → BI	+	-0.215	1.031	3.218	0.763	0.617	Not Supported
H08.10	HT → BI	+	0.088	0.459	2.284	0.763	0.617	Not Supported
H09.10	HT → UB	+	0.671***	4.959	1.702	0.395	0.246	Supported
H10.10	SE → BI	+	0.095	0.547	2.204	0.763	0.617	Not Supported
H11.10	BI → UB	+	-0.215	1.418	1.690	0.395	0.246	Not Supported

Concept 11: Click & Deliver of Groceries (Multichannel):

- VIF < 5: no multicollinearity
- β > 0.2: PE → BI, SI → BI, FC → UB, PV → BI, HT → BI, and HT → UB
- t-statistic t > 1.65: PE → BI, SI → BI, PV → BI, and HT → UB
- Path relationship of PE → BI, SI → BI, PV → BI, and HT → UB are presumed to be significant, remaining path are definitely not significant
- R^2 for BI ≥ 0.67: high significant prediction accuracy
- R^2 for UB ≥ 0.33: moderate prediction accuracy
- Q^2 for BI & UB > 0: meaningful prediction relevance
- F^2 ≥ 0.35: high influence of PV → BI and HT → UB
- F^2 ≥ 0.15: moderate influence of PE → BI and SI → BI
- H01.11 (PE → BI) is supported at the 10%-level
- H03.11 (SI → BI) is supported at the 5%-level
- H07.11 (PV → BI) is supported at the 5%-level
- H09.11 (HT → UB) is supported at the 1%-level
- Remaining hypotheses have to be rejected

Table 20 Overview of Values and Hypothesis Findings (Concept 11)

Concept 11: Click & Deliver of Groceries (Multichannel)

Hypothesis	Relation	Effect	Path Coeffizent	T-value	VIF	R^2	Q^2	Verification
H01.11	PE → BI	+	0.331*	1.856	2.335	0.821	0.703	Supported
H02.11	EE → BI	+	0.01	0.057	2.992	0.821	0.703	Not Supported
H03.11	SI → BI	+	0.312**	1.970	1.724	0.821	0.703	Supported
H04.11	FC → BI	+	0.181	1.106	2.698	0.821	0.703	Not Supported
H05.11	FC → UB	+	0.258	1.517	1.333	0.477	0.156	Not Supported
H06.11	HM → BI	+	-0.241	1.093	4.740	0.821	0.703	Not Supported
H07.11	PV → BI	+	0.532**	2.101	4.411	0.821	0.703	Supported
H08.11	HT → BI	+	0.232	1.572	1.582	0.821	0.703	Not Supported
H09.11	HT → UB	+	0.578***	2.871	1.419	0.477	0.156	Supported
H10.11	SE → BI	+	0.061	0.429	1.293	0.821	0.703	Not Supported
H11.11	BI → UB	+	0.017	0.052	1.799	0.477	0.156	Not Supported

Concept 12: Click & Deliver of Groceries (Online Pure Player):

- VIF < 5: no multicollinearity
- β > 0.2: PE → BI, HT → BI, HT → UB, and SE → BI
- t-statistic t > 1.65: HT → UB
- Path relationship of HT → UB is presumed to be significant, remaining path are definitely not significant
- R^2 for BI ≥ 0.33: moderate significant prediction accuracy
- R^2 for UB ≥ 0.19: weak prediction accuracy
- Q^2 for BI & UB > 0: meaningful prediction relevance
- F^2 < 0.15: weak influence of HT → UB
- H09.12 (HT → UB) is supported at the 10%-level
- Remaining hypotheses have to be rejected

Table 21 Overview of Values and Hypothesis Findings (Concept 12)

Concept 12: Click & Deliver of Groceries (Online Pure Player)

Hypothesis	Relation	Effect	Path Coeffizent	T-value	VIF	R^2	Q^2	Verification
H01.12	PE → BI	+	0.286	0.894	2.605	0.555	0.377	Not Supported
H02.12	EE → BI	+	-0.157	0.573	2.51	0.555	0.377	Not Supported
H03.12	SI → BI	+	0.053	0.228	2.625	0.555	0.377	Not Supported
H04.12	FC → BI	+	-0.106	0.441	1.765	0.555	0.377	Not Supported
H05.12	FC → UB	+	-0.245	0.995	1.055	0.238	0.066	Not Supported
H06.12	HM → BI	+	0.109	0.339	2.592	0.555	0.377	Not Supported
H07.12	PV → BI	+	0.164	0.715	1.327	0.555	0.377	Not Supported
H08.12	HT → BI	+	0.266	1.043	3.075	0.555	0.377	Not Supported
H09.12	HT → UB	+	0.389*	1.695	1.689	0.238	0.066	Supported
H10.12	SE → BI	+	0.236	1.261	1.515	0.555	0.377	Not Supported
H11.12	BI → UB	+	-0.033	0.157	1.630	0.238	0.066	Not Supported

Concept 13: Click & Collect of Groceries:

- VIF < 5: no multicollinearity
- β > 0.2: PE → BI, SI → BI, HT → UB, SE → BI, and BI → UB
- t-statistic t > 1.65: PE → BI, SI → BI, HT → UB, SE → BI, and BI → UB
- Path relationship of PE → BI, SI → BI, HT → UB, SE → BI, and BI → UB are presumed to be significant, remaining path are definitely not significant
- R^2 for BI ≥ 0.67: high significant prediction accuracy
- R^2 for UB ≥ 0.33: moderate prediction accuracy
- Q^2 for BI & UB > 0: meaningful prediction relevance
- F^2 ≥ 0.35: high influence of HT → UB
- F^2 ≥ 0.15: moderate influence of PE → BI, SI → BI, SE → BI, and BI → UB
- H01.13 (PE → BI) is supported at the 1%-level
- H03.13 (SI → BI) is supported at the 5%-level
- H09.13 (HT → UB) is supported at the 1%-level
- H10.13 (SE → BI) is supported at the 10%-level
- H11.13 (BI → UB) is supported at the 10%-level
- Remaining hypotheses have to be rejected

Table 22 Overview of Values and Hypothesis Findings (Concept 13)

Concept 13: Click & Collect of Groceries

Hypothesis	Relation	Effect	Path Coeffizent	T-value	VIF	R²	Q²	Verification
H01.13	PE → BI	+	0.416***	2.694	1.732	0.694	0.468	Supported
H02.13	EE → BI	+	-0.069	0.443	2.233	0.694	0.468	Not Supported
H03.13	SI → BI	+	0.342**	1.992	2.213	0.694	0.468	Supported
H04.13	FC → BI	+	-0.093	0.477	2.333	0.694	0.468	Not Supported
H05.13	FC → UB	+	-0.187	0.947	1.002	0.549	0.483	Not Supported
H06.13	HM → BI	+	0.193	1.187	2.124	0.694	0.468	Not Supported
H07.13	PV → BI	+	0.088	0.563	1.671	0.694	0.468	Not Supported
H08.13	HT → BI	+	-0.057	0.345	1.877	0.694	0.468	Not Supported
H09.13	HT → UB	+	0.520***	4.484	1.268	0.549	0.483	Supported
H10.13	SE → BI	+	0.286*	1.896	1.105	0.694	0.468	Supported
H11.13	BI → UB	+	0.307*	2.394	1.270	0.549	0.483	Supported

Concept 14: Grocery Pick-Up Station:

- VIF < 5: no multicollinearity
- β > 0.2: PE → BI, PV → BI, HT → UB, SE → BI, and BI → UB
- t-statistic t > 1.65: PE → BI, PV → BI, HT → UB, and SE → BI
- Path relationship of PE → BI, PV → BI, HT → UB, and SE → BI are presumed to be significant, remaining path are definitely not significant
- R^2 for BI ≥ 0.67: high significant prediction accuracy
- R^2 for UB ≥ 0.33: moderate prediction accuracy
- Q^2 for BI & UB > 0: meaningful prediction relevance
- F^2 ≥ 0.35: high influence of SE → BI
- F^2 ≥ 0.15: moderate influence of PE → BI, PV → BI, and HT → UB
- H01.14 (PE → BI) is supported at the 10%-level
- H07.14 (PV → BI) is supported at the 10%-level
- H09.14 (HT → UB) is supported at the 1%-level
- H10.14 (SE → BI) is supported at the 1%-level
- Remaining hypotheses has to be rejected

Table 23 Overview of Values and Hypothesis Findings (Concept 14)

Concept 14: Grocery Pick-Up Station

Hypothesis	Relation	Effect	Path Coeffizent	T-value	VIF	R²	Q²	Verification
H01.14	PE → BI	+	0.441*	1.884	4.003	0.817	0.664	Supported
H02.14	EE → BI	+	-0.036	0.289	1.864	0.817	0.664	Not Supported
H03.14	SI → BI	+	0.128	0.599	2.955	0.817	0.664	Not Supported
H04.14	FC → BI	+	0.039	0.326	1.732	0.817	0.664	Not Supported
H05.14	FC → UB	+	-0.224	0.939	1.083	0.464	0.389	Not Supported
H06.14	HM → BI	+	0.045	0.271	2.099	0.817	0.664	Not Supported
H07.14	PV → BI	+	0.213*	1.701	1.641	0.817	0.664	Supported
H08.14	HT → BI	+	0.053	0.371	2.823	0.817	0.664	Not Supported
H09.14	HT → UB	+	0.521***	3.024	1.745	0.464	0.389	Supported
H10.14	SE → BI	+	0.367***	2.758	1.641	0.817	0.664	Supported
H11.14	BI → UB	+	0.244	1.541	1.781	0.464	0.389	Not Supported

Overall, the results of the data analysis show that a total of 40 out of 154 hypotheses were supported. Frequently, the same significant path relationships are identified for most concepts. This leads to the assumption that certain factors in the context of the acceptance analysis of urban logistics concepts have a particular influence on end customers. Especially the constructs HT and PE have to be emphasized here. Accordingly, a significance between HT and UB (13 out of 14) or HT and BI (1 out of 14) is confirmed for all fourteen concepts. Furthermore, a positive influence of PE on BI (7 out of 14) is underlined for the half of analyzed concepts. The insights obtained will be discussed and interpreted in the subsequent section. In this case, peculiarities of the hypotheses assessment are addressed.

5 Discussion and Recommendations

The fundamentals of this study clarified that optimization is needed in the field of urban logistics. This affects transport processes on the last mile in particular. It also has to be stated that innovative logistics concepts are implemented more efficiently if all stakeholder groups are consulted during this process. In this respect, the opinions of public authorities, carriers, and recipients have to be taken into account. The overall objective of this study is to measure the acceptance of end customers for selected logistics concepts. The literature review presented in this study reveals that the knowledge on the subject of acceptance analysis among end customers is insufficient. It is therefore necessary to address this research gap in order to provide further information on the topic of urban logistics. To close this specific gap, a survey was conducted as part of this study.

This section discusses the outcomes of the investigations. For this purpose, the procedure of the present discussion is to be clarified. In the previous sections, the established research model was empirically examined using the methodology of PLS-SEM. On this basis, the results of the survey are initially compiled and interpreted. Moreover, this part of the discussion also formulates recommendations for actions of practice. Afterwards, identified similarities and differences between the results of the survey and the literature review are explained. The research question of this study ("Which factors influence the acceptance of urban logistics concepts among end customers?") is finally answered by means of this process. Thus, relevant factors are highlighted that have a significant influence on the acceptance of urban logistics concepts among end customers. In the following, we will analyze construct by construct.

<u>PE (Performance Expectancy):</u>

First of all, the results confirm that PE has a positive influence on the BI for seven of the investigated urban logistics concepts (H01.2, H01.3, H01.4, H01.5, H01.11, H01.12, H01.13, and H01.14). This significance has also been confirmed in previous studies with regard to similar contexts (Kim et al., 2008; Venkatesh et al., 2003). Here, the concepts Parcel Station with Delivery Service, In-Car Delivery, Parcel Drone Delivery and Parcel Robot Delivery are included for the CEP service provide concepts as well as for the E-Grocery concepts Click & Deliver (Multichannel), Click & Collect, and Grocery Pick Up Station. Hence, the PE of customers has a significant influence on their intention to use these concepts. This leads to the conclusion that end customers believe that using the addressed concepts helps them to improve their performance. Above all, time savings and related productivity improvements are achieved by these concepts. With regard to the Parcel Station with Delivery Service and Click & Deliver (Multichannel) customers have the option of defining an individual delivery time in order to increase the chances of a successful shipment. The concept Click & Collect and the concept Grocery Pick Up Station allow for pick-up of goods at the desired time the customers wants to collect their goods. Furthermore, a specific timeframe for delivery is guaranteed for the Parcel Drone Delivery and the Parcel Robot Delivery. For both concepts, the consignment is to take place within 30 minutes. In case of the In-Car Parcel Delivery the customer is also promised scheduled shipment as the order will be delivered to the trunk the next day. Additionally, a particular flexibility for the customers is to be emphasized here, since the purchase is delivered into the addressed car. The recipients are therefore not obliged to be at home at the time of delivery, which is why, for instance, this shipment alternative is of special interest to commuters. Such time saving service offerings enable customers to plan their daily obligations more efficiently. The majority of the surveyed persons belong either to the category "Pupil, Student, Apprentice" or to the category "Full- and Part-Time Employees, Official". Consequently, it is to be expected that most of the test persons be not at home during the conventional delivery times of the logistics service providers due to professional obligations. For this reason, it makes sense that the factor PE has a positive influence on the intended use of the respective concepts. A repeated delivery attempt in which the recipients have to be at home or a collection of the consignment at the next parcel shop is no longer necessary when using these concepts.

Considering the BentoBox, the Parcelbox, the Concierge-Service at Workplaces, White-Label CEP-Service, Unattended In-Home Delivery, the Neighborhood Supply, and Click & Deliver (Online Pure Player), there is no significant influence of PE on BI (H01.1, H01.6, H01.7, H01.8, H01.9, H01.10, and H01.12). With the BentoBox, customers pick up their delivered shipment at a specific location. As this is a time-consuming process, customers do not see any significant benefit in using this concept. According to the participants, the use of the BentoBox does not lead to an improvement in productivity. A Parcelbox is located in front of single or two-family houses. For most of the participants living in urban center, the installation of such a box is not possible. Due to this fact, the concept seems not to be useful for densely populated areas with multi-family houses. The use of the Concierge-Service presupposes that the employer has a corresponding installation option available. A further obstacle to the uncertified increase in productivity could be the means of transport to the workplaces. Customers do not accept parcel transport home by tram. A white-label solution does not change anything for the customer with regard to package reception, an increase in performance is therefore not apparent. Unattended In-Home Delivery is still in its infancy, often customers do not accept the access of strangers to the opening of the door to the private home or house. Likewise, the Supply through Neighborhood Purchasing is not perceived as positive. It is to be assumed that the supply of groceries by the neighbors is not considered to be particularly useful or time saving for the every-day life of end customers. A possible reason here could be the lack of trust towards the neighbors. When it comes to buying groceries, customers attach great importance to fresh and high-quality products (Pan et al., 2017). Thus, it is presumed that a self-performed procurement is more reliable for customers in this respect than a purchase by neighbors. Furthermore, a procurement for another neighbor is probably associated with more time effort. In addition to the own purchases, also the acquisitions of further persons are to be made. Click & Deliver-Goods by Online Pure Players are transported via traditional CEP service providers. The order of groceries including frozen food and other perishable goods transported via many kilometers and necessary transshipment points together with time windows of several hours for the delivery is not acceptable for most customers, as apparent through the employment.

The results regarding the construct PE imply that time savings and increased productivity are important for end customers. From this, recommendations for action for CEP service providers are derived. It shows that CEP services make their offer more appealing to customers if, for example, delivery times are optimized. Here, timeframes as requested by the customer are made possible. Delivery on the same day is also a conceivable alternative in this context. In addition, the recipient is given planning security if the shipment process can be followed through live-tracking. In this respect, it is important to ensure that the promised delivery dates are met. Delayed or failed deliveries have a negative impact on customer satisfaction, especially in case of grocery products. The consequences are increased time expenditure and reduced productivity on behalf of the end customer.

Effort Expectancy (EE):

The construct EE reveals a significant influence on BI for a single concept (H02.5). Accordingly, a positive influence between these two constructs is evident for the Parcel Robot concept. The significant effect of EE on usage intentions means that end customers believe that the use of the Parcel Robot is easy. In order to operate with the Parcel Robot, customers only need a mobile phone. Order and receipt are handled in this way. The majority of the respondents are in an age segment between 18 and 29. From this, it is concluded that the usage of a mobile device is not considered problematic, as most of the test persons grew up with this technology. This suggests that the Parcel Robot is perceived as an easy-to-use and user-friendly logistics concept. However, this result has to be questioned.

Apart from the Parcel Robot concept, no other concept shows a significant influence between EE and BI (H02.1, H02.2, H02.3, H02.4, H02.6, H02.7, H02.8, H02.9, H02.10, H02.11, H02.12, H02.13, and H02.14). The usage of the other concepts is basically as simple as the use of the Parcel Robot. For example, using the Parcel Station with Delivery Service, the In-Car Delivery, the Unattended In-Home Delivery, or the Parcel Drone Delivery also only need the application of a mobile device. As with the Parcel Robot, this coordinates registration, order placement and reception. In terms of the In-Car Delivery, it is generally expected that customers have their own car. Since this precondition was not always fulfilled by the respondents, the survey requested that the use of the concept and the possession of a car should be imagined. The BentoBox as well as the Concierge-Service at Workplaces concept requires the usage of a terminal in order to receive the delivery. As the handling of the corresponding terminal does not require any advanced knowledge, this is also not expected to be a major obstacle. The prevalent insignificance of EE is consistent with the results of similar studies. In their paper, Baptista and Oliveira (2015) examine the perception of mobile banking by customers, while Gupta and Dogra (2017) analyze tourist adoption of mapping apps. Hence, it has to be clarified why EE is not significant for most of the concepts in terms of their intention to use.

Further research proves that EE has a distinct impact on BI, especially in the early stages of implementing a new technology (Yang, 2010). Although the logistics concepts presented are innovative, the general process of ordering shipments and receiving consignments is not new to most customers. In other words, there is no specific learning process at this point. In fact, for most customers, ordering in general is probably a rather commonly practiced procedure. Many orders for products are already placed via mobile devices. The pick-up process at the BentoBox is very similar to the concept of a normal parcel station, which for most customers is also not an unknown process. In this sense, it is to be assumed that customers no longer consider ease of use to be an advantage. As a consequence, the EE construct is not meaningfully measured in this specific context. Accordingly, the significance of EE on BI for the Parcel Robot is only confirmed with reservations. Hence, EE is classified as a rather insignificant factor for the actual use of the concepts investigated.

<u>Social Influence (SI):</u>

The SI construct has five significant influences on BI (H03.3, H03.4, H03.9, H03.11, H03.13). Accordingly, this factor has a positive effect on BI for the In-Car Delivery, the Parcel Drone Delivery, Unattended In-Home Delivery, Click & Deliver of Groceries (Multichannel), and Click & Collect of Groceries. The significant effect between these constructs was similarly noted in other contexts (Venkatesh and Davis, 2000; Yang, 2010). It is therefore to be stated that the usage of these five concepts is considered necessary or useful by those persons who are important to the respondents. Family members, close friends or colleagues, for example, could have a substantial influence on this. In this way, it is combined a higher SI leads to a higher BI. One possible explanation is that the Parcel Drone is the concept that attracts the most attention in comparison to the other concepts. The idea that shipments from the air are delivered directly to the customer's location is both new and unknown. This means that this concept is likely to be discussed extensively in the social environment of customers and, thus, attracts greater interest. With In-Car Delivery and Unattended In-Home Delivery, the customer's privacy is invaded. The ordered delivery is placed in the customer's car by an unknown supplier. Considering this aspect, it is to be presumed that different opinions collide in the social environment of the end customer and thereby increase the influence of it. For the grocery concepts, this is to be interpreted as meaning that customers then adopt Click and Deliver (provided by multichannel retailers) and Click and Collect if important others have a positive opinion about using these e-food delivery concepts. In connection with adoption of internet-enabled e-retailing and mobile shopping services, for example, this effect has already been investigated and confirmed in previous studies (Liao and Shi, 2009; Yang, 2010).

Nevertheless, no significance is evident for the other nine concepts between SI and BI (H03.1, H03.2, H03.5, H03.6, H03.7, H03.8, H03.10, H03.12, H03.14). It follows that the social environment of the participants does not have a significant impact on the use of these concepts. At this point, companies and in particular CEP service as well as E-Grocery providers should examine to what extent they can have a positive influence on the social environment of customers. Psychological studies prove that individuals generally tend to follow the behavior of a trusted majority. This principle is known as social proof. Especially when there is uncertainty among end customers as to whether the use of a particular service has added value for them or not, social proof is decisive (Klumpe et al., 2018). Since the concepts presented are innovations, it is unlikely that the respondents are confident in using these. At this point, selective measures of CEP services and grocer could have a positive impact on the customer’s choice. The publication of positive customer evaluations regarding the concepts is a conceivable approach here. In this way, potential customers are shown that other individuals have decided to use these concepts and are satisfied with them. Advertising measures for the concepts in social media could also lead to an advantageous effect with respect to SI. For instance, promotional videos of CEP service and grocery providers could highlight the advantages of logistics concepts on the basis of practical examples.

Facilitating Conditions (FC):

Except from the Parcelbox concept, FC do not reveal a relevance for any of the examined concepts. From this, it is determined that the positive relation between FC and BI (H04.1-H04.14) and UB (H05.1-H05.5 and H05.7-H05.14) is not significant.

The FC have a significant positive effect on the UB of the Parcelbox. Accordingly, the UB increases when the general conditions improve. The fact that an influence can only be proven for the Parcelbox may be due to the nature of the system. While the other concepts are more of a service provided by the provider, some variants of the Parcelbox have to be installed and commissioned independently. The use increases accordingly if positive FC are given. The UB of the other concepts is not significantly influenced by the framework conditions, which could be traced back to the same reasons that apply in the context of the FC and the BI. In addition, the missing moderator variables that Venkatesh et al. (2003) follow are of importance for the significant influence of the framework conditions on usage behavior (Venkatesh et al., 2003).

Regarding the rejected concepts, an improvement of this factor consequently has no influence on customer patterns. This finding is congruent with other results from acceptance research. For instance, Jambulingam investigates people's intention to adopt mobile technology, whereas Maldonado et al. analyze the acceptance of students on e-learning (Jambulingam, 2013; Maldonado et al., 2009). The reason for the observation in this context could derive from the fact that the innovations presented are mainly services provided by companies to customers. With Neighborhood Supply of Groceries, customers are served by their neighbors. When shopping for other neighbors, the same destinations would be aimed as those that would be taken into consideration in the course of their own procurement process. Moreover, the usage of the BentoBox only requires the handling of a terminal. Accordingly, using these concepts does not entail any substantial expense for the end customers. As long as the application of the concepts is associated with little effort, the influence of FC reduces as well. Hence, it is summarized that the construct FC has, except for the Parcelbox, no significance with regard to the surveyed urban logistics concepts.

Hedonic Motivation (HM):

The construct HM reveals a significance for the concept Parcelbox, Concierge-Service at Workplaces, and Neighborhood Supply of Groceries (H06.6, H06.7, H06.10).

For these concepts, this indicates that customer gain a feeling of pleasure using this concepts through its features and functions. Thus, users will be driven by the enjoyment of the process and their commitment to the activity. With HM-values of 0.655 and 0.598 for the influences of the Parcelbox and the Concierge-Service on the BI can also be classified as strong and generate the greatest impacts in the model. The resulting importance of hedonistic motivation was also recognized by Venkatesh et al. (2012), who even rated its relevance above performance expectations. For

Neighborhood Supply, the entertainment value of this concept enhances by the interaction with the own neighbors. Additionally, the principle of reward points and the resulting prices could be a particular motivation for customers. Consequently, providers of this concept could optimize the necessary app to further improve the HM of the users. For this purpose, a ranking of the collected bonus points could be displayed in order to create a special incentive for customers to make more purchases for their neighbors. In this case, users with particularly good rankings could be rewarded for their efforts with monthly special rewards.

However, the significance of HM on BI is questionable in this setting. This follows from the fact that the relevance between these two constructs does not apply to eleven of the concepts. This result is contrary to the findings of comparable acceptance analyses (Baptista and Oliveira, 2015; Raman and Don, 2013; Venkatesh et al., 2012). Although the presented delivery processes of the concepts are to be classified as sustainable and innovative, the respondents did not consider them as particularly entertaining or joyful. This could be due to the fact that the general process of ordering products via mobile devices and receiving them is not perceived as special or new by customers. It is therefore concluded that improving HM in the context of urban logistics concepts does, except from the concepts Parcelbox, Concierge-Service at Workplaces, and Neighborhood Supply of Groceries, not have a significant impact on the user patterns of end customers.

<u>Price Value (PV):</u>

Moreover, it was hypothesized that PV positively influences the customers BI to use the presented urban logistics concepts (H07.1-H07.14). For the concept Click & Deliver of Groceries and the grocery Pick-Up Station, this hypotheses were supported. That means, if customers' perceptions about the benefits they can obtain from using the respective e-food delivery concepts exceed the personal costs for using it, their BI to use it will increase. The strongly significant effect of PV on BI confirms the assumption that customers are interested in a reasonable price/performance ratio (H07.11 and H07.14). The survey results do not allow any conclusions to be drawn as to which price expectations the customer has. Previous research indicates, however, that especially in the food sector customers tend to be more price sensitive. In Germany, this is due to the dense supermarket network, which is why customers consider it negative if they pay more for delivery costs than if they can buy in the supermarket next door without delivery costs. If this effect is stronger than PE, costs are valued higher than convenience benefits from delivery, which is why price-sensitive customers will not use the service if, from their point of view, the price is not reasonable. Therefore, it is equally useful for online food retailers to keep shipment prices low or to lower food prices for online shopping customers. This creates a discrepancy that has already been proven by numerous studies. Customers demand high service quality and deliveries that are as fast and prompt as possible. This increases costs for companies and increases delivery prices that customers are not willing to pay because they can buy groceries cheaper in local stores nearby. Surprisingly, however, the delivery concept of the Pick-Up Box shows that the effect of SE on BI is greater than PV. This can be an indication that customers accept higher costs if they believe the delivery is both convenient and environmentally friendly.

On basis of the results, the assumption that PV has a positive influence on BI is not confirmed for the other twelve concepts. The insignificance between PV and BI is also substantiated in other studies (Baptista and Oliveira, 2015; Gupta and Droga, 2017). In the course of the survey, the respondents were only shown prices for some of the concepts. This implies that the use of these concepts has no price added value for customers. In this case, a reasonable explanation is shown by the choice of cheaper alternatives. For most deliveries of the conventional CEP service providers, no additional shipping costs are incurred for the customers. Customers therefore reveal a price sensitivity by preferring the cheaper options of parcel delivery. As prices for the usage of the BentoBox and the Parcel Drone do not emerge from practice yet, respondents were made aware that the use of these concepts is free of charge. In fact, an application of the Neighborhood Supply does not entail any additional expenses since the costs of procurements are compensated by the neighbors. Findings from the survey demonstrate that even with regard to the concepts that are free of charge, there is no positive influence of PV on BI. Hence, a unified judgement of this construct is only possible up to a limited extent, since the answers of the respondents do not clearly reveal the reasons for the lack of significance. As this factor is not relevant for any of the investigated concepts, it is consequently assumed, that PV is not a major driver of the BI of end customers with respect to the presented urban logistics concepts.

Habit (HT):

As a matter of fact, the underlying research indicates that respondents see HT as the most important factor influencing actual UB. Compared to the relevance of other constructs, HT always reveals the strongest significance. These results are coherent with previous studies (Gupta and Droga, 2017; Luo et al., 2010; Venkatesh et al., 2012). Hence, this factor deserves special attention. Therefore, the examination of this finding is a central aspect of this discussion. In addition, it has to be determined how HT can be established in relation to urban logistics concepts and whether this is feasible in general. Here, HT shows a positive influence on UB for 13 concepts (except from Parcel Station with Delivery).

The Parcel Station with Delivery Service concept points to a positive relationship between HT and BI (H08.2). In order to place the outcomes in a meaningful context, it is necessary to clarify why HT has a significant influence on BI for only a single concept. It is due to the fact that the development of HT requires actual use. This is unlikely to be the case for the concepts presented, as they are innovative and not fully established in society. Thus, it appears that the habituation effect does not initially affect BI, but leads directly to repeated actions (Venkatesh et al., 2012). As a result, HT shows no significance for BI for most of the concepts in this study. However, a significance exists with regard to the Parcel Station with Delivery Service. Customers may have already had experience with a similar service. Resembling this concept, there are CEP service providers who offer deliveries at a desired time. Thus, it is conceivable that the respondents have transferred their experiences with comparable concepts to the Parcel Station with Delivery Service.

Concerning the investigated concepts, it is summarized that the greater the HT of the end customers, the greater the likelihood of actual use. Once end customers develop a certain level of HT when using urban logistics technologies, their UB will automatically increase. In fact, the development of HT is a long-term procedure and is built by certain routine and repetition of processes (Venkatesh et al., 2012). To encourage this, incentives have to be created by logistics service providers and public authorities. It is proposed that public authorities should develop rules and regulations to ensure an increased use of urban logistics concepts. Pollutant restrictions or parking bans on the last mile could contribute to this. Also, sensitive sanctions from the authorities for violations of these regulations could be a supportive measure. As a result, CEP services, for instance, could reconsider their approach of parcel delivery and focus more on the implementation and optimization of innovative logistics concepts such as BentoBox, In-Car Delivery, Drones, Robots, or Unattended In-Home Delivery. This, in turn, would lead to customers becoming more familiar with the use of these concepts and eventually developing a stronger HT. Customer trust can also be enhanced by CEP companies actively communicating the benefits of their concepts and providing consistent and good service. In addition, CEP service and grocery providers are able to increase the HT of end customers by taking into account factors that also have a positive impact on acceptance. For this purpose, the constructs PE and SI are highlighted. Correspondingly, it has been stated that CEP services increase the PE of customers by adjusting their delivery schedules. With regard to SI, advertisements about logistics concepts in social networks are recommended.

Sustainability Expectancy (SE):

The fundamentals of this study have highlighted the essential importance of sustainability in relation to urban logistics. This was subsequently considered in the empirical approach. In this respect, the included research model of UTAUT2 was extended by the construct SE. As a consequence, it was presumed that SE would have a positive impact on customers' BI (H10.1-H10.14). The results of the survey only confirm this assumption for the concepts Concierge-Service, White-Label CEP Service, Click & Collect of Groceries and Grocery Pick-Up Station discussed here. Accordingly, the intention to use the product is increased the more sustainably customers assess the respective concept. The decisive factor for this result could have been the concept descriptions within the survey, since the two concepts, in whose description the sustainability aspect was addressed, had a significant influence. While White-Label logistics only referred indirectly to environmental friendliness, this was explicitly mentioned in the concierge service. This could have led to the t-value and path coefficient of the concierge service being the largest. Furthermore, this suggests that the test persons do not directly recognize the sustainability aspects of the concepts, but must be explicitly made aware of them.

As a matter of fact previous research on parcel boxes, e.g. de Oliveira et al., 2017 and Wang et al., 2018, revealed that the delivery option is capable of reducing carbon emissions, increase efficiency and effectively provide convenience advantages to customers at the same time. This is expected to hold for cooled Grocery Pick-Up Stations as well. From the findings, we know that customers evidently recognize energy-saving and eco-logical potentials coming from using the Pick-Up Station as food delivery destination. Since refrigerated parcel stations are a completely new concept and are still in the experimental phase, food retailers could gain competitive advantages by investing in its development and cooperation partners. Furthermore, such cooled box stations in public places could be very conspicuous and visible for different customer groups, e.g. in railway stations, where simply the presence of the boxes could arouse curiosity due to the novelty and cause customers to gain interest in testing the concept. Testing a service is particularly effective when experiences, if positive, are passed on to individuals who tend to appreciate the opinions of important others and can, therefore, be encouraged to also test the e-food delivery concept. Customers should be actively informed about such novelties via apps or websites and about its functionality in an understandable way. This could especially alleviate the general skepticism towards buying fresh and chilled food online. This is interesting since the Pick-up Box itself is only a delivery option to choose after having purchased food online through clicking and selecting food products. Therefore, the concept can be seen as Click and deliver with the possibility for customers to opt for the Pick-Up Station as delivery destination. This might be evidence that when customers are offered delivery option from which they think it has a certain sustainability potential, they are more likely to use online food shopping in general. This insight should be used by e-food retailer to develop concepts and adapt services in such a way that the sustainability expectations of customers are also increased. If this true food retailers should promote and invest in more (ecological) sustainable food delivery services, including electric delivery fleets, e-scooters, cargo-bikes etc., and communicate that to the customers by marketing or e-advertising strategies. E-food retailers then may have a reputational advantage if they manage to actively communicate to customers that the services provided con-tribute to environmental sustainability. The use of electric vehicles and light-duty vehicles for de-livery can therefore also prove to be economically and ecologically advantageous and increase sustainability expectations.

In order to avoid high investment costs, it is advisable in this case to cooperate with established CEP service providers who already have extensive logistics know-how and networks and are currently operating with more sustainable delivery concepts or vehicles.

The rejection of the hypothesis for the other concepts suggests that the perception of sustainability has no influence on the customer's intention to use these concepts. Moreover, this assumption is also supported in another study on urban logistics concepts. The research of Moroz and Polkowski (2016) reveals that young customers in particular consider other factors with regard to their usage. In comparison between individual utility values and ecological benefits, the majority of customers priorities their personal advantage when using urban logistics concepts. The authors emphasize characteristics such as convenience and time savings of delivery and financial benefits. Most of the respondents in the underlying study are between 18 and 29 years old and therefore belong to the younger age group. On this basis, it is concluded that Moroz and Polkowski's (2016) findings on sustainability can be applied to this study. Furthermore, they assume that the environmental attitudes of young customers could be affected by social media campaigns.

Behavioral Intention (BI):

Lastly, the relevance between BI and UB is assessed. At this point, significance is only confirmed for the Parcel Station with Delivery Service, the Unattended In-Home Delivery, and Click & Collect for Groceries. It implies that the higher the perceived usage intention towards this concept is, the higher the chances of actual use will be. Concerning this, it has already been noted with regard to the significance between HT and BI that customers transfer their experience from similar concepts to the application of the Parcel Station with Delivery Service, the Unattended In-Home Delivery, or Click & Collect for Groceries. With regard to the positive influence between BI and UB, this assumption has to be taken up again. Since the respondents may have already used comparable services, the adoption of this concept is perceived as positive. Accordingly, customers have a high BI for this concept. Regarding Click & Collect of Groceries, this might be the case because Click and Collect is the "oldest" online shopping concept compared to the remaining and has therefore already been established as an adequate food purchase option for customers. This simply means click and collect might be the only concept that the participants of the survey used more often so far, which has proven to be useful. Since the survey does not provide information about how often customers already have been using the discussed e-food delivery concepts, this is only an assumption. Although it may seem logical at first sight, it cannot be generally assumed that the intention to perform an act also leads to the actual realization of the intention. Thus, Sheppard et al. (1988) identify various barriers that prevent an intention to do something from ultimately resulting in an actual action. An example would be the intention to buy a new car but not to realize the purchase due to lack of money. It is questionable, however, why a positive influence of the intention to use is proven especially in the case of Unattended In-Home Delivery. However, since the social influence has a positive effect on the intention to use the vehicle, a certain social pressure could trigger the intention to take action. The remaining concepts show no significance with regard to BI and UB (H11.1, H11.3, H11.4, H11.5, H11.6).

This section put emphasize on discussing the results from the data analyzes and hypotheses test in the context of the underlying CEP service and e-food delivery concepts under investigation.

The analysis of literature has particularly highlighted features like time savings of delivery, perceived relative advantage and a positive attitude for the acceptance of urban logistics concepts. In terms of the research model considered in this study, aspects such as time savings and perceived relative advantage are transferable to the PE construct. Furthermore, the data analysis shows that PE is a significant factor for the use of urban logistics concepts by end customers. In this respect, the results are consistent. With regard to the significance of the factor HT, no obvious comparison is to be drawn with the findings of past literature. This is probably due to the fact that HT is a specific construct within the UTAUT2 research model. In numerous comparable studies in which UTAUT2 is also selected as the research approach, HT is frequently highlighted as the most significant factor influencing the UB of various technologies. This is also congruent with the results of this analysis, as HT is consistently the construct with the strongest significance. Consequently, HT is to be emphasized as relevant in this context.

Moreover, past literature indicates that positive customer attitudes towards urban logistics concepts have a beneficial impact on their acceptance. It emerges from the discussion that several constructs lead to a positive attitude among end customers. Taking data analysis into account, PE, HT, and SI have to be emphasized here. Since the relevance of PE and HT to the acceptance of urban logistics concepts has already been confirmed in this study, it is necessary to discuss the importance of SI. Considering that SI is only relevant for two of the examined concepts, it is initially to be expected that this construct has no substantial significance in this context. Simultaneously, it is stated that this factor could have a potential to influence customers' acceptance of urban logistics concepts by means of specific measures. Based on these inferences, the research question of this discussion paper is answered. Consequently, the factors HT and PE have a significant influence on the acceptance of urban logistics concepts among end customers.

It turned out that e-food retailers could undertake various efforts and measures in order to motivate customers to use their e-food products and services. In order to enhance customers’ adoption behavior multichannel food retailers should increase electronic and logistic service quality to positively affect customers’ performance expectancy. Furthermore, effective e-advertising strategies should be implemented to actively inform about customers’ benefits, if using e-food delivery concepts.

Additionally, by providing more sustainable and reliable delivery options, e-food retailers could reach out to new customers as they may appreciate more ecologically sustainable services to optimally gain competitive advantages. Implementing the pick-up box as delivery option might be one solution to fulfill customers' needs and to arouse customers' acceptance. Moreover, positively convinced customers who are already using e-food supply services could be given incentives to spread the word of mouth, since important others' opinion might encourage people to use e-food deliveries as well. Especially Online Pure Players need to create customer trust in order to be recognized and taken seriously in the market at all, in view of the intense competition from established food retailers and the high supermarket density in Germany. In any case, it is important to keep delivery costs as low as possible in order not to deter the mostly price-sensitive customers.

In order to enable optimization for prospective research, it is also necessary to clarify the theoretical obstacles of this study. Therefore, the limitations of this study and further research directions are explained in the next section.

6 Limitations and Further Research

Since scientific research generally does not aspire to be free of certain boundaries or limitations, the present study needs to be considered against this background. Despite the fact the quantitative analysis yielded a high degree of validity and reliability of the models, some limitations have been detected concerning the implementation of SEM.

First and foremost, the online survey, as the type chosen for data collection, led to unsatisfactory sample compositions in relation to the representativeness of the population. Since the characteristics of age and professional situation were largely homogenous, it concluded that the sample did not reflect the population in reality. More specifically, young academics between 25 and 29 years of age as well as employees, younger than 40 years, were highly overrepresented (see Figure 4). For instance, older participants might perceive a higher complexity when using innovative logistics concepts. This could deliver different findings, especially with regard to the constructs PE and EE. Therefore, it has to be concluded, that the sample is biased in this study. Therefore, future research could increase the generalizability of results by collecting data systematically and within a larger period of time. Even though PLS methods are suitable for small sample sizes and the model results revealed high predictive accuracy, nevertheless, it is questionable if present samples might have been too small to find effect relationships that reflect reality. Additionally, statistical analysis methods were limited by the small size and versatility of the samples. With more suitable sample data, future research could also investigate moderating effects based on customer characteristics like age, gender, or experience in the context of adopting delivery concepts by conducting multi-group causal analysis.

Further, it deserves to be emphasized that the analyzed logistics concepts have not acquired a far-reaching number of customers yet. This is due to the fact that most of them are still in the testing phase. Correspondingly, the answers of the respondents are limited in their meaningfulness, especially with regard to the frequency of use. Since UTAUT2 is used to investigate general technology acceptance, further studies need to verify the suitability of this research model for measuring the acceptance of urban logistics concepts by end customers.

Past research reveals that other research approaches are also applied to evaluate the acceptance of logistics concepts. Wang et al. (2018) for instance, use the DOI model in their analysis. For this reason, future studies could confront the meaningfulness of comparable examinations in order to design an optimized research framework for the adoption of urban logistics concepts. Additionally, researchers could investigate whether a modification of UTAUT2 is appropriate in this context. At this point, it could be questioned, for example, if a combination of the constructs EE and FC makes sense due to similar item-batteries. With regard to the analyzed concepts, researchers could link variables of other technology acceptance models such as individual innovativeness, perceived trust, or perceived privacy with the extended UTAUT2 model of this study. Numerous other studies have already demonstrated the significant importance of these factors for the acceptance of other technologies (Hossain and Prybutok, 2008; Li et al., 2007; Roca et al., 2009; Yi et al., 2006). Thereby, potential factors influencing the adoption of urban logistics concepts could be tested for significance. Besides, it emerges from the discussion of this work, that customer attitudes to urban logistics concepts could be positively influenced by targeted actions in social networks. This assumption is specifically made for the factors SI and SE. Future research could address this presumption with a long-term study. Over time, repeated surveys could be conducted to analyze the extent to which social media activities influence the significance of SI and SE when measuring the acceptance of urban logistics concepts. As already found in previous studies, FC and EE had no significant influence on BI (Kourouthanassis et al., 2010; Yang, 2010). In view of the fact that the possibilities for using electronic devices, the internet and online retailing are ubiquitous today and the know-how in dealing with IS and ICT is strongly developed in today's society, it can be questioned whether factors such as EE, FC, or similar factors must be included at all in future research concerning e-commerce. Especially UTAUT was developed in a time where internet and computer-based technology was in its early stages, which is why the original constructs might not all be suitable to measure customers' acceptance with regard to the context of e-commerce.

Additionally, IR tests revealed that especially items form the factor FC were not suitable to explain the construct. Some of the indicators surveyed did not show any IR, it is likely that unclear formulations of the indicators have led to these results. In order to prevent this in the future, expert interviews could help to find suitable constructs and suitable indicators that describe the factors to be examined as precisely as possible.

Since the results deviated largely from the assumed effect relationships and only 40 out of 154 hypotheses could be supported, it can be assumed that other factors influence the behavioral intention of customers when buying goods and grocery online. In case of e-grocery, customers in Germany are still skeptical and risk-averse about buying online food, which especially hold for pure player food suppliers. In this context, future research could be conducted on pure players and integrate further factors such as trust or risk perceptions into the research, since these variables were already proven in affecting individuals' decision to purchase e-commerce products and services (Dinev and Hart, 2006; Gefen et al., 2003).

As the results revealed significant effects of, both, SE and PV on BI, but no information about customers specific price expectations, e-food retailers and logistics operators may be interested in discovering knowledge about which maximum price customers would be willing to pay for more sustainable delivery options. Therefore, future research on customers' willingness-to-pay for sustainable deliveries might be of great interest.

Regarding especially e-grocery supply, another limitation refers to country differences. The literature and market observations of the e-food market show that the German online food sector is not yet experiencing the popularity as in Great Britain or South Korea. Customers in these countries are likely to have much more general confidence and experience in online food shopping and delivery services. By cross-nationally comparing e-food customers in several countries, future research may therefore be able to gain insights for the German market, especially with regard to sustainable delivery methods, which could already be more advanced. While ecological sustainability expectations have an influence on integration to use in this study, this influence was not confirmed in a study on the acceptance of parcel machines in Poland.

Furthermore, participants in the survey may have concepts with a particular delivery of food retail companies that they are unwilling or extremely positive about anyway, which may distort the results, which is commonly known as the halo effect (Weiber and Mühlhaus, 2014). Customers may also have a negative attitude towards online shopping in general. Therefore, future research may integrate factors such as attitude towards e-food shopping in future research models.

7 Conclusion

The overall objective of this study was to identify relevant influencing factors with regard to customer acceptance of urban logistics concepts. Against this background, fundamental aspects of urban logistics were initially explained.

Concerning the empirical approach of this study, the research model of UTAUT2 was applied, which was subsequently extended by an additional construct. The model was tested on 14 urban logistics concepts and evaluated by means of an online survey. In the course of the subsequent data assessment, it was observed that only certain constructs had a significant influence on customer acceptance of urban logistics concepts. In this respect, the factors HT and PE were frequently found to be relevant. The results indicated that PE is the most significant antecedent of end customers BI. Hence, PE was relevant for seven of the 14 concepts presented. Further, it was pointed out that the actual UB of customers to utilize urban logistics concepts was exclusively positively influenced by the HT factor. With respect to customers UB, HT revealed a strong significance for thirteen of the included concepts.

The results from the data analysis were discussed, reasons for significance and insignificance of the constructs of the treated research model were explained. Based on this, recommendations for practical actions were formulated. Consequently, CEP service providers and e-grocery suppliers should take into account that PE and HT are essential factors for the acceptance of urban logistics concepts among end customers. As a result, CEP companies need to generate customer confidence by actively communicating the benefits of their concepts and ensuring a consistent and good service. In terms of the limitations, it was pointed out that the research model designed for this work should be further modified. This could identify other essential factors for the acceptance of urban logistics concepts among end customers. Moreover, in the preparatory course of the survey, it was assumed that the SE factor could increase the customer's intention to use urban logistics concepts. However, this presumption was not confirmed as part of the data analysis. Further research should address this topic, as sustainability and environmental protection are central aspects in the implementation of urban logistics concepts.

After all, essential factors for influencing the acceptance of urban logistics concepts among end customers were accentuated in this study. In order to further expand the current state of research, numerous possibilities for future studies were additionally formulated. In principle, it is to state that all logistics concepts presented above can be suitable solutions to overcome the challenges on the last mile. However, these approaches must be considered in a more differentiated way. Depending on the local circumstances of each region and city, urban logistics concepts need to be adapted individually, in order to achieve the optimal impact, taking into account the requirements and objectives of end customers and other urban stakeholders.

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9 References

Altmeyer, T. (2018). Digitalisierung in den Bereichen Handel und Konsumgüter. In: Fend, L. and Hofmann, J. (eds.) Digitalisierung in Industrie-, Handels- und Dienstleistungsunternehmen, 253-267. Wiesbaden.

Amazon (2019). Amazon Key Home Kit. Retrieved July 16, 2019 from Amazon.com: https://www.amazon.com/b?ie=UTF8&node=17861200011

Arndt, W.-H. (2017). Gleiche Bedingungen für alle. Retrieved July 13, 2019 from Deutsche Verkehrs-Zeitung: https://www.dvz.de/rubriken/logistik/detail/news/gleiche-bedingungen-fuer-alle.html

Averdung, A. and Wagenfuehrer, D. (2011). Consumers' acceptance, adoption and behavioural intentions regarding environmentally sustainable innovations. Journal of Business Management and Economics, 2 (3), 98-106.

Baptista, G. and Oliveira, T. (2015). Understanding mobile banking: The unified theory of acceptance and use of technology combined with cultural moderators. Computers in Human Behaviour, 50, 418-430.

Bendel, O. (2017). Serviceroboter. Achtung, sie kommen! Retrieved June 10, 2019 from oliver-bendel.net/publikationen/Serviceroboter_UZ_Published_Version.pdf.

Bhattacherjee, A. (2012). Social science research principles, methods, and practices. Tampa, FL: University of South Florida.

Bogdanski, R. (2017). Innovationen auf der Letzten Meile — Bewertung der Chancen für die nachhaltige Stadtlogistik von morgen. Berlin: Bundesverband Paket und Expresslogistik e. V.

Bundesverband der Kurier-Express-Post-Dienste e.V. (BdKEP) (2019). Paketboxen, Paketkasten und Softwarelösungen zum Empfang von Paketsendungen - Die große Übersicht zu den Anbietern. Retrieved July 16, 2019 from BdKEP: https://bdkep.de/Paketbox-Anbieter.html

Cepolina, E. M. and Farina, A. (2015). A new urban freight distribution scheme and an optimization methodology for reducing its overall cost. European Transport Research Review, 7 (1), 1-14.

Chen, C.-C., Chen, C.-W. and Tung, Y.-C. (2018). Exploring the Consumer Behavior of Intention to Purchase Green Products in Belt and Road Countries: An Empirical Analsis. Sustainability (10), Paper 854.

Chin, W. W. (1998a). Issues and opinion on structural equation modeling. MIS Quarterly, 22 (1), 7-16.

Chin, W. W. (1998b). The Partial Least Squares Approach to Structural Equation Modelling. In: Marcoulides, G. A. (ed.) Modern methods for business research, 295-336. New Jersey.

Cohen, J. (1988). Statistical Power Analysis for the Behavioural Sciences. Hillsdale.

De Oliveira, L. M., Morganti, E., Dablanc, L. and de Oliveira, R. L. M. (2017). Analysis of the potential demand of automated delivery stations for e-commerce deliveries in Belo Horizonte, Brazil. Research in Transportation Economics, 65, 34-43.

Dell'Amico, M. and Hadjidimitriou, N. S. (2012). Innovative Logistics Model and Containers Solution for Efficient Last Mile Delivery. Procedia - Social and Behavioral Sciences, 48, 1505-1514.

DHL (2017). DHL Kofferraumzustellung: Pakete direkt im Kofferraum empfangen. Retrieved June 22, 2019 from https://www.dhl.de/de/privatkunden/pakete-empfang

Dinev, T. and Hart, P. (2006). An Extended Privacy Calculus Model for E-Commerce Transactions. Information Systems Research, 17(1) 61–80.

Dodds, W.B., Monroe, K.B. and Grewal, D. (1991). Effects of Price, Brand, and Store Information on Buyers' Product Evaluations. Journal of Marketing Research, 28(3) 307.

Edel, B. (2018). Packstation und Paketbox: Das Gegenmittel für das Logistik-Chaos? Retrieved July 16, 2019 from INTERNET WORDL BUSINESS: https://www.internet-world.de/technik/logistik/packstation-paketbox-gegenmittel-logistik-chaos-1536615.html?ganzseitig=1

Ehrler, V. C. and Hebes, P. (2012). Electromobility For City Logistics - The Solution To Urban Transport Collaps? An Analysis Beyond Theory. Procedia - Social and Behavioral Sciences, 48, 786-795.

Erd, J. (2015). Stand und Entwicklung von Konzepten zur City-Logistik. Wiesbaden: Springer-Gabler.

Fazel, L. (2014). Akzeptanz von Elektromobilität: Entwicklung und Validierung eines Modells unter Berücksichtigung der Nutzungsform des Carsharing. Wiesbaden: Springer Gabler.

Geisser, S. (1974). A Predictive approach to the random effect model. Biometrika, 61 (1), 101-107.

Goodchild, A., Wygonik, E. and Mayes, N. (2018). An analytical model for vehicle miles traveled and carbon emissions for goods delivery scenarios. European Transport Research Review, 10(1).

Goodman, R. W. (2005). Whatever you call it, just don't think of last-mile logistics, last. Global Logistics and Supply Chain Strategies, 9 (12), 46-51.

Green, D. (2017). Amazon and Walmart can both soon put packages in your home when you're not there — and it raises privacy concerns. Retrieved July 16, 2019 from Business Insider Deutschland: https://www.businessinsider.de/walmart-vs-amazon-in-home-delivery-2017-10?r=US&IR=T

Grüning, M. (2002). Performance Measurement-Systeme: Messung und Steuerung von Unternehmensleistung. Wiesbaden.

Gupta, A. and Dogra, N. (2017). Tourist adoption of mapping apps: A UTAUT2 perspective of smart travellers. Tourism and Hospitality Management, 23 (2), 145-161.

Hair, J.F., Hult, G., Ringle, T.M. and Sarstedt, C.M. (2017). A primer on partial least squares structural equation modeling (PLS-SEM). Second edition. Los Angeles: Sage.

Hair, J.F., Sarstedt, M., Ringle, C.M. and Mena, J.A. (2012). An assessment of the use of partial least squares structural equation modeling in marketing research. Journal of the Academy of Marketing Science, 40(3) 414–433.

Hamari, J., Sjöklint, M. and Ukkonen, A. (2016). The Sharing Economy: Why People Participate in Collaborative Consumption. Journal of the Association for Information Science and Technology, 67 (9), 2047-2059.

Hanafizadeh, P., Keating, B. W. and Khedmatgozar, H. R. (2014). A systematic review of internet banking adoption. Telematics and Informatics, 31 (3), 492-510.

Heiserich, O.-E., Helbig, K. and Ullmann, W. (2011). Logistik: eine praxisorientierte Einführung. Lehrbuch. 4. Edition. Wiesbaden: Gabler.

Hofmann, J. (2018). Ausgewählte technologische Grundlagen. In: Fend, L. and Hofmann, J. (eds.) Digitalisierung in Industrie-, Handels- und Dienstleistungsunternehmen, 3-28. Wiesbaden.

Hossain, M. M. and Prybutok, V. R. (2008). Consumer Acceptance of RFID Technology: An Exploratory Study. IEEE Transactions on Engineering Management, 55 (2), 316-328.

I-Bring (2019). Retrieved January 14, 2019 from https://www.i-bring.de.

Jambulingam, M. (2013). Behavioural intention to adopt mobile technology among tertiary students. World Applied Sciences Journal, 22 (9), 1262-1271.

Kim, D. Y., Park, J. and Morrison, A. M. (2008). A model of traveller acceptance of mobile technology. International Journal of Tourism Research, 10 (5), 393-407.

Klumpe, J., Koch, O. F. and Benlian, A. (2018). How pull vs. push information delivery and social proof affect information disclosure in location based services. Electronic Markets, 1-18.

Kourouthanassis, P.E., Georgiadis, C.K., Zamani, E. and Giaglis, G.M. (2010). Explaining the Adoption of Mobile Internet Applications. In: 2010 Ninth International Conference on Mobile Business and 2010 Ninth Global Mobility Roundtable (ICMB-GMR). 2010 Athens, Greece: IEEE, 148–153.

Kwon, O. and Song, M. S. (2012). Understanding Customer Intention to Adopt Sustainable IT Products through Two Dimensional Value Structure and Perceived Sustainability. Asia Pacific Journal of Information Systems, 22 (3), S. 29-52.

Li, R., Kim, J. J. and Park, J. S. (2007). The Effects of Internet Shoppers' Trust on their purchasing intention in China. Journal of Information Systems and Technology Management, 4 (3), 269-286.

Liao, C. W., Lu, C. Y., Huang, C. K. and Chiang, T. L. (2012). Work values, work attitude and job performance of green energy industry employees in Taiwan. African Journal of Business Management, 6 (15), 5299-5318.

Liao, Z. and Shi, X. (2009). Consumer perceptions of internet-based e-retailing: an empirical research in Hong Kong. Journal of Services Marketing, 23(1) 24–30.

Logistics Group International GmbH (2018). FAQ für Arbeitgeber. Retrieved July 16, 2019 from Pakadoo: https://www.pakadoo.de/arbeitgeber/faq-arbeitgeber/

Luo, X., Li, H., Zhang, J. and Shim, J. P. (2010). Examining multidimensional trust and multi-faceted risk in initial acceptance of emerging technologies: An empirical study of mobile banking services. Decision Support Systems, 49 (2), 222-234.

Maldonado, U. P. T., Khan, G. F., Moon, J. and Rho, J. J. (2009). E-learning motivation, students' acceptance/use of educational portal in developing countries. Proceedings of the 4th International Conference on Computer Sciences and Convergence Information Technology. Seoul.

Moroz, M. and Polkowski, Z. (2016). The Last Mile Issue and Urban Logistics: Choosing Parcel Machines in the Context of the Ecological Attitudes of the Y Generation Consumers Purchasing Online. Transportation Research Procedia, 16, 378-393.

Murray, C. C. and Chu, A. G. (2015). The flying sidekick traveling salesman problem: Optimization of drone-assisted parcel delivery. Transportation Research Part C: Emerging Technologies, 54, 86-109.

Niehaus, A. (2005). Analyse der Bewertung verschiedener Zustellungsoptionen im B2C e-commerce. Schriftenreihe des Instituts für Transportwirtschaft und Logistik. Vienna.

Nitzl, C. (2010). Eine anwenderorientierte Einführung in Partial Least Square (PLS)-Methode. SSRN Electronic Journal.

Ozaki, R. and Dodgson, M. (2010). Adopting and consuming innovations. Prometheus, 28 (4), 311-326.

Pan, S., Giannikas, V., Han, Y., Grover-Silva, E. and Qiao, B. (2017). Using customer-related data to enhance e-grocery home delivery. Industrial Management & Data Systems, 117 (9), 1917-1933.

Prümm, D., Kauschke, P. and Peisel, H. (2017). Aufbruch auf der letzten Meile – Neue Wege für die städtische Logistik. Düsseldorf: PricewaterhouseCoopers GmbH.

Raithel, J. (2008). Quantitative Forschung. Wiesbaden: VS Verlag für Sozialwissenschaften.

Rakel, W. (2016). DHL startet Kofferraum-Belieferung. Retrieved July 17, 2019 from http://www.dnv-online.net/services/detail.php?nr=111188&rubric=Logistik%20&

Raman, A. and Don, Y. (2013). Preservice Teachers' Acceptance of Learning Management Software: An Application of the UTAUT2 Model. International Education Studies, 6 (7), 157-164.

Ranieri, L., Digiesi, S., Silvestri, B. and Roccotelli, M. (2018). A Review of Last Mile Logistics Innovations in an Externalities Cost Reduction Vision. Sustainability, 10 (3), 782.

Roca, J. C., Garcia, J. J. and de la Vega, J. J. (2009). The importance of perceived trust, security and privacy in online trading systems. Information Management & Computer Security, 17 (2), 96-113.

Schnedlitz, P., Lienbacher, E., Waldegg-Lindl, B. and Waldegg-Lindl, M. (2013). Last Mile: Die letzten – und teuersten – Meter zum Kunden im B2C ECommerce. In: Gesa Crockford, Falk Ritschel, Ulf-Marten Schmieder (eds.) Handel in Theorie und Praxis. Wiesbaden: Springer Fachmedien Wiesbaden, 249–273.

Shavarani, S. M., Nejad, M. G., Rismanchian, F. and Izbirak, G. (2018). Application of hierarchical facility location problem for optimization of a drone delivery system: a case study of Amazon prime air in the city of San Francisco. The International Journal of Advanced Manufacturing Technology, 95 (9-12), 3141-3153.

Sheppard, B. H., Hartwick, J. and Warsha, P. R. (1988). The Theory of Reasoned Action: A Meta-Analysis of Past Research with Recommendations for Modifications and Future Research. Journal of Consumer Research, 15 (3), S. 325-343.

Stone, M. (1974). Cross-validatory Choice and Assessment of Statistical Predictions. Journal of the Royal Statistical Society, Series B, 36 (2), 111-147.

Taddicken, M. (2013). Online-Befragung. In: Mehring, W. and Schlütz, D. (eds.) Handbuch standardisierte Erhebungsverfahren in der Kommunikationswissenschaft, 201-217. Wiesbaden.

Taefi, T.T., Kreutzfeldt, J., Held, T. and Fink, A. (2016). Supporting the adoption of electric vehicles in urban road freight transport – A multi-criteria analysis of policy measures in Germany. Transportation Research Part A: Policy & Practice, 91 61–79.

Tan, L. and Wu, L. (2010). An Empirical Study on Factors Affecting Customer Intention in Mobile Commerce Contexts. In: 2010 Second International Conference on Multimedia and Information Technology, 310-313. Kaifeng.

Taniguchi, E., Thompson, R.G. and Yamada, T. (2014). Recent Trends and Innovations in Modelling City Logistics. Procedia - Social and Behavioral Sciences, 125 4–14.

Tarhini, A., Elyas, T., Akour, M. A. and Al-Salti, Z. (2016). Technology, Demographic Characteristics and E-Learning Acceptance: A Conceptual Model Based on Extended Technology Acceptance Model. Higher Education Studies, 6 (3), 72.

Tripp, C. (2018). Distributions- und Handelslogistik: Netzwerke und Strategien der Omnichannel-Distribution im Handel. Wiesbaden.

Venkatesh, V. and Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. Management Science, 46 (2), 186-204.

Venkatesh, V., Morris, M. G., Davis, G. B. and Davis, F. D. (2003). User Acceptance of Information Technology: Toward a Unified View. MIS Quarterly, 27 (3), 425-478.

Venkatesh, V., Thong, J. Y. L. and Xu, X. (2012). Consumer Acceptance and Use of Information Technology: Extending the Unified Theory of Acceptance and Use of Technology. MIS Quarterly, 36 (1), 157-178.

Vertical Media GmbH (n.d.). White-Label. Retrieved July 16, 2019 from Gründerszene Lexikon: https://www.gruenderszene.de/lexikon/begriffe/white-label

Waitz, M., Mild, A. and Fikar, C. (n.d.). A Decision Support System for Efficient Last-Mile Distribution of Fresh Fruits and Vegetables as Part of E-Grocery Operation. Proceedings of the HICSS 51.

Wang, X., Yuen, K. F., Wang, Y. D. and Teo, C. C. (2018). An innovation diffusion perspective of e-consumers' initial adoption of self-collection service via automated parcel station. The International Journal of Logistics Management, 29 (1), 237-260.

Weiber, R. and Mühlhaus, D. (2014). Strukturgleichungsmodellierung - Eine anwendungsorientierte Einführung in die Kausalanalyse mit Hilfe von AMOS, SmartPLS und SPSS. Berlin, Heidelberg: Springer Gabler.

Yang, K. (2010). Determinants of US consumer mobile shopping services adoption: implications for designing mobile shopping services. Journal of Consumer Marketing, 27 (3), 262-270.

Yi, M. Y., Fiedler, K. D. and Park, J. S. (2006). Understanding the Role of Individual Innovativeness in the Acceptance of IT-Based Innovations: Comparative Analyses of Models and Measures. Decision Sciences, 37 (3), 393-426.

Zuijderwijk, A. M. G. (2015). Open data infrastructures: The design of an infrastructure to enhance the coordination of open data use. Delft.

10 Appendix

i. Survey Explanations of Contained Concepts

Concept 1: BentoBox

https://www.youtube.com/watch?v=7dlN9UjsB2M

Concept 2: Parcel Station with Delivery Service

I-bring offers its customers a flexible way of parcel delivery. Parcels are no longer delivered directly to the customer's home, but are first delivered to service providers such as i-bring and then stored there. After successful registration on the i-bring website, the customer receives the authorisation to use the i-bring service and to have the corresponding items delivered to the so-called i-depot. The customer then has the option of selecting an individual delivery date. Delivery: Delivery to the preferred address is made within a previously selectable time window (usually four hours) on the desired day. In addition, i-bring relies on existing fleets of local logistics service providers for the execution of deliveries. They also use, for example, electric vehicles and freight wheels for delivery. The idea is based on the problem that delivery by parcel services usually takes place in time windows in which most individuals are not at home.

Concept 3: In-Car Parcel Delivery

https://www.youtube.com/watch?v=m0eQN4UB6lE&feature=youtu.be

Concept 4: Parcel Drone Delivery

https://www.youtube.com/watch?v=vNySOrI2Ny8

Concept 5: Parcel Robot Delivery

During a recent pilot test, Hermes is currently using parcel robots to deliver items stored in a parcel shop to the recipient. Normally, such parcels have to be collected personally. The order is submitted using a smartphone app. Delivery is to take place within 30 minutes. After receipt of the customer's order, the Parcel Robot is filled by the employees of the parcel shop and sent to its destination. The robot itself is electrically driven and delivers parcels weighing a maximum of 15kg. Pedestrian crossings, zebra crossings and traffic lights are detected automatically. In the event of obstacles, the parcel robot can evade and, if necessary, brake. A built-in GPS satellite navi-gation system continuously informs the Hermes headquarters of the robot's location. Each parcel robot transports its consignments in a securely locked compartment, which is only unlocked by customers via an individual opening link. The recipient receives the link by SMS shortly before the robot arrives. After successful delivery, the Parcel Robot automatically returns to the parcel shop.

Concept 6: Parcelbox

https://youtu.be/8jFAgkfF2Jk & https://youtu.be/48cBVkqgvRs

Concept 7: Concierge-Service at Workplaces

https://youtu.be/zS6rWQNTt-k

Concept 8: White-Label CEP-Service

The companies Hermes, DHL and UPS operate in a city with three districts. Currently, all companies deliver throughout the city and only their own shipments. Various models are conceivable to reduce the volume of traffic and avoid having to travel to the same addresses several times:
Neutral parcel service:
All shipments are bundled and a neutral parcel service handles delivery for all three companies together.
Spatial distribution: Hermes is responsible for city district A, DHL for city district B, and UPS for city district C. Each company delivers not only its own parcels, but also those of other companies.
Time distribution: One of the companies handles the delivery of all parcels across the group. Monday and Tuesday is Hermes, Wednesday and Thursday is DHL and Friday and Saturday is UPS responsible for delivery.

Concept 9: Unattended In-Home Delivery

https://youtu.be/wn7DBdaUNLA

Concept 10: Neighborhood Supply of Grocery

Supply through Neighborhood Purchasing describes a process in which neighborhoods jointly organise their purchasing through division of labour. Procurement refers to mutual food shopping that is done for other neighbours. The division of labour between the neighbors is organised via a local app. Once the app has been installed, residents are assigned to a suitable neighborhood circle. Finally, orders can be placed and executed via the app. Bonus points are awarded for each completed purchase by a neighbor, which are credited to the app. The bonus points are distributed according to the volume and quantity of purchases made. From a certain amount, these bonus points can be redeemed in the form of vouchers or discount codes at local grocers such as Edeka or Rewe. The idea behind this concept is that there are fewer private vehicles on the road heading for the same destination. In this way, for example, emissions can be reduced and traffic congestion can be relieved.

Concept 11: Click & Deliver of Groceries (Multichannel)

Local stores of large retail groups, such as the Rewe Group or Kaufland, are increasingly offering the delivery of food to the customer's front door. In addition to conventional shopping in local supermarkets, the delivery of food is an additional service for the customer, which can usually be used with a minimum order value of at least 40€. The customer orders and pays for the goods in the online shop of the retailer (via computer or app). Delivery: The delivery to a preferred address is made in a previously selectable time window (usually two hours or all day) on the desired day and usually carried out by employees using the retailer's delivery vehicles. Delivery times: Delivery times depend on the opening hours of the market in question. Delivery fee: Between 1€ and 6€, depending on the time window of the delivery and the order value. It applies: The lower the order value and the smaller the desired delivery time window, the higher the delivery fee.

Concept 12: Click & Deliver of Groceries (Online Pure Player)

With their online food services online marketplaces such as Amazon and Allyouneed.de offer grocery shopping in a virtual supermarket and its fastest possible home delivery. In contrast to their competitors (e.g. Rewe or Edeka), they sell their food exclusively online as so-called pure players. There are no locally accessible supermarkets. Product selection and payment by the customer takes place in the online shop on the retailer's website or via app. Delivery: The delivery to a preferred address is carried out in a previously selectable time window (usually two hours) on the desired day and usually by logistics service providers (e.g. DHL, Hermes, etc.). Costs: With an order value up to 50€ approx. 6€ shipping costs are due. Basically applies: The higher the order value, the lower the shipping costs.

Concept 13: Click & Collect of Groceries

In food retailing, customers are increasingly being offered a pick-up service. Large retail groups, such as Rewe Group and Real, thus enable customers to purchase food via the Internet or App and collect the goods themselves from the local market, ready packed. After the goods have been ordered, the shopping basket is then put together by the employees of the selected store and made available for collection by the customer. Collection: By specifying a time window, it is up to the customer to decide when to collect the goods during opening hours. The customer receives the purchase packaged from the employee. Costs: This service is offered for a fee of 1-2€. The payment takes place either online or in the market.

Concept 14: Grocery Pick-Up Station

Pick-up boxes for food are self-collection boxes equipped with an electronic locking system and special freezing and cooling technology for food that requires an uninterrupted cold chain and/or is perishable. The stationary boxes are installed at railway stations, universities or other public places. The pick-up boxes enable the recipient to receive food orders outside normal delivery and opening hours. How it works: After the customer has ordered and paid for the goods in a food retailer's online supermarket or via an app and selected a pick-up box at a preferred station, the customer receives an order confirmation by e-mail or SMS with a previously selectable pick-up time window, a pick-up number and an access code to open the box. Depending on the number of items, one or more compartments are reserved, which the customer can open with the pick-up number or access code. Delivery & collection: The delivery or the equipping of the boxes with the ordered goods is carried out either by employees using the dealer's delivery vehicles or by logistics service providers (e.g. DHL, Hermes, etc.). The customer collects the goods himself (within the selectable time window) at the station. Price: The price is determined by the operator of the respective pick-up station. A shipping fee of 1€ to 6€ is possible. If the station is located in the immediate vicinity of the respective supermarket, only a service charge of 1-2€ is conceivable.

ii. Overview of Constructs and Item Batteries

Construct	Item Label	Indicator
Performance Expectancy	PE1	I find the BentoBox* useful for my daily life.
	PE2	Using the BentoBox* helps me accomplish things more quickly.
	PE3	Using the BentoBox* increases my productivity.
Effort Expectancy	EE1	Learning how to use the BentoBox* is easy for me.
	EE2	My interaction with the BentoBox* is clear and understandable.
	EE3	I find the BentoBox* easy to use.
	EE4	It is easy for me to become skillful at using the BentoBox*.
Social Influence	SI1	People who are important to me think that I should use the BentoBox*.
	SI2	People who influence my behaviour think that I should use the BentoBox*.
	SI3	People whose opinions I value prefer that I use the BentoBox*.
Facilitating Conditions	FC1	I have the resources necessary to use the BentoBox*.
	FC2	I have the knowledge necessary to use the BentoBox*.
	FC3	The BentoBox* is compatible with other technologies that I use.
	FC4	I can get help from others when I have difficulties using the BentoBox*.
Behavioural Intention	BI1	I intend to continue using the BentoBox* in the future.
	BI2	I will always try to use the BentoBox* in my daily life.
	BI3	I plan to continue to use the BentoBox* frequently.
Use Behaviour	UB1	How often do you use the BentoBox*?
Hedonic Motivation	HM1	Using the BentoBox* is fun.
	HM2	Using the BentoBox* is enjoyable.
	HM3	Using the BentoBox* is very entertaining.
Price Value	PV1	The BentoBox* is reasonably priced.
	PV2	The BentoBox* is a good value for the money.
	PV3	At the current price, the BentoBox* provides a good value.
Habit	HT1	The use of the BentoBox* has become a habit for me.
	HT2	I am addicted to using the BentoBox*.
	HT3	I must use the BentoBox*.
	HT4	Using the BentoBox* has become natural to me.
Sustainability Expectancy	SE1	The BentoBox* helps to save natural resources.
	SE2	The BentoBox* is sustainable.
	SE3	The BentoBox* is energy-efficient.
	SE4	The BentoBox* is environmentally friendly. [9]

[9] * is replaced by the name of the concept.

iii. Demographics per Concept

Demographics	Overall respondents		Concept 1: BentoBox		Concept 2: Parcel Station with Delivery Service		Concept 3: In-Car Parcel Delivery		Concept 4: Parcel Drone Delivery		Concept 5: Parcel Robot Delivery		Concept 6: Parcelbox		Concept 7: Consierge Service at Work	
	Total	Share	Total	Share	Total	Share	Total	Share	Total	Share	Total	Share	Total	Share	Total	Share
Participants	494	100.00%	36	100.00%	37	100.00%	38	100.00%	36	100.00%	35	100.00%	37	100.00%	36	100.00%
Gender																
Male	267	54.05%	18	50.00%	15	40.54%	22	57.89%	16	53.33%	18	56.25%	24	64.86%	21	58.33%
Female	226	45.75%	18	50.00%	21	56.76%	16	42.11%	20	66.67%	17	53.13%	13	35.14%	15	41.67%
Not specified	1	0.20%	-	-	1	2.70%	-	-	-	-	-	-	-	-	-	-
Age																
< 18	4	0.81%	-	-	2	5.41%	1	2.63%	-	-	-	-	1	2.70%	-	-
18 - 23	78	15.79%	10	27.78%	7	18.92%	6	15.79%	11	36.67%	3	9.38%	4	10.81%	5	13.89%
24 - 29	322	65.18%	21	58.33%	19	51.35%	20	52.63%	22	73.33%	26	81.25%	26	70.27%	25	69.44%
30 - 39	44	8.91%	2	5.56%	6	16.22%	6	15.79%	2	6.67%	3	9.38%	3	8.11%	5	13.89%
40 - 49	17	3.44%	-	-	2	5.41%	2	5.26%	1	3.33%	1	3.13%	3	8.11%	1	2.78%
50 - 59	22	4.45%	3	8.33%	1	2.70%	2	5.26%	-	-	2	6.25%	-	-	-	-
> 59	7	1.42%	-	-	-	-	1	2.63%	-	-	-	-	-	-	-	-
Professional Situation																
Pupil, Student, Apprentice	251	50.81%	30	83.33%	21	56.76%	20	52.63%	24	80.00%	21	65.63%	15	40.54%	19	52.78%
Full- and Part-time employee, Officia	212	42.91%	6	16.67%	13	35.14%	17	44.74%	11	36.67%	14	43.75%	19	51.35%	15	41.67%
Self-employed	12	2.43%	-	-	-	-	-	-	-	-	-	-	1	2.70%	1	2.78%
other	19	3.85%	-	-	3	8.11%	1	2.63%	1	3.33%	-	-	2	5.41%	1	2.78%
Place of Residence																
Urban Center	293	59.31%	20	55.56%	22	59.46%	22	57.89%	24	80.00%	22	68.75%	26	70.27%	24	66.67%
Suburban Area	103	20.85%	10	27.78%	8	21.62%	5	13.16%	8	26.67%	6	18.75%	3	8.11%	9	25.00%
Metropolitan Area	65	13.16%	5	13.89%	5	13.51%	10	26.32%	2	6.67%	6	18.75%	5	13.51%	-	-
Countryside	33	6.68%	1	2.78%	2	5.41%	1	2.63%	2	6.67%	1	3.13%	3	8.11%	3	8.33%

Demographics	Overall respondents		Concept 8: White-Label CEP-Service		Concept 9: Unattended In-Home Delivery		Concept 10: Neighborhood Supply		Concept 11: Click & Deliver (Multichannel)		Concept 12: Click & Deliver (Online Pure Player)		Concept 13: Click & Collect		Concept 14: Grocery Pick-Up Station	
	Total	Share	Total	Share	Total	Share	Total	Share	Total	Share	Total	Share	Total	Share	Total	Share
Participants	494	100.00%	37	100.00%	33	100.00%	34	100.00%	30	100.00%	32	100.00%	37	100.00%	36	100.00%
Gender																
Male	267	54.05%	22	61.11%	18	48.65%	19	55.88%	21	70.00%	18	56.25%	14	37.84%	21	58.33%
Female	226	45.75%	15	41.67%	15	40.54%	15	44.12%	9	30.00%	14	43.75%	23	62.16%	15	41.67%
Not specified	1	0.20%	-	-	-	-		0.00%	-	-		0.00%		0.00%		0.00%
Age																
< 18	4	0.81%	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18 - 23	78	15.79%	2	5.56%	5	13.51%	6	17.65%	5	16.67%	3	9.38%	9	24.32%	2	5.56%
24 - 29	322	65.18%	27	75.00%	25	67.57%	22	64.71%	19	63.33%	23	71.88%	23	62.16%	24	66.67%
30 - 39	44	8.91%	3	8.33%	1	2.70%	4	11.76%	1	3.33%	2	6.25%	4	10.81%	2	5.56%
40 - 49	17	3.44%	-	-	-	-	1	2.94%	1	3.33%	2	6.25%	-	-	3	8.33%
50 - 59	22	4.45%	2	5.56%	2	5.41%	1	2.94%	3	10.00%	2	6.25%	1	2.70%	3	8.33%
> 59	7	1.42%	3	8.33%	-	-	-	-	1	3.33%	-	-	-	-	2	5.56%
Professional Situation																
Pupil, Student, Apprentice	251	50.81%	13	36.11%	21	56.76%	22	64.71%	11	36.67%	10	31.25%	17	45.95%	9	25.00%
Full- and Part-time employee, Officia	212	42.91%	21	58.33%	11	29.73%	11	32.35%	15	50.00%	20	62.50%	17	45.95%	22	61.11%
Self-employed	12	2.43%	3	8.33%	1	2.70%	-	-	3	10.00%	-	-	-	-	3	8.33%
other	19	3.85%	-	-	-	-	1	2.94%	1	3.33%	2	6.25%	5	13.51%	2	5.56%
Place of Residence																
Urban Center	293	59.31%	20	55.56%	24	64.86%	21	61.76%	13	43.33%	18	56.25%	20	54.05%	17	47.22%
Suburban Area	103	20.85%	7	19.44%	5	13.51%	7	20.59%	9	30.00%	6	18.75%	10	27.03%	10	27.78%
Metropolitan Area	65	13.16%	5	13.89%	3	8.11%	4	11.76%	5	16.67%	4	12.50%	5	13.51%	6	16.67%
Countryside	33	6.68%	5	13.89%	1	2.70%	2	5.88%	3	10.00%	4	12.50%	2	5.41%	3	8.33%

iv. Fornell-Larcker-Criteria

Concept 1: BentoBox

Construct	BI	EE	FC	HM	HT	PE	PV	SE	SI	UB
BI	**0.923**									
EE	0.569	**0.875**								
FC	0.616	0.782	**0.791**							
HM	0.514	0.306	0.278	**0.824**						
HT	0.454	0.146	0.171	0.443	**0.839**					
PE	0.695	0.455	0.444	0.600	0.479	**0.849**				
PV	0.674	0.452	0.545	0.439	0.335	0.587	**0.934**			
SE	0.547	0.334	0.195	0.296	0.192	0.489	0.444	**0.891**		
SI	0.524	0.088	0.215	0.228	0.487	0.409	0.280	0.374	**0.856**	
UB	0.384	0.147	0.239	0.402	0.657	0.396	0.311	0.282	0.277	**1.000**

Concept 2: Parcel Station with Delivery Service

Construct	BI	EE	FC	HM	HT	PE	PV	SE	SI	UB
BI	**0.948**									
EE	0.426	**0.832**								
FC	0.424	0.789	**0.876**							
HM	0.568	0.155	0.290	**0.837**						
HT	0.668	0.125	0.047	0.483	**0.837**					
PE	0.762	0.550	0.380	0.428	0.458	**0.869**				
PV	0.221	-0.075	-0.139	0.493	0.469	0.162	**0.842**			
SE	0.665	0.415	0.261	0.543	0.556	0.643	0.325	**0.917**		
SI	0.671	0.393	0.386	0.399	0.425	0.743	0.025	0.384	**0.930**	
UB	0.539	0.223	0.217	0.160	0.455	0.449	0.104	0.135	0.602	**1.000**

Concept 3: In-Car Parcel Delivery

Construct	BI	EE	FC	HM	HT	PE	PV	SE	SI	UB
BI	**0.980**									
EE	0.405	**0.807**								
FC	0.446	0.512	**0.765**							
HM	0.710	0.340	0.550	**0.880**						
HT	0.640	0.210	0.460	0.728	**0.867**					
PE	0.802	0.280	0.409	0.610	0.555	**0.931**				
PV	0.615	0.129	0.360	0.575	0.624	0.478	**0.968**			
SE	0.555	0.334	0.488	0.627	0.504	0.561	0.436	**0.913**		
SI	0.834	0.348	0.443	0.639	0.657	0.761	0.555	0.478	**0.965**	
UB	0.318	-0.048	0.272	0.383	0.520	0.424	0.343	0.351	0.318	**1.000**

Concept 4: Parcel Drone Delivery

Construct	BI	EE	FC	HM	HT	PE	PV	SE	SI	UB
BI	**0.950**									
EE	0.408	**0.854**								
FC	0.304	0.365	**0.743**							
HM	0.492	0.549	0.018	**0.903**						
HT	0.574	0.367	0.094	0.513	**0.860**					
PE	0.781	0.583	0.367	0.544	0.483	**0.921**				
PV	0.312	0.317	0.005	0.258	0.382	0.411	**0.959**			
SE	0.561	0.416	-0.154	0.574	0.563	0.538	0.477	**0.931**		
SI	0.705	0.334	0.334	0.414	0.335	0.652	0.084	0.354	**0.958**	
UB	0.232	0.165	0.098	0.358	0.492	0.261	0.253	0.170	0.067	**1.000**

Concept 5: Parcel Robot Delivery

Construct	BI	EE	FC	HM	HT	PE	PV	SE	SI	UB
BI	**0.940**									
EE	0.571	**0.919**								
FC	0.571	0.554	**0.715**							
HM	0.696	0.354	0.510	**0.887**						
HT	0.486	0.086	0.299	0.537	**0.815**					
PE	0.804	0.349	0.511	0.689	0.494	**0.942**				
PV	0.276	0.204	0.362	0.288	0.570	0.314	**0.938**			
SE	0.682	0.344	0.205	0.598	0.322	0.591	0.062	**0.946**		
SI	0.613	0.520	0.572	0.615	0.552	0.554	0.373	0.343	**0.979**	
UB	0.259	-0.096	0.275	0.305	0.554	0.420	0.336	0.207	0.101	**1.000**

Concept 6: Parcelbox

Construct	BI	EE	FC	HM	HT	PE	PV	SE	SI	UB
BI	**0.978**									
EE	0.517	**0.931**								
FC	0.578	0.486	**0.740**							
HM	0.785	0.654	0.501	**0.820**						
HT	0.511	0.434	0.507	0.522	**0.924**					
PE	0.489	0.589	0.403	0.607	0.287	**0.877**				
PV	0.289	0.440	0.345	0.364	0.329	0.402	**0.889**			
SE	0.372	0.291	0.424	0.444	0.357	0.557	0.477	**0.905**		
SI	0.510	0.359	0.579	0.495	0.240	0.534	0.329	0.511	**0.947**	
UB	0.376	0.231	0.547	0.403	0.601	0.265	0.197	0.322	0.254	**1.000**

Concept 7: Concierge-Service at Workplaces

Construct	BI	EE	FC	HM	HT	PE	PV	SE	SI	UB
BI	**0.933**									
EE	0.418	**0.828**								
FC	0.503	0.442	**0.767**							
HM	0.838	0.408	0.392	**0.806**						
HT	0.651	0.214	0.300	0.760	**0.863**					
PE	0.649	0.586	0.398	0.667	0.484	**0.877**				
PV	0.413	0.584	0.354	0.483	0.371	0.421	**0.923**			
SE	0.568	0.317	0.171	0.464	0.394	0.338	0.307	**0.909**		
SI	0.517	0.475	0.268	0.588	0.502	0.681	0.398	0.410	**0.870**	
UB	0.506	0.186	0.111	0.541	0.731	0.332	0.363	0.347	0.588	**1.000**

Concept 8: White-Label CEP-Service

Construct	BI	EE	FC	HM	HT	PE	PV	SE	SI	UB
BI	**0.953**									
EE	0.620	**0.890**								
FC	0.517	0.658	**0.836**							
HM	0.703	0.471	0.487	**0.908**						
HT	0.624	0.356	0.441	0.670	**0.858**					
PE	0.762	0.601	0.383	0.639	0.477	**0.896**				
PV	0.640	0.450	0.311	0.621	0.575	0.618	**0.919**			
SE	0.698	0.406	0.177	0.571	0.471	0.716	0.534	**0.915**		
SI	0.665	0.601	0.465	0.533	0.494	0.663	0.307	0.561	**0.910**	
UB	0.390	0.136	0.390	0.421	0.528	0.277	0.352	0.200	0.186	**1.000**

Concept 9: Unattended In-Home Delivery

Construct	BI	EE	FC	HM	HT	PE	PV	SE	SI	UB
BI	**0.981**									
EE	0.371	**0.824**								
FC	0.423	0.316	**0.734**							
HM	0.627	0.357	0.160	**0.876**						
HT	0.405	0.446	-0.052	0.750	**0.853**					
PE	0.565	0.238	0.282	0.408	0.206	**0.961**				
PV	0.368	0.541	0.008	0.625	0.743	0.288	**0.913**			
SE	0.174	0.267	0.209	0.372	0.200	0.247	0.470	**0.943**		
SI	0.650	0.156	0.125	0.656	0.486	0.507	0.479	0.373	**0.950**	
UB	0.538	0.182	0.184	0.655	0.627	0.515	0.412	0.009	0.462	**1.000**

Concept 10: Neighborhood Supply of Grocery

Construct	BI	EE	FC	HM	HT	PE	PV	SE	SI	UB
BI	**0.965**									
EE	0.391	**0.858**								
FC	0.080	0.520	**0.781**							
HM	0.827	0.534	0.284	**0.864**						
HT	0.639	0.173	0.118	0.693	**0.803**					
PE	0.777	0.474	0.351	0.854	0.595	**0.873**				
PV	0.254	0.612	0.560	0.511	0.240	0.399	**0.940**			
SE	0.205	0.512	0.439	0.314	0.170	0.304	0.710	**0.871**		
SI	0.621	0.446	0.210	0.679	0.548	0.694	0.297	0.226	**0.936**	
UB	0.232	0.164	0.295	0.333	0.561	0.303	0.258	0.108	0.338	**1.000**

Concept 11: Click & Deliver of Groceries (Multichannel)

Construct	BI	EE	FC	HM	HT	PE	PV	SE	SI	UB
BI	**0.978**									
EE	0.422	**0.960**								
FC	0.494	0.754	**0.833**							
HM	0.553	0.383	0.418	**0.898**						
HT	0.539	0.077	0.205	0.472	**0.836**					
PE	0.657	0.477	0.316	0.400	0.157	**0.923**				
PV	0.623	0.340	0.453	0.862	0.460	0.290	**0.982**			
SE	0.349	-0.044	0.042	0.285	0.412	0.119	0.335	**0.943**		
SI	0.530	0.044	0.035	-0.010	0.194	0.523	-0.031	0.118	**0.948**	
UB	0.456	0.325	0.385	0.354	0.640	0.258	0.334	0.085	0.166	**1.000**

Concept 12: Click & Deliver of Groceries (Online Pure Player)

Construct	BI	EE	FC	HM	HT	PE	PV	SE	SI	UB
BI	**0.930**									
EE	-0.126	**0.918**								
FC	-0.133	0.616	**0.766**							
HM	0.509	0.287	0.081	**0.822**						
HT	0.622	-0.290	-0.228	0.565	**0.863**					
PE	0.412	0.343	0.250	0.486	0.156	**0.830**				
PV	0.262	0.163	0.049	0.333	0.321	-0.025	**0.845**			
SE	0.475	0.071	0.190	0.344	0.426	0.343	0.043	**0.932**		
SI	0.508	0.014	-0.048	0.540	0.490	0.660	0.068	0.267	**0.973**	
UB	0.242	-0.401	-0.330	0.146	0.425	-0.030	0.082	0.087	0.042	**1.000**

Concept 13: Click & Collect of Groceries

Construct	BI	EE	FC	HM	HT	PE	PV	SE	SI	UB
BI	**0.918**									
EE	0.079	**0.876**								
FC	-0.035	0.651	**0.791**							
HM	0.635	0.130	-0.162	**0.838**						
HT	0.459	0.135	0.008	0.501	**0.931**					
PE	0.676	0.285	0.076	0.533	0.470	**0.879**				
PV	0.293	0.467	0.293	0.307	0.224	0.403	**0.839**			
SE	0.373	0.017	0.092	0.161	0.029	0.141	0.168	**0.831**		
SI	0.543	0.092	0.147	0.492	0.604	0.396	0.006	-0.016	**0.927**	
UB	0.553	0.003	-0.193	0.434	0.659	0.520	0.070	0.171	0.534	**1.000**

Concept 14: Grocery Pick-Up Station

Construct	BI	EE	FC	HM	HT	PE	PV	SE	SI	UB
BI	**0.963**									
EE	0.085	**0.815**								
FC	0.267	0.575	**0.778**							
HM	0.458	0.273	0.163	**0.896**						
HT	0.651	0.053	0.229	0.625	**0.825**					
PE	0.765	0.236	0.321	0.453	0.667	**0.875**				
PV	0.556	0.004	0.080	0.154	0.316	0.542	**0.902**			
SE	0.574	-0.107	0.122	0.223	0.352	0.176	0.144	**0.914**		
SI	0.696	0.137	0.203	0.542	0.570	0.658	0.198	0.487	**0.938**	
UB	0.523	0.118	-0.040	0.540	0.629	0.470	0.239	0.317	0.417	**1.000**

v. Cohen's f² on Endogenous Variables

Cohen's f²	Concept 1: BentoBox		Concept 2: Parcel Station with Delivery Service		Concept 3: In-Car Parcel Delivery		Concept 3: In-Car Parcel Delivery	
Construct	BI	UB	BI	UB	BI	UB	BI	UB
PE	0.037		0.186		0.219		0.231	
EE	0.014		0.039		0.077		0.028	
SI	0.118		0.013		0.232		0.178	
FC	0.060	0.014	0.107	0.002	0.020	0.002	0.021	0.007
HM	0.025		0.015		0.058		0.000	
PV	0.077		0.019		0.084		0.001	
HT	0.011	0.546	0.330	0.025	0.001	0.207	0.099	0.264
SE	0.070		0.041		0.000		0.054	
BI		0.001		0.090		0.001		0.009

Cohen's f²	Concept 5: Parcel Robot Delivery		Concept 6: Parcelbox		Concept 7: Concierge-Service at Workplaces	
Construct	BI	UB	BI	UB	BI	UB
PE	0.379		0.000		0.050	
EE	0.173		0.006		0.002	
SI	0.000		0.016		0.015	
FC	0.033	0.029	0.063	0.134	0.152	0.047
HM	0.002		0.534		0.481	
PV	0.014		0.002		0.009	
HT	0.049	0.350	0.018	0.247	0.001	0.614
SE	0.159		0.008		0.221	
BI		0.010		0.004		0.022

Cohen's f²	Concept 8: White-Label CEP-Service		Concept 9: Unattended In-Home Delivery		Concept 10: Neighborhood Supply		Concept 11: Click & Deliver (Multichannel)	
Construct	BI	UB	BI	UB	BI	UB	BI	UB
PE	0.186		0.068		0.071		0.261	
EE	0.079		0.050		0.012		0.000	
SI	0.140		0.234		0.002		0.314	
FC	0.143	0.187	0.140	0.011	0.066	0.088	0.068	0.095
HM	0.100		0.111		0.219		0.069	
PV	0.149		0.000		0.060		0.355	
HT	0.108	0.430	0.009	0.404	0.014	0.437	0.190	0.451
SE	0.242		0.101		0.017		0.016	
BI		0.025		0.109		0.045		0.000

Cohen's f²	Concept 12: Click & Deliver (Online Player)		Concept 13: Click & Collect of Groceries		Concept 14: Grocery Pick-Up Station	
Construct	BI	UB	BI	UB	BI	UB
PE	0.071		0.326		0.266	
EE	0.022		0.007		0.004	
SI	0.002		0.173		0.030	
FC	0.014	0.075	0.012	0.077	0.005	0.087
HM	0.010		0.057		0.005	
PV	0.046		0.015		0.151	
HT	0.052	0.118	0.006	0.472	0.005	0.290
SE	0.083		0.241		0.448	
BI		0.001		0.165		0.062

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