Fachbereich 4
Wirtschaft

Finding a balanced logistics mixture for solving the last mile problem in terms of city logistics

Term paper

Supply Chain Management

im Studiengang
Business Management M.A.

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Abgabetermin: 12. März 2018
Ort: Flensburg

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III List of abbreviations

AHD	at-home-delivery
AI	artificial intelligence
B2B	Business-to-Business
B2C	Business-to-Consumer
CDP	collection-and-delivery-point
EU	European Union
ICT	information and communication technology
IT	information technology
LEZ	low emission zone
ORION	On-Road Integrated Optimization and Navigation System
PR	public relations
RB	reception box
R&D	research and development
SCM	Supply Chain Management
UCC	urban consolidation center

Abstract

In times of growth of population in inner cities (urbanization), the logistics industry is faced with the danger of gridlock in metropolises by reason of importance of e-commerce in today's retailing. Changes are unavoidable, especially in solving the last mile problem as the costliest step of supply chains. We suggest a still greater bundling respectively other innovative solution approaches that are already technically feasible but are most widely not implemented yet (e.g. subsurface pipelines, air transport). For us, extensive developments can be summarized as a dynamic logistic mix that includes all five dimensions of transport. Moreover, the consciousness of consumers must increase what is conductive to needed cooperation in logistic context.

Key words:

city logistics, e-commerce, last mile, logistics mix, smart city, urbanization

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1 Introduction

The megatrend urbanization says that people move from underdeveloped countryside to state-of-the-art, innovative metropolises. By the year 2050, 70 percent of the population on earth will live in cities.[1] Technological progress and towns that come to their limits of capacity cause new concepts like smart cities. In the context of logistics, new challenges as well as possibilities arise. Therefore, this term paper deals with the overall topic city logistics and its aims to improve efficient delivery in areas that are affected by high population density.

Increasing dynamics in economic competition and the arising relevance of e-commerce demonstrate the functionality of supply chains with a challenge. E-business gears to the needs of its customers to stay competitive. Individual handling of orders is complex and costly. The question is: how long can the suppliers hold the contemporary logistic systems up in terms of nearly fully stretched infrastructure? Consequently, nowadays concepts and alternative logistical methods should be tested for future viability. Main focus has to be on the last mile which describes the way of the final product to the end costumer due to its major influence on i.e. costs, environmental pollution, service quality and so on.

Accordingly, the goal of our term paper is to discuss the following research question: *How can the last mile be optimized in view of future challenges in city logistics?*

To deal with this subject, we give an overview of the status of literature concerning the novel issue of logistics in context of urbanization and the importance of last mile structure. Furthermore, we present our methodical approach that includes a cluster and scenario analysis based on actual state. After that, our aim is showing the most promising results to solve the last mile problem. First, we elaborate on different perspectives of the stakeholders which are retail, logistic service provider, consumer and local authority. Afterwards, we demonstrate practical guidance to improve the process of parcel deliveries. Finally, we discuss our findings and add the prospective considerations of our scenario analysis that are currently not implementable due to legal trouble. All in all, we suggest a multifaceted logistics mix which considers different feasible ways of transport.

[1] Tachizawa et al. (2015)

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2 Actual challenges and new concepts for logistics

In this chapter, we want to illustrate the specific developments in today's advanced societies that affect the economic circumstances. In doing so, we start with the megatrend urbanization that impacts the bulk of population on earth in a long-term way. As second nearly independent factor, we consider the increasing significance of the e-commerce that has a huge effect on the structure of economy. The following concepts smart city, city logistics and last mile should be understood as deductions of urbanization and e-commerce and become more detailed from tier to tier. Therefore, it is necessary to recognize the relevance and the extent of those issues for being able to think about efficient action alternatives of nowadays logistical procedures.

2.1 Urbanization

Today's provincial live becomes more and more unattractive for inhabitants due to outdated infrastructure in the countryside. Services and supply are going to be shifted to the urban areas because of missing profitability. This is a reason and a consequence of the movement to the cities in the same matter. Most of work places are located in centers. In society, the comprehension for the value of time and an equalized work-live-balance grows. Many people do not want to waste time while shuttling and look for apartments near their place of employment. The advantages of modern technological society are rather noticeable in metropolitan areas, while the countryside is more or less neglected in term of these progress.

Based on those developments, life in cities is faced with an amount of challenges and problems that must be solved. The main issue is that capacity limits are reached very often. This subject can have a lot of different facets like congestions to the point of gridlock, housing shortage, insufficient waste disposal and the excess of limit values for carbon emissions. You can capture the fact that the infrastructure is not designed in context of fast-paced crowds in cities what results in inefficiency.

The trend of arising megacities, that means more than 10 million inhabitants, is yet unabated and is going to strengthen. 2015, there were 26 megacities on earth, many of them in less developed countries.[2] Furthermore, agglomerations arise out of existing towns. Orderless growth involves the danger of chaotic places.[3]

Local authorities are under pressure to coordinate the main aspects of advanced, humane and sustainable life. We understand the responsibility of policy as expanded basic functions of existence. Therefore, we extend the work of Chourabi et al. (2012) by adding own ideas. In our opinion, expanded basic functions of existence must include the following aspects: safety, education and culture, medicare, conservation, digitalization, traffic planning, activity area, preservation of resources, waste disposal and energy and water supply.[4]

[2] Bretzke (2013)

[3] Chourabi et al. (2012)

[4] Chourabi et al. (2012)

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2.2 E-commerce

E-commerce is a combined term composed of the words “electronic” and “commerce” describing that consumers place their orders in the world wide web while exhausting every digital condition to optimize the transactions from the customer’s point of view. From 2010 to 2016, the global sales executed by e-commerce rose by 23.6% on an average per year.[5] The increase is attributed to an expanding amount of distribution channels. Currently, 75% of online sales are generated by companies that implemented more than one distribution channel with tendency to rise.[6]

The term “e-commerce” could also stand for the expression “everywhere commerce” because today’s customer should have access to every channel from every point at every time. That is the goal of modern e-tailers.[7] As a result, brick-and-mortar retailers disappear more and more and are replaced by click-and-mortar shops. Pure stationary stores respectively show rooms are complimented with manifold, complex sales channels that reflect the concept “multi-channeling”.[8] If the channels are interconnected and managed holistically and correlate with each other, literature names the phenomenon “omni-channeling”.[9] The mentioned concept results from novel technological opportunities as well as comprehensive customer requirements. You can record that these factors are dependent on each other and reinforce themselves.

The customer’s wishes flow into the perception of connected consumers who interact on different channels without noticing implicitly. The concerned person compares offers and prices on different platforms, exchanges views about product quality through publishing recensions and choses the most efficient proposal to receipt the good the fastest, cheapest and most individual way. In addition to that, the whole world is connected through commerce what you can notice in the context of globalization and digital progress which causes in an increase of productivity and worldwide exchange of commodities.

An improvement constitutes that the customer itself determines the delivery modalities like delivery time and place dependent on his aims. Geographical and temporal dimensions are degenerated in the way that parcels can be delivered to a random destination at a freely selectable time without the need of addressee’s presence.[10]

The advances of e-commerce result in quite new concepts of good receipt and return that can be summarized as “omni-channel-services”. For example, “pick-up-services” are included. In this regard, methods like “click and reserve” and “click and collect” can be mentioned. Here the customer orders in an online shop and picks up his goods in the store. Either he has already

[5] Iwan et al. (2016)

[6] Mahar & Wright (2009)

[7] Schramm-Klein et al. (2014)

[8] Heinemann (2014)

[9] Verhoef et al. (2015)

[10] Pletscher et al. (2015)

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paid for his article and only collects it, or he firstly tries it and spends money on his product in the local shop, if it pleases him.[11] The “instore-order” describes the process of booking in the store and the shipment to the customer’s home. In contrast, the “instore-return” implies the possibility to restore articles in the physical shops in the neighborhood, though they were ordered in the internet. A useful supplement is the online availability display. So, the customer knows in the first place whether an article is available or not.[12] These assets emphasize the superiority of e-commerce in contrast to traditional retail, so the trend of e-business’ growth will continue.

As a result, the supply chain becomes more and more complex and multilayer because of the high amount of house deliveries.[13] The inventory in cities are minimized in favor of the display area. Fast subsequent delivery from the warehouses are guaranteed.[14] These observations are extended in chapter 2.4.

E-commerce causes a specific conflict of aims. Companies must trade off between cost reduction and increasing service quality respectively fulfilment of consumer needs. This target conflict depicts the main challenge of today’s economical competition.

2.3 Smart city

Smart cities pertain as a huge organic system that includes many subsystems. It is very difficult to capture the concept “smart city” as a specific, uniform construct. Manville et al. (2014) define a smart city as “a city seeking to address public issues via information and communication technology-based solutions on the basis of a multi-stakeholder, municipally based partnership”.[15]

However, smart cities are considerably more than a traditional metropolis with a modern communication network. Surely, technology can be recognized as a meta factor that has an overall impact on the other factors of success.[16] But the concept “smart city” is characterized by the three dimensions of sustainability: ecology, economy and society.[17]

IT-based communication systems are the initial point of the smart city concept to increase livability for its inhabitants and the surrounding population.[18] On this view, it is advisable to combine the challenges of urbanization with the opportunities of digitalization to design urban

[11] Hübner et al. (2016)

[12] Heinemann (2014)

[13] Hübner et al. (2016)

[14] Deckert (Hrsg.) (2016): p. 281 ff.

[15] Manville et al. (2014)

[16] Chourabi et al. (2012)

[17] Hansmann et al. (2012)

[18] Tachizawa et al. (2015)

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life more sustainably. Therefore, investments in novel transportation routes, infrastructure, promotion of innovation and energy-saving techniques are necessary.[19]

With that means, livability and competitiveness should be secured and forced.[20] Consequentially, stakeholders benefit from these developments. The bulk of our modern society wants to spend an uncomplicated and comfortable life. If the functionality of the implemented smart systems taps the full potential, it includes a convenient daily grind without limitation.[21]

As another advantage, the concept of smart cities enables to consolidate supply chain networks insofar that the intensity of interactions between subjects raises. That can be explained as the result of big data. It describes the mass of information that is accumulated and available for purpose in the era of digitalization.[22] These issues can help to support and optimize the processes of today's city logistics.

2.4 City logistics

The main aspect and intention of city logistics is undoubted the urban transport of goods up to the recipient.[23] Meanwhile, the focus is on optimizing logistical activities of companies and less on local improvement of cities, as it is pronounced in the chapter 2.3 about smart cities. Taniguchi et al. (2014) define city logistics as "the process for totally optimizing the logistics and transport activities by private companies with support of advanced information systems in urban are-as considering the traffic environment, the traffic congestion, the traffic safety and the energy savings within the framework of a market economy."[24]

It must be considered that city logistics is a non-consistent and non-closed concept but should rather be adapted flexibly and individually to local conditions.[25] Herewith, we think about size and position of warehouses, limits in city traffic or the location of enterprises.

Despite the varieties of the elaborated designs, city logistics can be expressed with three essential components. At first, innovative technologies are exercised to generate precise data of delivery vehicles at urban road networks to optimize the routes. Costs and emissions can be reduced, and congestions can be avoided. Secondly, there is a change in the attitude of logistic managers who recognize the meaning of a green image at the market, develop green logistic systems and educate the employees about these circumstances. Thirdly, public-private partnerships should be established to involve each stakeholder in the development of urban

[19] Tachizawa et al. (2015)

[20] Schliwa et al. (2015)

[21] Pletscher et al. (2015)

[22] Tachizawa et al. (2015)

[23] Ehmke & Mattfeldt (2012)

[24] Taniguchi et al. (2014)

[25] Erd (2015)

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transport systems. Therefore, there is a need of data interchange between those players.[26] These considerations complement the earlier remarks of Taniguchi of the year 2014 insofar that meanwhile local authorities are also interested in city logistics and take a hand in economical procedures like distribution due to its externalities.

City logistics terms not only the good delivery but concerns the disposal and the recycling as a component that should not be neglected.[27] Additively, the local public transport constitutes an aspect of urban planning and thereby also of city logistics.[28] You must consider that urbanism concentrates on transport of humans and less on carrying goods.[29] This holistic observation underlines the amount and the range of influence of city logistics.

Although city logistics requires a high level of planning and coordination, external effects as environmental pollution and opportunity costs as lost time by reason of blocked roads can be avoided.[30] While we are at environmental aspects, especially the carriage of goods is responsible for carbon emissions and disturbance. That is why the EU published a white paper that targets to reach CO^2-free logistics in major urban centers to the year 2030.[31]

Basically, the main focus should be on bundling of deliveries depending on their destination areas to maximize the load factor of vehicles. This coordination and perhaps the cooperation of different carriers can be reached by use of so-called Urban Consolidation Centers (UCC) that are located in the suburbia.[32] In the UCC, parcels have to be disentangled, but it is very difficult that deliveries of different suppliers do not overlap and to break down the commodity flow to separate domestic homes or streets.[33] The complexity, that the logistic managers have to deal with, consequently appears because of the different interests of the multiple stakeholders.

Additionally, smaller logistics points are relocated to central points in cities, from where customers can pick up their deliveries that will be supplied from positions outside the urban area.[34]

The overall aim is transporting goods in a fast and reliable way whereat considering efficiency and environmental compatibility.[35] The goal of a homogeneous logistical system is at risk, if the movement of freight is uncoordinated, individual and depends on the case.

[26] Taniguchi (2014)

[27] Erd (2015)

[28] Bektas et al. (2015)

[29] Müller-Seitz et al. (2016)

[30] Bretzke (2013)

[31] Ehrler & Hebes (2012)

[32] Deckert (Hrsg.) (2016): p. 32 ff.

[33] Bretzke (2013)

[34] Müller-Seitz et al. (2016)

[35] Ehmke & Mattfeldt (2012)

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The increasing density of deliveries could be a useful approach because the distances between the stops diminish. Or you can bundle the orders per recipient, so you concentrate the deliveries.[36]

In economics literature, there is an upcoming trend which arises from the character of city logistics – green logistics.[37] You can construe green logistics as an element of city logistics because proponents of these tendencies pursue similar goals. However, the mindsets for achieving the aims are quite different. For example, city logistics wants to increase the performance through reducing costs. Otherwise, green logistics is designed for conserving resources. That does not necessarily have to mean that less resources are used. For instance, suppliers could change crude materials and replace conventional gas by alternative fuel such as natural gas.

Green logistics highlights environmental consciousness. That can be extended to the point of sustainable logistics which absorbs the society besides the economy and ecology.[38]

2.5 Last mile

The last mile describes the final part of delivery process of physical goods. Therein, it is important to connect the online order process with the physical transportation.[39]

Since the last mile is the most expensive, dirtiest, slowest and most inefficient part of the supply chain, logistics managers must keep the overall relevance in mind.[40] The last mile constitutes 30% of e-logistics' total costs.[41] In general you can say that the last mile is the biggest cost driver of supply chains. Depending on specific modalities in the distribution, the last mile costs from 13% to 75% of the overall costs of supply chain management.[42]

The reason why the last mile is as costly as mentioned is the needed flexibility in the final logistical section. The costs vary e.g. with the population density, product type, parcel size and weight. Companies expose themselves to the meaningful challenge to design the final part of delivering their goods in an efficient way. Here it is shown that planning the last mile includes the greatest potential to increase logistic performance and distance oneself from the other competitors.[43]

The general task is the handling of fragmented orders because of the customer's requirements

[36] Bretzke (2013)

[37] Dekker et al. (2012)

[38] Deckert (Hrsg.) (2016): p. 62 ff.

[39] Aized & Srai (2013)

[40] Ehmke & Mattfeldt (2012)

[41] Wang et al. (2014)

[42] Aized & Srai (2013)

[43] Brown & Guiffrida (2014)

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who expects an individual and especially fast delivery.[44] In this context, logistics managers are faced with specific challenges.

Modern society sets value on individuality and that also refers to the parcel deliveries. This finds expression in the unwillingness of private persons to pay attention to the traditional opening times of post offices or being available for receiving their orders over a specific period. Fix addresses and attendance times are an obstacle and can be redounded to failed deliveries.[45]

In the context of the internet of things respectively the developments in the direction of industry 4.0, recipients co-decide about modalities of transport. So, the route of the particular parcel is not fixed from the outset.[46] The mission of being responsive to the necessities of the costumers results in the inability of bundling orders in the most efficient manner. For this reason, a lot of vehicles are under capacity.[47]

In practice, three different types of deliveries can be compared:

- home delivery coming from store
- home delivery coming from specific warehouses
- delivery to depot or freight station.[48]

Different approaches can be regarded in today's practice. In chapter 2.4, we mentioned the UCC as a solution in suburbia. Furthermore, we want to respond to the functionality of cross-docking points. The delivered goods do not get embedded, are related to the outgoing goods and finally are redirected.[49] Hence, deliveries can be divided in different zones whereby routes can be optimized, and fuel can be economized.[50]

To reduce the amount of failed deliveries, the suppliers can implement specific drop points where parcels are released or picked up. In this regard, new interaction points are designed for exchange between customers and suppliers.[51] That can be mentioned as a compromise to trade off the interests of both and make the process quite economical for all the stakeholders. The costumer profits insofar that he obtains the overall information access of the delivery process like parcel tracking and the last minute defining of drop point and time.[52]

As you can see, there are many ways to optimize the last mile as an efficient instrument to stay competitive. The challenge is to include diverse factors while designing the most important

[44] Iwan et al. (2016)

[45] Pletscher et al. (2015)

[46] Pletscher et al. (2015)

[47] Aized & Srai (2013)

[48] Iwan et al. (2016)

[49] Aized & Srai (2013)

[50] Brown & Guiffrida (2014)

[51] Aized & Srai (2013)

[52] Aized & Srai (2013)

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section of supply chain management:

- distance between transit points
- infrastructure
- regulation
- road network
- traffic intensity
- parking areas
- congestions
- inner city toll
- etc.[53]

Now the current developments and challenges of state of the art logistics are presented. As a next step we want to explain our methodical approach to generate information and data, before we introduce you to practical and prospective projection to use modern technology for improving the distribution, especially the last mile problem.

[53] Aized & Srai (2013)

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3 Methodical approach

Our procedure to generate information is based on three different sections. Firstly, we tried to approach the topic by constructing a network of key variables that deal with the main topic “city logistics”. Four generic terms follow from the findings of the first step that are the starting point for our literature analysis. Based on the actual state, we look forward to design different possible future prospects and to be up to join the discourse of wise recommended actions for supply chain members.

3.1 Cluster analysis

Due to the perceived present developments in the logistic industry, we pick the term “city logistics” as the center of our current work. However, it is difficult to extrapolate the whole complex issue. Through applying the method of systematic brainstorming, we can extract first key terms and coherences that allow us to advance the relevant components step by step. Thereby, we mainly deal with the last mile problem because of its potential of increasing the quality of logistic service while combining possibilities of flexibility and efficiency in an innovative manner.

The used brainstorming method conduces us as scientists insofar that we can generate a huge amount of valuable information input without being biased in the forefront in any way. The whole process allows a creative finding of ideas without contentual constraints. While doing so, we avoid an unstructured and random literature research and we ensure a useful basis to deal with logistics in the era of urbanization.

We arrange the findings of our brainstorming in a network of associative chains which presents the interdependencies of the determent variables. Through the graphical array, it makes us easier to detect causal coherences and name the key terms.

As a result, we identify six key terms for our start of literature research which are located at the first layer beyond “city logistics” and are blue colored:

- R&D
- Last mile (green colored)
- SCM-performance
- Urban growth
- Public support
- Conflict of aims.

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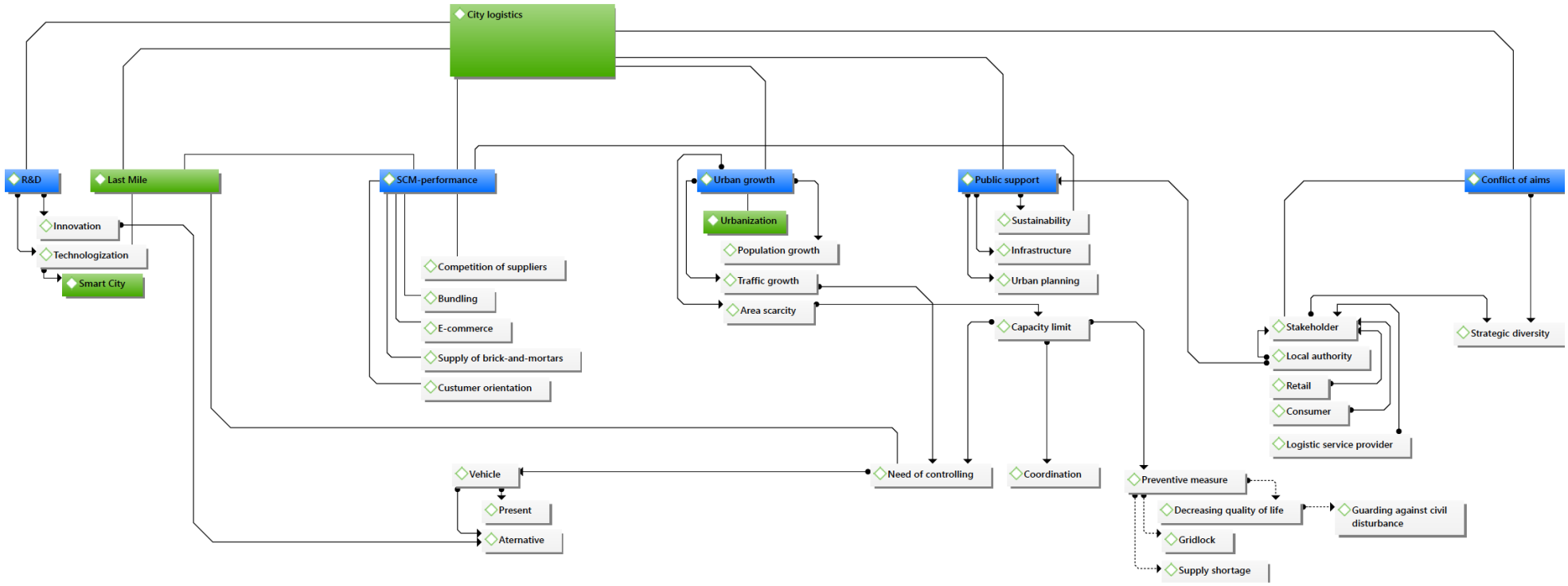

Figure 1: Results of brainstorming. Network of associative chain. Self-made figure.

<u>legend</u>

SCM-performance — key term

Urbanization — terms that serve as basis for the literature review

Population growth — term arising while brainstorming

↳ is the cause of

— correlates with

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3.2 Fixation of generic terms

Our literature research is mainly based on scientific papers from the year 2012 until today. In these papers we are especially responsive to the abstracts and its keywords. Consequently, we determine that most authors publishing articles about city logistics code their works with the green colored generic terms “last mile”, “urbanization”, “smart city” and “city logistics”. Surely, we could expand our research or choose different main factors, but our observations promise that these variables support us in the most meaningful way to deal with our research question.

We use the four key terms and other specific variables of the network to code the utilized literature. Furthermore, if we find out an overall topic thread in an article which is important to deal with our research question, we add this term as a new code, how you can see in figure 2.

Via the software “ATLAS.ti” it is possible to have an overview about the key points in our created literature summary by coding. It helps us to make the results clearer. The preparatory work is a bit costly in terms of time, but the possibility of the selection and target-oriented analysis of text passages mean a huge advantage for the writing process.

Via the generated background knowledge, we manage to construct a solution-oriented outline that is divided in two main parts: on the one hand the challenges and on the other hand the solution statements for current procedures in practice. Thereby, we illustrate the actual state of city logistics in a differentiated way.

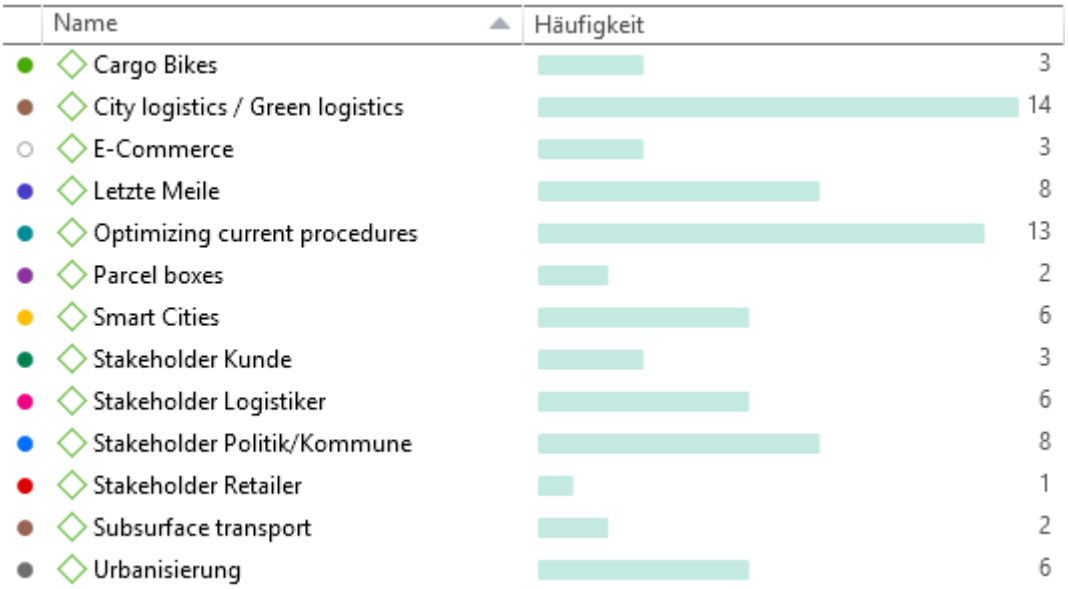

Figure 2: Codes and their frequency used for categorization. Screen-shot.

3.3 Scenario analysis

Based on actual challenges and developments of technology in logistics, conceivable prospective scenarios are listed. Therefore, we include alternative scenarios for environment that serve as frame conditions on the way to specific occurrences. It is important to notice requirements

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in terms of progress to receive conceivable results. We define them as technology, infrastructure, customer preference, legal provisions and economic efficiency.

Strategies of companies and especially logistic service providers depend on preconditions and arising results. With the help of our scenario analysis we manage to focus on a substantive discussion that follows in chapter 5.

The consideration of extreme scenarios is very valuable. Here we can compare the findings of specialist literature with imaginable and well-grounded observations that are detached from conservative procedures. As a result, the findings become more profound and we expand the observation object to get over the limits of present expert opinions.

In figure number 3, different scenarios are depicted. Firstly, we think about delivery via drones up to the end customer due to the benefits of speed, flexibility, non-usage of air space in urban areas and probably saving costs because of increasing autonomy.

Otherwise, delivery can be realized by use of robots or self-driving vehicles that drive on sidewalks, disburden road traffic and are able to be applied flexibly. As a third, we propose delivery via subsurface pipelines as we know from transport of gas or water. Delivery can be fulfilled at decentral pickup stations or reloading points that are supplied from the underground. This procedure does not cause environmental pollution, noise and aboveground traffic density.

The last scenario suggests mobile pickup-stations that are filled in destination centers and are located at central points in cities where the customers pick up their deliveries. Thereby, the recipient is independent of fixed delivery times and benefits from the fact that he does not need to be at home for receiving his goods.

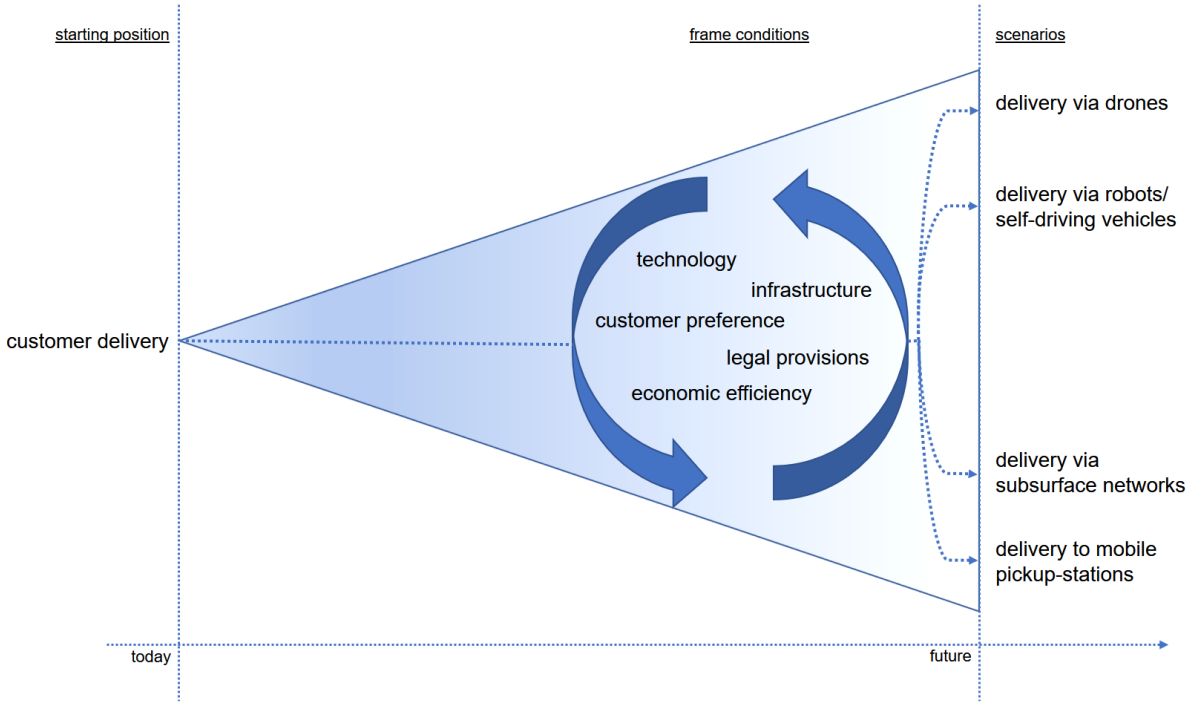

Figure 3: Conceivable prospective scenarios dependent on certain frame conditions. Self-made figure.

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In the next chapter we want to look at implications that can be found in economic literature, before we include our findings and the challenges of chapter 2 for an overall discourse.

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4 Solving the last mile problem

Up to this point of our work, we considered the topic “city logistics” in a rather general way to give an overview about implications and challenges that the supply chain has to deal with. In the following chapter it is our aim to examine the relevance of the last mile problem in detail for each stakeholder involved in progress. Therefore, we present some recommended actions for companies that occur in recent literature. The criteria for listing here is today’s utilization responsively the existence of solid designs to conduct the process in practice.

Even if there is a large variety of feasible approaches due to the technological development, we focus on particular aspects to rather give some thought provoking impulses.

4.1 Implications for stakeholders

4.1.1 Retail

Today’s trend of increasing e-commerce will endure the next years and probably amplify.[54] In light of this observation the retail must improve and adapt its strategy to stay competitive in relation to the huge component online retail.

Brick-and-mortars should exhaust the potential of traditional shopping behavior and design specific concepts to set themselves from the rivalry and to generate competitive edges. Starting points for focusing on could be making the following advantages clearly: product trying, experiential shopping, showrooming and consulting service.

Maybe, traditional shops can render an own process to deliver their articles to the end customer as you can see using the example of drugstores. Here you can profit from the counseling and get the goods in a comfortable way via home delivery.[55]

The next step could be the implementation of additional channels to create a multiple solution named omni-channeling. By doing so, the retail tries to ensure that potential customers do not even use the exhibition of the assortment for comparing and testing and buying the articles from another online supplier. By use of the omni-channel strategy, you can built up a specific customer loyalty that can make sure that consumers appreciate the value of traditional shops and pursue the last mile in cooperation with the retail.[56]

An issue that must not be neglected is the price structure insofar that in times of e-commerce the price of an article becomes one of the most crucial factors for customer’s buying decision. In times of complete information access, retail should be aware that their prices bear appropriate relation to those of e-retailers.

[54] Ehmke & Mattfeldt (2012)

[55] Bektas et al. (2015)

[56] Carvalho & Campomar (2014)

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4.1.2 Logistical service provider

An important decision of logistics services is the consideration of a profitable strategy how to get the goods on the last mile to the end customer. In this chapter, we focus on general advisements detached from technological issues and including needs of interaction with consumers.

There are three ways to deliver the goods to the final point of the supply chain exempt from recycling. On the one hand, parcels can be transferred to the client's home personally. That procedure is named at-home-delivery (AHD). If there are less orders or the investments for improving infrastructure are too high, AHD is useful. On the other hand, it is possible to put ordered articles in specific boxes near the customer from where he can take his delivery autonomously. Here you can speak about reception boxes (RB). As a third, the customer can set out for pick-up-stations of logistic providers, so-called collection-and-delivery-points (CDP). Concerning this procedure, the client exposes himself to the largest own initiative.[57]

However, logistic service providers benefit from CDP's, if the population density and the amount of orders are high. These circumstances are found in urban areas. As a result, DHL pursues that the carriage of freight is up to the customer on the last kilometer.[58] Studies in Helsinki found out that customer pickup is much eco-friendlier than home deliveries. Via this method, 18% to 87% of carbon emissions can be saved depending on the specific, formed engineering technique.[59]

In general, the last mile is the costliest section of delivery routes. Especially the factor, whether the quote of successful deliveries is under a certain critical point, is decisive for profitability.[60] This financial effort is problematic insofar that clients on the majority do not show willingness to pay as much as needed to break even the expenses of logistics.

Logistic procedures are quite susceptible to external disturbances as congestions, weather, technical sensitivity and the human factor. For this reason, logistic service providers should be the main part of R&D to sidestep externalities and to be robust. Maybe an expanded cooperation with local authority is a key factor to face those challenges. Furthermore, decision-makers should think about the potential of collaborations with other logistic service providers to implement a generic platform that divides costs and resources in an optimal and efficient way. Consequences can be superior bundling, dispersion independent from suppliers and reduction of distance-covered inner-city tours.[61]

Finally, it must be mentioned that logistic service providers should include strategic require-

[57] Wang et al. (2014)

[58] Müller-Seitz et al. (2016)

[59] Brown & Guiffrida (2014)

[60] Maes & Vanelslander (2012)

[61] Pletscher et al. (2015)

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ments of other stakeholders that correlate with the own sphere of activity. Population necessities and legal restraints must be affiliated to the companie's business program. Concerning this matter, key words like green logistics, sustainability and conscious behavior co-determine strategic concepts.

4.1.3 Customer

Consumer's behavior and sense of entitlement is the main reason for the need of specific and rather individual logistic processes. Due to the fact of present and immense economical competition, customers are in power to determine economic policy measures. In general, you can say that companies cannot be profitable, if the consumer needs are disregarded. Following aspects can be summarized as consumer needs: simplicity, rapidity, flexibility and favorability.

Because of this huge influential impact, the delivery process is controlled obviously by the particular customer in the range of delivery date and place even when the procedure has already begun to fulfill. As already mentioned, AHD effects increasing costs for logistic providers and the other partners of the supply chain. Nevertheless, AHD is still the most preferred delivery method of most people.[62]

The completing of supply via multiple online channels results in huge benefits for consumers. The product width expands, orders can be placed beyond local regions, prices can be compared more simply etc.[63]

Meanwhile, it should not be neglected that any transportation causes externalities like traffic or noise burden. Thereby, not only the specific customer of the delivery process is affected, but rather the whole population is faced with the consequences. It is easier to nominate the explicit costs for investments e.g. in infrastructure than displaying implicit costs of city logistics. Impacts coming from environmental pollution cannot be easily broken down into the individuals.

You must weigh up whether the pollution is lower by logistic provider's delivery on optimized routes or individual tours by recipients to especially provided central pick-up-points.

The benefit of the consumers follows from the immediate, ubiquitous product availability and thereby occurring comfort. The functionality of city logistics can be observed as a sign for social wealth. In contrast to the assumption that digitalization and industry 4.0 affect negatively the employment market, you must recognize that jobs are newly created in logistics sector.[64]

As an interim conclusion, you can state that the distance between consumers and suppliers decreases significantly and the trend will continue in the light of concepts like same-day-delivery and so on.

[62] Wang et al. (2014)

[63] Ehmke & Mattfeldt (2012)

[64] Wolter et al. (2015)

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4.1.4 Local Authority

Contrary to the assumption that optimizing processes in city logistics is the sole purpose of logistic providers and insofar of private business, local authorities are involved noticeably in city logistics. The expansion of infrastructure is a subtask of municipalities respectively federal government since possibilities of enlarging traffic are limited.[65] The costs for the implementation of novel infrastructural components are very high. That is the reason why the corporate sector does not bear the charges on his own. Corporations are necessary.

Meanwhile, local authorities are interested in upgrading consequently urban life quality and the attractiveness of cities to attract further investors. Thereby, livability must not be at risk in cities because of increasing dense traffic and accompanying emissions. Lastly, it is valid to encourage the appearance of the city as an important business location. So, these measures can be understood as PR work and marketing.[66]

To keep urban areas livable, legal regulations and consequently the guiding by clearly defined frames are essential. To achieve this objective, the EU presented a white paper which determines the freedom of the cities concerning diesel and petrol cars until 2050.[67] Even till 2030, nearly carbon emission free city logistics is striven.[68]

However, the conflict of objectives is perceptible. You must keep in mind that tax pounds are primarily determined for the public and not for the private business. Nonetheless, these investments are a matter of expenses for the upvaluation of the inner-city life that is in behoof of residents.

All in all, politics have the task of a superior control to coordinate processes more efficiently for optimizing them. Thereby, holistic wealth and not individual interests should be on focus. For this purpose, especially private companies must keep three components of sustainability - economy, ecology and society - in mind and e.g. must consider the ecological foot print.[69] Local authorities should claim that.

4.2 Practical suggestions for providing parcel delivery

4.2.1 Optimizing current procedures

If a company wants to improve its logistic performance, it must analyze the current situation and thus uncover first leverage points for progress. The first step is to scrutinize whether the tours are planned efficiently, and the routes are optimized. In this point, a goal conflict can be noticed between speed and saving fuel. For example, in the beginning of the tours, heavy

[65] Ehmke & Mattfeldt (2012)

[66] Erd (2015)

[67] Maes & Vanelslander (2012)

[68] Ehrler & Hebes (2012)

[69] Bretzke (2013)

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goods can be delivered before smaller and lighter articles. The fuel saving amounts from 4.9% to 6.9%.[70] However, in this case delivery times increase. In general, higher fill rates should be intended.

To deepen the approach of reducing carbon emissions, you can adapt low emission zones (LEZ) or expedite the operation of electrically driven transport vehicles to ensure local emission-free distribution.[71]

Electric mobility is a useful tool to make the last mile cleaner. Disadvantages like low range or missing charging infrastructure must be considered. It is difficult to measure the explicit and precise impact of usage of electric vans because the experience of requirements and acceptance in the range of city logistics is scarce.[72]

Another idea to make last mile logistics more efficient is the coordination and consolidation of flows of goods and information via specific hubs that could be urban collecting or distribution centers.[73] You must distinguish between two different concepts of UCCs: from UCC to retailer or from UCC direct-to-consumer.[74] UCCs can be used in common by different logistic providers to improve efficiency and to reduce environmental impacts.[75] Private companies often conduct UCCs in suburbs.[76]

An innovative concept is the sheathing of UCCs by stores that can be provided with goods “through the wall” at short notice.[77]

The efficient utilization of existing road networks is keener interest of all stakeholders. Many intensions fail because of missing profitability or huge amount of investment capital. Nevertheless, different positive examples exist. E.g. congestion charging can be mentioned. For preventing congestion, road fees are charged according to daytime.[78]

Bundling can also be achieved while combining people and wares mobility. For each parcel, software solutions determine the optimal transport modalities. If the certain is similar to the route of an individual, at least a part of the way is covered in common.[79] An exciting approach is the increasing occupancy rate of trains, busses and subways by combining public and goods transport.

[70] Taniguchi (2014)

[71] Taniguchi (2014)

[72] Ehrler & Hebes (2012)

[73] Erd (2015)

[74] Aized & Srai (2013)

[75] Taniguchi (2014)

[76] Taniguchi (2014)

[77] Deckert (Hrsg.) (2016): p. 281 ff.

[78] Erd (2015)

[79] Pletscher et al. (2015)

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The local public transport is rather rigid and so far in fringe times barely busy so that a large part of disposable capacities can be used for transport of cargo.[80]

To keep transport routes as short as possible and for the purpose of decentralization, as an example UPS daily provides several freight containers from where shipments are distributed via bicycles, hand trucks or cargo cruisers.[81] In the last days in the present of increasing e-commerce, suppliers target own initiative of customers which means that consumers pick up their goods in those central containers independently.[82] To afford further transport efficiency, the usage of standardized city containers that are comparable with sea containers should be considered as well.[83]

To profit from synergy effects, you can consider the transport between UCC and freight containers in the city centers via so-called “CarGoTram”. Thereby, the existing tram tracks are used by adjusted freight ferrying street railways.[84]

More or less progressive instruments to support logistic and as well last mile performance, are unified in information and communication technology (ICT). Even if the beginning of systematic usage of those technologies arose in the early 1990s, the development is strengthened until today. The deliverer is backed in his job by On-Road Integrated Optimization and Navigation Systems (ORION) that offer a specific routing considering defined delivery and pick-up dates.[85]

Furthermore, generating precise data of the road network obtained from the delivery vehicles serves in terms of route planning and optimization. Subsequently, costs, emissions and congestions will be reduced.[86] The basic is the internet of things respectively big data. The more data you have got, the more suppliers are able to develop more intelligent solutions.[87]

Ultimately, you can appreciate the attempt to avoid whole transports. In terms of dematerialization via virtualization per 3D printers, only raw materials instead of complete products must be moved. A generic term in this context that does not reflect only 3D techniques but also the networking of production facilities via internet is called cloud manufacturing.[88]

4.2.2 Subsurface transport

The subsurface passenger transport is a proven technology since decades to ensure short

[80] Bektas et al. (2015)

[81] Deckert (Hrsg.) (2016): p. 138 ff.

[82] Müller-Seitz et al. (2016)

[83] Bektas et al. (2015)

[84] Deckert (Hrsg.) (2016): p. 281 ff.

[85] Deckert (Hrsg.) (2016): p. 138 ff.

[86] Taniguchi (2014)

[87] Pletscher et al. (2015)

[88] Deckert (Hrsg.) (2016): p. 23 ff.

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travel times whilst relieving the aboveground road system. For the same reasons, the underground transport of goods can be considered. Nowadays, many concepts are in the drawer to reform logistic processes in the subsurface of cities. The technique is already well-proved out of tunneling in the form of fit tube segments. A minimum of surface intervention is necessary due to classic canalization. A tube segment is placed under the earth that mills the ground without the need of constructing roadworks.[89]

As a sort of giant pneumatic post, sendings were transmitted in Chicago since 1910, in Great Britain since 1927 or even in Amsterdam the transport of cut flowers shall be concluded per subsurface railway.[90]

For expanding this idea to a holistic city logistics solution, we want to deal with the tangible solution approach “CargoCap” which was developed at the university of Bochum. By using a separate tunnel system, automated and standardized capsules drive autonomously either in groups or individual to their destination on tracks powered by electric engines.[91] More precisely, the capsules are driven by linear induction motors and are controlled via artificial intelligence (AI) respectively software.[92]

Thereby, the size of the particular dollies is normed for two euro pallets what simplifies further utilization. The flexibility of the system allows a fast cargo handling in conjunction with automated forklift trucks. The delivery happens up to the assembly line. An immense advantage compared with other innovative approaches is the slight obstacle of legal regulations. For example, a plan approval procedure is not necessary.[93]

A solution for daily transport of goods at all weather conditions under obvious energy conservation might be very attractive for communes that are faced with busy infrastructure of urban areas. Although, the system would be operated from only one main host, you would have to ensure that goods are delivered on time and at low prices.

All in all, you can submit that subsurface transport provides multifaceted benefits in contrast to other methods. It is environmental friendly, rapid, flexible, competitive, secure and reliable.[94]

Concrete realization is intended in Germany’s Ruhr district, more precisely in Bergisch-Gladbach. In the beginning of 2017, politics adopt the plan to construct a 6 kilometers long tunnel that costs around 60 million euros which must be funded by private investors. The “CargoCap” might connect cargo centers with business parks and the inner city. The goal is to shift up to 80% of truck load to subsurface transport. The building would last three years.[95]

[89] CargoCap GmbH (n.y.)

[90] Handelsblatt (2002)

[91] CargoCap GmbH (n.y.)

[92] Kulinska (2014)

[93] CargoCap GmbH (n.y.)

[94] Kulinska (2014)

[95] WDR (2017)

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4.2.3 Parcel boxes

To achieve the objective of increasing delivery rate and accompanying decreasing costs, the approach of parcel boxes can be mentioned. In this case, customers and logistic providers are codependent because they do not need to be in the same place at the same time. It is obvious that delivery process gets thus much more flexible and affordable for the logistic provider. As well the recipient benefits from the missing need to orient its daily routine towards the delivery.

An unnecessary direct contact of package deliverer and the recipient is avoided. Admittedly, the personal contact provides a service. But in term of overloaded city logistics it is more important to make the delivery process more economical by increasing the amount of deliveries per tour.

In the presence, specialist literature deals with three different types of reception boxes. Their application is defined by the required benefit while considering the costs. The first solution describes the existence of reception boxes at houses or garages that can be opened by key or transmitted code.[96] This approach is a very comfortable one. However, it must be clarified who bears the costs of implementation of the infrastructure. Is it the customer, the local authority, logistic providers or private investors? In case of DHL's conception, the customer purchases the box that costs from 99 euros to 229 euros.[97] It is a debatable point whether the consumer is content to spend the needed money.

In another scenario there is no individual box for each customer. The logistic provider is the owner of the particular delivery box. E.g. DHL brings the parcel boxes with itself and saves the cases at the jurisdiction of the consumer before collecting at a later point of time. These boxes are equipped with special mechanisms for reuse when the percipient gets his goods out.[98] The costs for implementation would be lower compared to the first solution and the costumer would be discharged. Meanwhile, you must consider that it is an effort to save space in the delivery vans for the numerous mobile cases.

As a third approach, shared usage near the residences of customers can be mentioned. Suppliers install collection points in close vicinity to either domiciles or central points like stations, supermarkets etc. what is named locker-banks. Perhaps, more than one company is able to use these boxes with codes. So, sharing is an efficient and sustainable way to cooperate and complement each other.[99]

In general, you can summarize that reception box technology is secure since only the customer and the particular deliverer have access to the parcel by passwords (controlled access systems). The efficiency of deliveries increases and also special requirements like cooling and so

[96] Wang et al. (2014)

[97] DHL (n.y.)

[98] Iwan et al. (2016)

[99] Iwan et al. (2016)

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on can be guaranteed. Although investments are not small, cost savings up to 60% are realizable compared with AHD.[100]

4.2.4 Cargo bikes

Although the method of transportation of goods via bicycle is not novel at all, in case of very specific and last-minute deliveries with high priority cargo bikes gain leverage. In case of confidential papers that are not allowed to be sent by fax or email cargo bikes constitute a delivery alternative.[101]

Cycle couriers are often employed in central business districts in metropolises where shipments are fragmented individually. An advantage is the lower occurrence of congestions and the independence of traffic condition like rush hours or strikes of local public transport. The more congestions appear, the more beneficial is the procedure of cargo cycling.[102]

The fast and reliable lot at appropriate prices is entirely attractive for senders whose delivery requires an extraordinary service. Possible applications could be the itself-promotion of companies by designing a sportive and speedy image, administration that are pressed for time, or consignments of medicine, flowers, food etc.

Especially, this procedure is meaningful for same-day delivery services in conjunction with a central depot. Considering the regulation of the EU's white paper we have already mentioned, shipments by cargo bikes could be even broadened in inner cities.

The range of possible saved motor traffic due to the application of cargo bikes varies immensely. As Lenz and Riehle (2013) presented, 25% of commercial traffic in urban areas could be replaced by bicycles. The study about the project "Cyclelogistics" accentuates that cargo bikes can undertake by an average of 51% of motorized delivery tours.[103]

An extension of the approach is to run cargo bikes electrically so that you can classify them between ordinary bikes on the one hand and cars on the other hand concerning parameters like costs, payload or reach.

Cargo cycling serves a very specific market. Firstly, the contact with logistic providers has to be made. Currently, cargo bikes are only a side issue for logistic providers because of the obstacle contingent on the acceptance of B2B or B2C customers.[104]

Mostly, cargo bike firms consist of only one or two people. That is a relevant point why it is

[100] Wang et al. (2014)

[101] Maes & Vanelslander (2012)

[102] Maes & Vanelslander (2012)

[103] Schliwa et al. (2015)

[104] Schliwa et al. (2015)

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difficult to connect them to giant logistic providers. Nevertheless, UPS tests the usage of electric cargo bikes in a manner of speaking as a pioneer of parcel delivery.[105]

You must consider that this solution is certainly not a generic solution but rather a sensible supplement to unburden the system of city logistics.

[105] Deckert (Hrsg.) (2016): p. 138 ff.

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5 Discussion

Specialize literature and numerous studies underline that trends like e-commerce or urbanization persist and force the pace. In 2015, 2.3 billion parcels were sent in Germany. That means 15 parcels per person per year. Within the next seven years, the Fraunhofer Institute predicts an almost doubling (4.2 billion parcels per year).[106]

A wide problem is the amount of failing delivery attempts of private customers. From the logistic providers' point of view, it must be the purpose to increase highly the rate so that nearly every parcel is delivered. In doing so, redundant tours are avoided.

To achieve this objective, you can consider different approaches. In general, the goal must be to guarantee the successful delivery of every parcel, e.g. by using parcel boxes. The consequence would be emptier roads because multiple delivery attempts would not exist. Additionally, suppliers can establish an incentive scheme for customers to handle the subject e-commerce more consciously. Consumers must recognize that AHD is an auxiliary service almost on the cheap and the demanding attitude must change.

We want to amplify the awareness of a system composed of correlation that must be sustained over the long term. Mutual support is necessary. For example, the customer could take the pressure off logistic providers by picking up his orders at central pick-up stations on his deflection.[107]

A more radical way is to inspire the thought of fining recipients that are responsible for failed delivery attempts. We suggest the model of a first gratis try, if the certain delivery mode allows the principle of freedom from costs. Each further attempt would be debited with additional fees.

A not-negligible aspect concerning the last mile issue are the brick-and-mortars. Offline-retailers often are not mentioned in specialist literature dealing with the last mile problem in city logistics. But in our opinion, stated stakeholders bear co-responsibility for brick-and-mortars to design a more attractive appearance of urban areas. Local authorities should be mainly interested in reforging their districts. The mediation between customer and retail is an important task that comes up to communes.

In particular, it is the consumer who has a huge influence on the economic success of offline retailers due to its buying behavior. In practice, there are different models to unify offline and online retail by implementing omni-channel solutions to react to the customer's wishes. The Online City Wuppertal is an example. Here the commune designed a special platform where local retail and logistic providers cooperate and interact channel-comprehensively. Consumers benefit by being able to purchase online as well as offline. They do not perceive a gap between the different channels because of the fluent passage, the lines between e-commerce and brick-

[106] FAZ (2016)

[107] Ehmke & Mattfeldt (2012)

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and-mortars blur. The main aspect to disengage from giant suppliers like Amazon is the guarantee of same-day-delivery.

As a consequence, the need of reformation of offline retail shows oneself, even if this sector accounts for its own performance.

But what does the preceding section have to do with the last mile problem in city logistics? For us, a powerful offline retail provides the facility of relieving logistic providers. As already mentioned, DHL wants to dedicate the collection of parcels to demanders at the last kilometer. If the consumer makes use of brick-and-mortars, the individual fragmentation of goods is dropped, and the system of city logistics becomes unburdened provided by the customer.

In our opinion, the consciousness of the need of an innovative holistic system concerning city logistics in times of urbanization must increase. Therefore, we suggest a multilayer logistics mix comparable with the well-known marketing mix. It is not sensible to force particular technologies. We target an integral point of view. Solutions like e-mobility are pre-existing, although - properly speaking - each individual technology for itself does not make the last mile more efficient. Indeed, certain aspects (here: environment protection) are forced. Nevertheless, our main concern is the merger of all systematic components.

Therefore, we consult the three pillars of sustainability: ecology, economy and society. To achieve sustainable and complex goals, a profound logistics mix should be striven with the overall goal of efficient control of logistical transfer.

In general, you can notice five main ways of transport: railway, road, air, water or pipeline. We verify the exploitation of all feasible technologies to find the optimal mix. Thereby, you must consider a variety of parameters before implementing an overall solution:

- Costs and earnings (efficiency)
- Workload
- Flexibility
- Speed
- Environmental impact
- Danger of accidents
- Legal regulations
- Social acceptance
- Technical feasibility
- Etc.

Stakeholders, especially logistic providers and local authorities, must expedite and coordinate the expansion of necessary infrastructure. It is rather simple to pursue single topics. But if city logistics would be considered as a holistic issue of society, economy and ecology, it is not easy to operate the system.

In times of broad competitive constraints, it is important that investments in alternative delivery systems amortize in an adequate time frame. Therefore, the economy might entrust R&D with

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the task to evolve consisting technologies and to develop entire reliable new ones.

Concrete approaches for extending the existing system can be deduced of pre-existing technologies. We think about the exploitation of inner-city air space via the application of drones. The methodology is already proven, but you must consider legal barriers and the possibly missing acceptance provided by the customer. Challenges like coordinating the air traffic, security, capacity limits of parcel weight respectively size or implementing specific filed locations must be concerned.

Another idea is to rely on automotive delivery vehicles. As a first step, we propose small self-driving carts that accompany the deliverer on the sidewalk automatically. As a next level, the implementation of automatic vehicles that delivers the recipients independently can be seen. The customer could pick up his article using codes. The concept of Domino's Pizza in Hamburg proves that the technology works.[108]

A further thought is the utilization of metro infrastructure for transportation of cargo at night. Nights, capacities are available to carry freight due to the lower clock of subways. That means that appropriate for shipping goods from stations to depots or trading centers must be established.

At the last mile it is necessary to be mindful of the type of transported goods. Thereby, you must yield to specific handling conditions like cooling or heating, extraordinary protection or special sizes like bulky goods or taller.

The deployment of infrastructure is rather costly, but even cheaper as the construction of freeways, whereby it must be mentioned that in compressed inner cities the space for new building is not available. In general, you must always evaluate whether an investment pays of in an appropriate period of time or not.

Albeit, pilot projects of management of city logistics have failed in the 1990's in Germany, nowadays it is the only solution to deal with logistic challenges in urbanized areas. Today, technological possibilities are major eminent, and the need of innovation is much higher.

We are aware of the discrepancy between the current situation and the suggested system. The technology already exists, though. The implementation happens hesitantly due to giant effort and costs. The problem can be solved by cooperation of stakeholders instead of complete independency. Finally, there is no other possibility as shifting and redesigning urban traffic and logistic processes. Topics that are not fully stretched (pipelines, air space etc.) are of peculiar interest because of the high potential and in the same way because of high risk and uncertainty.

Nevertheless, we are starting out on these developments. Dimensions are hardly foreseeable. Now, the implementation of theoretical approaches is the next step in light of the danger that the current system cannot be maintained sustainably.

[108] Handelsblatt (2017)

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6 Limitations and further approaches

The present draft just provides guidance to further challenges that society will be faced with in the next years. This term paper shall depict useful approaches in a summarizing way. Thereby, you must consider that the parameters concerning optimal transport modalities introduced in chapter 5 should be filled by concrete data to conduct a cost-benefit analysis and to make a reliable point.

In addition, legal guidelines are complex and require a thorough assessment. The contemplation must be deepened.

We deal with a relative generic concept for modern urban areas. Hence, we want to underline that specific components must be fitted to individual needs of cities depending on their size, the current infrastructure that can be used as well etc.

It is in doubt if the presented concepts are directly convertible as a whole. The expansion of logistical dimensions is a step-by-step process. Therefore, you must fix the order of necessary strides.

In this term paper, we only pay attention to the last mile problem. Even if the final section of the supply chain is the costliest one, logistical processes must be coordinated as a holistic system. Aspects like factories and wholesalers must not be neglected because of the importance of an efficient, overall solution in transport of goods.

Even though we propose a cooperation between private firms in several contexts, you must not disregard that this is often associated with the partial loss of independency. You need to observe that particular stakeholders pursue compulsorily their individual economic interests.

Additionally, we want to emphasize the need of investigations about the acceptance of companies and society concerning new transport methods that will change obviously the urban area life. In this way, it is vital to decrease the level of uncertainty and to develop growing conscious for aware behavior in terms of e-commerce and the important function of consumers in the last mile problem. Prospectively, the role of consumers must be included in context of logistics, and the responsibility for livability in urban areas must be underlined.

This term paper presents a logistics mix as a snapshot in time which is geared to the state of the art of technology. The specific logistics mix is definitely not a fixed model and must be seen as a dynamic way of analyzing future scenarios continuously. Refining technology means orientation to innovative processes.

In a nutshell, this work offers a descriptive overview of possibilities to face further developments. The necessity of change subsists undeniably that will be noticeable progressively in the next years.

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7 List of literature

AIZED, T., J. Srai (2014). Hierarchical modelling of Last Mile logistic distribution system. In: The International Journal of Advanced Manufacturing Technology, Vol. 70 (5-8). P. 1053-1061.

BEKTAS, T., T. Crainic, T. van Woensel (2017). From managing urban freight to smart city logistics networks. In: Network Design and Optimization for Smart Cities. P. 143-188.

BRETZKE, W. (2013). Global urbanization: a major challenge for logistics. In: Logistics Research. Vol. 6. (2-3). P. 57-62.

BROWN, J., A. Guiffrida (2014). Carbon emissions comparison of last mile delivery versus customer pickup. In: International Journal of Logistics Research and Applications. Vol. 17 (6). P. 503-521.

CARGOCAP GMBH (n.y.). http://www.cargocap.de/. As consulted online on 27.02.2018.

CARVALHO, J., M. Campomar (2014). Multichannel at retail and omni-channel: Challenges for Marketing and Logistics. In: Business and Management Review. Vol. 4. P. 103-113.

CHOURABI, H., T. Nam, S. Walke, J. Gil-Garcia, S. Mellouli, K. Nahon, H. Scholl, H. (2012). Understanding smart cities: An integrative framework. In: System Science (HICSS), 45th Hawaii International Conference on. IEEE, 2012.

DECKERT, C. (Hrsg.). (2016). CSR und Logistik: Spannungsfelder Green Logistics und City-Logistik. Berlin. Springer-Verlag.

DEKKER, R., J. Bloemhof, I. Mallidis (2012). Operations Research for green logistics – An overview of aspects, issues, contributions and challenges. In: European Journal of Operational Research. Vol. 219 (3). P. 671-679.

DHL (n.y.). https://www.dhl.de/de/privatkunden/pakete-empfangen/pakete-zuhause-empfangen/paketkasten.html. As consulted online on 27.02.2018.

EHMKE, J., D. Mattfeld (2012). Vehicle routing for attended home delivery in city logistics. In: Procedia-Social and Behavioral Sciences. Vol. 39. P. 622-632.

EHRLER, V., P. Hebes (2012). Electromobility for city logistics – the solution to urban transport collapse? An analysis beyond theory. In: Procedia-Social and Behavioral Sciences. Vol. 48. P. 786-795.

ERD, J. (2015). Stand und Entwicklung von Konzepten zur City-logistik. Wiesbaden. Springer-Verlag.

FAZ (2016). Geliebter Päckchenheld. http://www.faz.net/aktuell/gesellschaft/menschen/paeckchen-landen-haeufig-zuerst-beim-nachbarn-14566921.html. As consulted online on 27.02.2018.

HANDELSBLATT (2017). Wenn der Roboter die Pizza liefert. http://www.handelsblatt.com/unternehmen/handel-konsumgueter/dominos-in-hamburg-wenn-der-roboter-die-pizza-liefert/19584636.html. As consulted online on 27.02.2018.

© Scheithauer, Zielinski (2018, HS Flensburg)

HANDELSBLATT (2012). Stromgetriebene Kapseln sollen Fracht unterirdisch transportieren: Waren sausen durch die Röhre. http://www.handelsblatt.com/archiv/stromgetriebene-kapseln-sollen-fracht-unterirdisch-transportieren-waren-sausen-durch-die-roehre/2188672.html. As consulted online on 27.02.2018.

HANSMANN, R., H. Mieg, P. Frischknecht (2012). Principal sustainability components: empirical analysis of synergies between the three pillars of sustainability. In: International Journal of Sustainable Development & World Ecology. Vol. 19 (5). P. 451-459.

HEINEMANN, G. (2014). Der neue Online-Handel: Geschäftsmodell und Kanalexzellenz im Digital Commerce. Mönchengladbach. Springer-Verlag. 6. Auflage.

HÜBNER, A., J. Wollenburg, A. Holzapfel (2016). Retail logistics in the transition from multi-channel to omni-channel. In: International Journal of Physical Distribution & Logistics Management. Vol. 46. P. 562-583.

IWAN, S., K. Kijewska, J. Lemke (2016). Analysis of parcel lockers' efficiency as the last mile delivery solution – the results of the research in Poland. In: Transportation Research Procedia. Vol. 12. P. 644-655.

KULINSKA, E. (2014). Pipeline Transportation of Solid Materials. In: China-USA Business Review. P. 527.

MAES, J., T. Vanelslander (2012). The use of bicycle messengers in the logistics chain, concepts further revised. In: Procedia-Social and behavioral sciences. Vol. 39. P. 409-423.

MAHAR, S., P. Wright, K. Bretthauer (2014). Optimizing marketer costs and consumer benefits across „clicks" and „bricks". In: Journal of the Academy of Marketing Science. Vol. 42 (6). P. 619-641.

MAHAR, S., P. Wright (2009). The value of postponing online fulfillment decisions in multi-channel retail/e-tail organizations. In: Computers & Operations Research. Vol. 36. P. 3061-3072.

MANVILLE, C., G. Cochrane, J. Cave, J. Millard, J. Pederson, R. Thaarup, B. Kotterink (2014). Mapping smart cities in the EU. Brussels: European Parliament, Directorate-General for Internal Policies, Policy Department A: Economic and Scientific Policy.

MÜLLER-SEITZ, G., M. Seiter, P. Wenz (2016). Was ist eine Smart City?. Wiesbaden. Springer Fachmedien Wiesbaden.

PLETSCHER, C., T. Golliard, S. Regli, R. Cueni (2015). Smart Cities sind auch Yellow Cities: Der Beitrag der Schweizerischen Post zur Stadt der Zukunft. In: HMD Praxis der Wirtschaftsinformatik. Vol. 52 (4). P. 531-561.

SCHLIWA, G., R. Armitage, S. Aziz, J. Evans, J. Rhoades (2015). Sustainable city logistics - Making cargo cycles viable for urban freight transport. In: Research in Transportation Business & Management. Vol. 15. P. 50-57.

SCHRAMM-KLEIN, H., G. Wagner, F. Neus, B. Swoboda, T. Foscht (2014). (R)Evolution des Mehrkanalhandels: von Multi-Channel- über Cross-Channel- zu Omni-Channel-Retailing.

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Frankfurt am Main. Dt. Fachverlag.

TACHIZAWA, E., M. Alvarez-Gil, M. Montes-Sancho (2015). How “smart cities” will change supply chain management. In: Supply Chain Management: An International Journal. Vol. 20 (3). P. 237-248.

TANIGUCHI, E., R. Thompson, T. Yamada (2014). Recent trends and innovations in modelling city logistics. In: Procedia-Social and Behavioral Sciences. Vol. 125. P. 4-14.

TANIGUCHI, E. (2014). Concepts of city logistics for sustainable and liveable cities. In: Procedia-social and behavioral sciences. Vol. 151. P. 310-317.

VERHOEF, P., P. Kannan, J. Inman (2015). From multi-channel retailing to omni-channel retailing: introduction to the special issue on multi-channel retailing. In: Journal of retailing. Vol. 91 (2). P. 174-181.

WANG, X., L. Zhan, J. Ruan, J. Zhang (2014). How to choose “last mile” delivery modes for E-fulfillment. In: Mathematical Problems in Engineering.

WDR (2017). Unterirdischer Warentransport in Bergisch Gladbach?. https://www1.wdr.de/nachrichten/rheinland/koeln-bergischgladbach-transport-unterirdisch-100.html. As consulted online on 27.02.2018.

WOLTER, M., A. Mönning, M. Hummel, C. Schneemann, E. Weber, G. Zika, R. Helmrich, T. Maier, C. Neuber-Pohl (2015): Industrie 4.0 und die Folgen für Arbeitsmarkt und Wirtschaft: Szenario-Rechnungen im Rahmen der BIBB-IAB-Qualifikations- und Berufsfeldprojektionen. In: IAB-Forschungsbericht, Institut für Arbeitsmarkt und Berufsforschung.

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Eidesstattliche Erklärung

Wir versichern, dass wir die vorliegende Arbeit selbstständig ohne fremde Hilfe gefertigt und keine anderen als die angegebenen Quellen und Hilfsmittel benutzt und alle Zitate kenntlich gemacht haben. Diese Arbeit hat in gleicher oder ähnlicher Form noch keinem Prüfungsorgan vorgelegen.

Flensburg, den 28.02.2018

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