UNIVERSITY OF LJUBLJANA
FACULTY OF ECONOMICS

MASTER'S THESIS

KLARA LJUBI

UNIVERSITY OF LJUBLJANA
FACULTY OF ECONOMICS

MASTER'S THESIS

FUTURE URBAN LOGISTICS

Ljubljana, October 2017 KLARA LJUBI

AUTHORSHIP STATEMENT

The undersigned Klara Ljubi, a student at the University of Ljubljana, Faculty of Economics, (hereafter: FELU), author of this written final work of studies with the title Future urban logistics, prepared under supervision of prof. dr. Aleš Groznik.

DECLARE

1. this written final work of studies to be based on the results of my own research;

2. the printed form of this written final work of studies to be identical to its electronic form;

3. the text of this written final work of studies to be language-edited and technically in adherence with the FELU's Technical Guidelines for Written Works, which means that I cited and / or quoted works and opinions of other authors in this written final work of studies in accordance with the FELU's Technical Guidelines for Written Works;

4. to be aware of the fact that plagiarism (in written or graphical form) is a criminal offence and can be prosecuted in accordance with the Criminal Code of the Republic of Slovenia;

5. to be aware of the consequences a proven plagiarism charge based on this written final work could have for my status at the FELU in accordance with the relevant FELU Rules;

6. to have obtained all the necessary permits to use the data and works of other authors which are (in written or graphical form) referred to in this written final work of studies and to have clearly marked them;

7. to have acted in accordance with ethical principles during the preparation of this written final work of studies and to have, where necessary, obtained permission of the Ethics Committee;

8. my consent to use the electronic form of this written final work of studies for the detection of content similarity with other written works, using similarity detection software that is connected with the FELU Study Information System;

9. to transfer to the University of Ljubljana free of charge, non-exclusively, geographically and time-wise unlimited the right of saving this written final work of studies in the electronic form, the right of its reproduction, as well as the right of making this written final work of studies available to the public on the World Wide Web via the Repository of the University of Ljubljana;

10. my consent to publication of my personal data that are included in this written final work of studies and in this declaration, when this written final work of studies is published.

Ljubljana, October 2017 Author's signature: _____

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

INTRODUCTION

Shift from prediction of manufacturing based on demand, called push manufacturing concept, towards manufacturing after order receipt, called pull concept which means more personalised production, would not be possible without electronic business. Moreover, as a result of Internet of Things the companies with vast amounts of data are already in general able to more precisely target their products. Also commonly in literature, focus on customers and their needs can be determined. The authors believe that every digitalisation should start precisely by this since improvement of customer experience in the final stage affects profit of the company (von Leipzig et al., 2017).

Comfort, product range, price and other factors which speak in favour of electronic business have convinced the consumers that smaller and at the same time more frequent purchases are worthwhile, too. Accordingly, customers are becoming more demanding, the volume of electronic purchases is increasing which further increases the number of deliveries for logistics and transport companies. Delivery companies at the area of fresh food are definitely examples which are aware of the importance of more frequent and especially faster deliveries. Guo, Wang, Fan and Gen (2017) made a study in this sector from where the concepts could be transferred to other products, as well.

The impact of above mentioned trends can be noticed in most sectors of the economy even though they are not beneficial to all of them to the same extent. Logistics and transport are definitely not excluded from harvesting success or oppositely facing overtaking by rivals. It is true that this is the industry which historically faced worse business results in economic terms. Nevertheless, there are companies which stand out with above-average profits (Hausmann, Nangia, Netzer, Rehm, & Rothkopf, 2015). Such winners have demonstrated that they can overtake trends and, in this way, develop the industry further. One such example could be Über that made car sharing as recognisable alternative to taxi rides. Watanabe, Naveed, Neittaanmäki, and Fox (2017) are only some researchers who are analysing what stands behind its success.

If we move more towards logistics part of the sector, we encounter on a question how can traditional companies, like Pošta Slovenije, keep the pace of recent development and simultaneously with competitors that have already been founded as express delivery service providers, e.g. DHL and DPD.

At the same time, market players are limited by regulative and environmental changes. To some extent, these are addressed by the European Union in its strategy Europe 2020 where they among other goals also aim towards greenhouse gas emissions reduction by 20 % (or even 30 %) in comparison with the values in 1990 (European Commission, 2015).

Moreover, governments and municipalities are closing city centres or at least imposing restrictions inside them. There are also possibilities that only certain company would be allowed to enter city centres or the deliveries would be distributed among delivery experts. In addition to the latter, this encourages new forms of cooperation even among rivals (Fraunhofer-Institut für Materialfluss und Logistik, Daimler AG, & DB Mobility Logistics AG, 2014). Additionally, such cooperation affects reduction of so called empty kilometres, transportation costs as well as number of trucks and vans (Hausmann et al., 2015).

Not only that the changes bring challenges but also promises number of potential opportunities which can be helpful for companies' performance, i.e. with already above-mentioned customer oriented approach or only inside the value chain. Ubiquitous communication of smart devices brings better control and goods' transparency. Furthermore, it can reduce errors, speed up the process of finding lost delivery packages as well as decrease delivery times. Henning's opinion (2015) is that Internet of Things can be the main factor that will enable digitalisation of logistics centres with linking all participants in the chain from manufacturing to final delivery.

Future strategies will be influenced by several trade-offs which can be summarised with the following facts. Customer satisfaction will depend on delivery within the same or at least on the next day. How to address this request while the companies are at the same time under the pressure of not increasing the traffic on the roads due to abundance of vehicles? Can we avoid the traffic during the day with over-night deliveries?

On the other hand, Shao, H. Yang, Xing, and L. Yang (2016) with empirical study corroborated their allegations which show exactly the opposite. In their opinion, especially online shopping will concentrate the traffic on delivery companies instead of cars that are used by people when going shopping. This can reduce the congestion on the roads as well as environmental impact.

On top of everything, distribution companies are opening pick-up and drop-off points where customers can receive or leave their packets. As a result, companies reduce mileage since they avoid unnecessary visits at the delivery addresses (Kauf, 2016).

As more frequent deliveries negatively affect pollution, the diesel vehicles will have to be replaced by other alternatives, e.g. electric. Would it make sense to completely focus on electric vehicles or rather choose the combination between electric and diesel? Moreover, the implementation of, in motorsport already almost a decade developed system, Energy Resource Recovery System is expected. The system converts a part of the emissions for reuse (Formula One Digital Media Limited, n.d.).

Melo, Baptista and Costab (2014) in their article see the potential in small electric or non-electric vehicles, too. On short distance, they could be used instead of delivery vans. Delivery company DPD Slovenija has already introduced similar solution; in Ljubljana city centre delivery couriers use bicycles for package delivery.

Digitalisation is not vainly seen as one of the biggest changes which mankind faced/is facing beside climate change and globalisation (Leviäkangas, 2016). Taking into account that the latter two are running in parallel with the first one or at least affect one another, we can conclude that the foundations of the industries will still be freshened.

Since digitalisation progress is not showing any signs of decline, the companies for successful survival in business will have to address countless challenges among which we find: more frequent deliveries with simultaneous pressure for sustainable growth where environmental status should at least be retained if not improved, obtaining benefits from modern technologies and especially adaptation in terms of current events.

The intention of master thesis is to prove that the above outlined facts are being researched and in Slovenia the following two hypotheses are indicating the direction of the sector in near future:

- Goods distribution providers will increasingly choose alternative vehicles, e.g. electricity powered vehicles and bicycles, or their combination rather than diesel powered vehicles.
- Cooperation between companies is not yet at the level where they would be prepared to share the customers in order to improve their performance. Hence, advanced forms of cooperation will still lag behind.

In the thesis, I first make an overview of logistics as an industry. Definitions of either urban logistics or city logistics are provided and historical development emphasised in order to justify the industry's today's situation. In the second chapter, I am moving towards market changes that are the key factors why logistics providers have to increasingly pay attention to strategy development to stay competitive. For the latter, the effects in the third chapter could be a good starting point. Those effects are the responses on following the requirements.

Next, some so called best practices from over the world are presented. To proof the trends are evident also in Slovenia, DPD, DHL and Pošta Slovenije are taken as examples. Based on the interviews, their development is summarised. Since the technology that is in logistics an important determinant is changing very quickly, a light is also shed on some more futuristic ideas that are still more in the development phase than practical use.

1 DEVELOPMENT OF URBAN LOGISTICS

Urban logistics and city logistics are usually considered as a term with similar meaning. In both cases, we speak about the logistics that distributes goods to the areas where population density is high. Recently, the demand for deliveries in city centres is increasingly popular and thus I am providing a few definitions of either city logistics or urban logistics.

Taniguchi, Thompson, Yamasa, and van Duin (in Taniguchi, 2014, pp. 311) defined city logistics as:

> »the process for totally optimising the logistics and transport activities by private companies with support of advanced information systems in urban areas considering the traffic environment, the traffic congestion, the traffic safety and the energy savings within the framework of a market economy.«

According to Ehmke (2012), city logistics optimizes urban transportation systems as a whole. He sees considering congestion, alignment of different stakeholders and integrated planning as well as realisation as the perspectives that has to be taken into account.

City logistics does not look on each shipment, company or vehicle separately but rather as the optimisation of advanced urban freight transportation systems. The latter coordinate shippers, carriers and movements as well as consolidation of loads many customers as well as carriers into the same, usually green, vehicle (Crainic, 2008).

Urban logistics is a link between suppliers and final customers providing goods to the stores and firms. In this way, it is an important component for cities functioning (Behrends, 2016).

Definition by Melo et al. (2014) proposes that city logistics takes place in the areas with high buildings density and population with high demand for goods and services. There are several factors contributing to its development and are further discussed in section 2, namely urbanisation and aging population, internationalisation, environmental challenges and technology development.

Flow of goods in an urban area depends mainly on the following factors (Alarcón, Antún, & Lozano, 2012):

- complexity of urban structure,
- congestion levels,
- characteristics of urban road network,
- equipment for freight transportation operations,
- fleet size,

- local regulations on access limitation for freight vehicles and loading/unloading operations,
- market size and segmentation.

The European Commission (hereinafter: the EC) sees urban logistics or urban mobility as an important prerequisite for successful functioning of the cities. According to its report, already in April 2012 between 8 % and 15 % of traffic flow in urban areas was performed by freight vehicles and this daily intensity is highly questionable for air quality in the cities, especially since most of the vehicles use diesel engines (European Commission, 2012).

The following sections from 1.1 to 1.4 first review the history of the sector and then builds on the latest trends that contributed, and still are contributing, to the changes logistics providers and customers are facing in terms of goods distribution. Profitability of the sector is addressed, too.

1.1 Logistics Over Time

Recent trends in the economy and consequently logistics are significantly changing the industry. However, in order to understand the problems as well as challenges today, we have to first overview historical development of this sector to which computerised systems contributed a lot (Speranza, 2016).

In the past, horses and walking were the main means of transport which are today replaced by not only more comfortable and convenient means of transport but at the same time costlier. Increased traffic also requires much more coordination in terms of routes, schedules and crew (Speranza, 2016).

The history of logistics reaches the beginning of mankind even though the first infrastructure that supported logistics was discovered only at the beginning of the 19th century when it started with railroad which was followed by airplane in 1903. The invention of sea container in 1956 is regarded as another major impact (Speranza, 2016).

Nowadays, transportation and logistics are often considered as combined terms despite one being more main term and another one its under-term. Their meanings were evolving through the history and let us say that today logistics as a broader term also includes transportation.

Speranza (2016) sees logistics as business function that makes goods as well as people available where, when and in quantities needed. Oppositely, transportation management is more a business process.

Irrespective of all, both transportation as well as logistics are crucial components of trade and at the same time contributors to economic growth (Evangelista, Colicchia, & Creazza, 2017).

1.2 Types of Service Providers

In the past two decades, Courier, Express and Parcel sector (hereinafter: CEP sector) has evolved and is separated from traditional postal services. Ducret (2014) has defined CEP firms as firms delivering small and light parcels under 31.5 kilograms, quickly, accurately, all over the world supported by sophisticated networks while simultaneously tracking and tracing shipments.

The sector can be divided into two main families, i.e. heirs and new players, which can be further divided into 10 sub-families as follows (Ducret, 2014):

- national post offices,
- express providers,
- logistics providers in the mail-order sales sector,
- couriers,
- other logistics providers and carriers,
- sub-contractors,
- pick-up point networks,
- players from the e-retail sector,
- other postal authorised players,
- specialised delivery service providers.

Heirs are known as traditional players in CEP sector that are currently under the pressure of adaptation to evolving e-commerce market and changing their business strategies with the aim of diversification. To achieve this, companies from business to business segment (hereinafter: B2B) decided for partnerships with companies from business to consumer segment (hereinafter: B2C) rather than doing it on their own. Moreover, their existing services were strengthened by innovation in information and communication technologies (hereinafter: ICT) (Ducret, 2014).

New players are specialised in urban parcel delivery segment and most of the services are enabled by the rise of e-commerce. The providers are providing innovative solutions and solutions with high value. Next, they are innovative in terms of vehicles and logistics organisation as well as committed to sustainability. Oppositely, other logistics providers are more specialised in delivering heavy goods and pallets or the upstream activities of the supply chain, logistics and heavy freight (Ducret, 2014).

Ducret (2014) explains an example of a company that is classified in both groups at the same time where he mentions United Parcel Service (hereinafter: UPS). Its importance in the CEP sector is evident from the beginning. However, with their purchase of Kiala and the creation of UPS Access Point they expanded into new player area, too.

Kiala Points offer package drop-off and pick-up at convenient locations near your home or work, e.g. convenience stores, grocery stores, newsagents (United Parcel Service of America, Inc., n.d.). Another option to overcome the problem of people not being at home when the delivery is supposed to take place are UPS Access Points where they customers can pick-up the packages at the places in the neighbourhood which has a contract with UPS, e.g. coffee shop, dry cleaner, at any time they want, even at night or during the weekend (United Parcel Service of America, Inc., n.d.).

In the near future, segment can again be subjected to new players if e-retail companies individually enter into parcel transport sector. Vertical and horizontal integration further shape the industry, as well (Ducret, 2014).

Amazon can be seen as an example of above mention trend. It can be characterised as a newcomer into CEP sector since they started offering delivery services in addition to their core e-commerce business. In this way, they are challenging the incumbent companies that have to fight towards higher level of customer experience, faster speed of delivery and diversified pick-up locations (Hausmann et al., 2015). In section 4.3, Amazon's solution Amazon Prime Air is discussed.

1.3 Profitability of Transportation and Logistics Sector

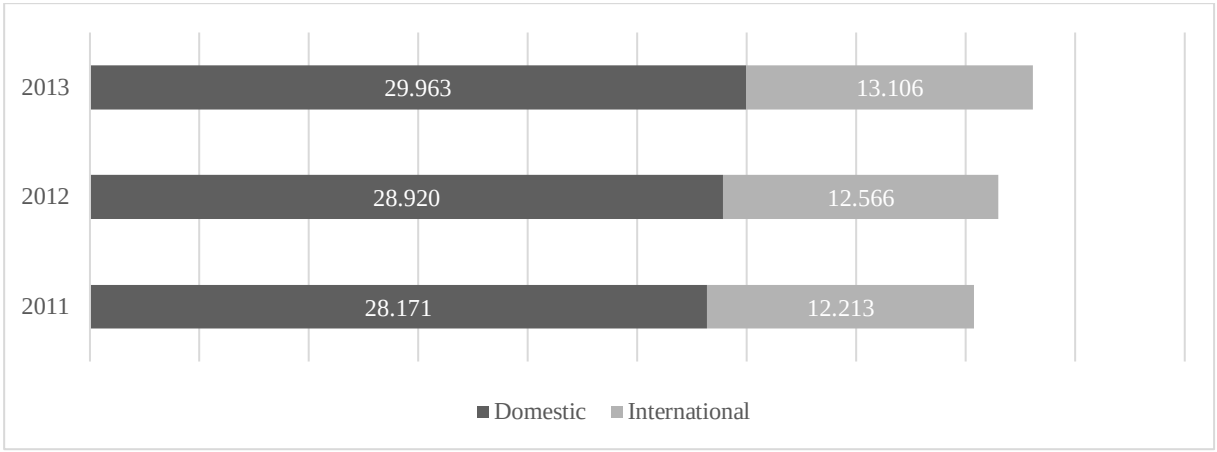
McKinsey&Company's consultants in their report studied 264 transportation and logistics companies all over the world taking into account a period of 10 years. One out of eight sectors addressing different steps of the value chain included in the report was CEP sector. Other sectors were ranging from airline to bus, contract logistics, freight forwarding, rail, shipping and trucking (Hausmann et al., 2015).

From 2004 to 2013, Total Returns to Shareholders (hereinafter: TRS) in the transportation and logistics sector were 7.2 % annually which is below the cost of equity that is 10.5 % as well as far below the best-performing sector; biotechnology's TRS accounted for 16.5 % in the same period (Hausmann et al., 2015).

Breaking down the numbers depending on in the first paragraph mentioned division shows that CEP falls into the category of so called "phoenix from the ashes", i.e. having low numbers before the crisis but improving them for even four times after it. Despite having TRS around 4 % before the crisis, it soared to 17 % afterwards (Hausmann et al., 2015).

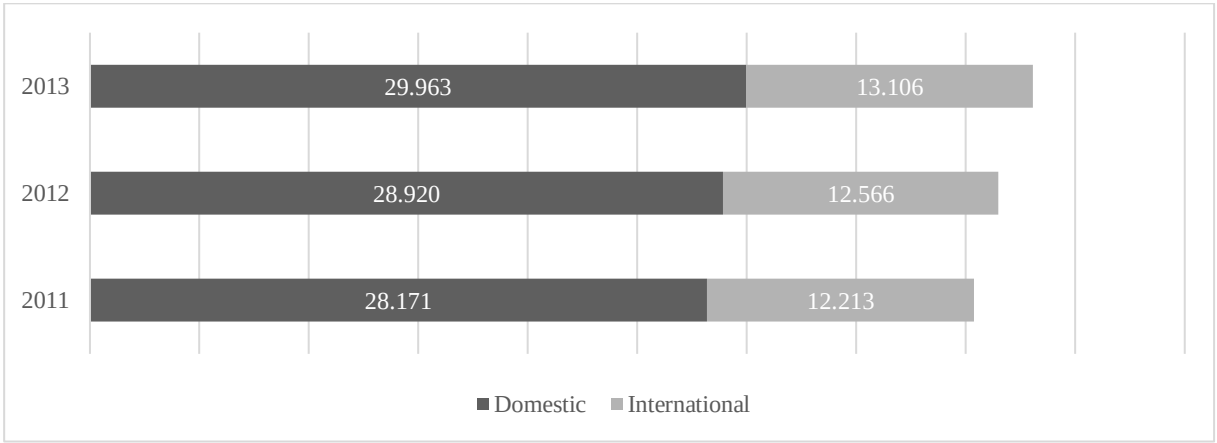
Figure 1 and Figure 2 summarise the growth of revenues and volume measured in shipments for the European CEP sector. Combining domestic and international growth, the revenues grew by 4 % in 2013 and the shipments by 5 %. However, more fierce competition and increasing importance of B2C segment resulted in around 1 % decline in revenues per shipment (Salehi, Ryssel, & Matuska, 2015).

Figure 1. The Size of European CEP Sector in Terms of Revenues, million EUR



Source: F. Salehi, L. Ryssel, & J. Matuska, *Europe's CEP Market: Steady Growth Begins to Shift*, 2015.

Figure 2. The Size of European CEP Sector in Terms of Shipments, millions



Source: F. Salehi, L. Ryssel, & J. Matuska, *Europe's CEP Market: Steady Growth Begins to Shift*, 2015.

CEP is the only sector that recorded positive net economic profit during studied period. Nevertheless, the percentage fell from 15 % before the crisis to 14 % after the crisis. During the crisis, it was negative for 1 % (Hausmann et al., 2015).

The overall evaluation of the transportation and logistics does not forecast significant future profitability and growth potential taking into account the ratio of enterprise value

(hereinafter: EV) to earnings before interest, taxes and amortisation (hereinafter: EBITA), i.e. EV/EBITA. Even though the CEP's current performance measuring pre-tax return on invested capital (ROIC) is 30.5 %, the expectations for the future growth are sceptic and predicting an increase of only 3.6 % (Hausmann et al., 2015).

The market size of the CEP sector in 2008 was around 42.2 % summing up B2B, B2C and consumer to consumer segments (hereinafter: C2C) (Ducret, 2014).

1.4 Development Trends

CEP sector service providers, presented in section 1.3, are converging and evolving (co-evolving) together nowadays. Despite blurring the frontiers between them, there are some distinguishing characteristics amongst them. Originally, couriers (C from CEP) provide point-to-point same day delivery, express providers (E from CEP) supply fast delivery at fixed time windows the next day or the second day relying on their powerful networks and were created as a response to the United States (the US) integrators that were entering the mail market and offering new services for businesses. Next, parcel providers (P from CEP) are characterised by the consolidation of standardised light-weight parcels delivered the next or second day (Ducret, 2014).

In line with co-evolution, companies and strategies among them are similar, too (Ducret, 2014).

Next, new technologies and economic as well as social changes together with new shopping and logistics patterns are changing the industry. On one hand, new technologies and innovation offer opportunities to enterprises but are defined as threats at the same time, especially if the enterprises are not following rapidly changing trends on the market (Accenture, 2014).

This segment that is newly created by above mentioned changes can be called urban parcel delivery segment which is focused more on delivering small and light parcels (Ducret, 2014).

Customised solutions in terms of delivery are more and more frequently expected due to changed consumer behaviour and individualisation of demand (Fraunhofer-Institut für Materialfluss und Logistik et al., 2014).

If in the past ordinary and slower delivery was provided to individual consumers in comparison with express and guaranteed delivery for business purposes, today both these two customers are demanding in terms of quality, especially reliability and speed (Ducret, 2014). Accordingly, we have already seen shift towards 90-minute delivery which was

introduced by DPD in Germany with DPD NOW (DPDgroup, n.d.f) or 30-minute delivery by Amazon in the United Kingdom with Amazon Prime Air (Amazon.com, n.d.).

In addition to convergence of individual and business deliveries, final customers are more problematic and inefficient for delivery service providers. We speak about last-mile delivery problem, further discussed in the section 3.6, where individuals may not be at home which causes unnecessary congestion and costs (Ducret, 2014).

Last but not least important, the development of transportation and logistics must increasingly focus on finding a balance between sustainability, i.e. environmental perspective, and economic perspective (Fraunhofer-Institut für Materialfluss und Logistik et al., 2014).

Different researchers list different challenges that delivery companies have to take into account when competing on the market shaped by recent trends. Starting with Leviäkangas (2016) who defined more general list, we have the following issues:

- climate change,
- environmental impacts,
- aging population,
- urbanisation,
- digitalisation,
- changes in people lifestyle.

Taking into account Accenture's (2014) concerns, the companies should pay attention to:

- volatile, instable and pressuring freight rates,
- high input costs, i.e. fuel and resources,
- sluggish global trade,
- sophisticated customer demand,
- dwindling bargaining power of logistics service providers,
- disruptive technologies.

Hausmann's et al. (2015) proposal is focusing on:

- shifting growth patterns,
- shared transportation,
- digitalisation,
- efficiency and competitiveness,
- deregulation,

- consolidation and cooperation,
- turbulent times in terms of demand and input factors.

Some of those challenges are discussed below while the others are more in detailed presented in other sections of the thesis. Nevertheless, the reference to them is still made in the following paragraphs.

Sluggish global trade/shifting growth patterns. Despite increase in volume of trade, the World Trade Organization (hereinafter: the WTO) reports about sluggish growth of world trade due to shifting exchange rates and falling commodity prices. In 2015, the growth was 2.8 % and the same was expected for the following year that would mean fifth consecutive year of growth under 3 % (World Trade Organization, 2016).

So far, only the data for the first quarter of 2016 was available and, as estimated, confirmed another year of weak as well as uneven growth in terms of real gross domestic product (hereinafter: GDP) and merchandise trade volume (World Trade Organization, 2017).

Trade in services is less sensitive to business cycles in comparison with trade in goods. This can be proved by the fact that transportation services as goods-related services faced stronger trade decline than commercial services (World Trade Organization, 2016).

Even though the growth of world trade is weak, there is the other way around with e-commerce that is showing a constant growth further discussed in section 2.4.3. Also, the growth in goods export is faster than overall global trade which is mainly due to lower trading costs (Fraunhofer-Institut für Materialfluss und Logistik et al., 2014).

Next, especially evident is the shift of economic gravity. Trade flows linked with Asia are becoming increasingly important. For example, imports of Latin America from Asia have grown by 36 % from 2003 to 2008. On the other hand, exports from Latin America to Asia during the same period increased by 25 % (Hausmann et al., 2015).

Furthermore, the number of megacities with nominal GDP above 100 billion dollars, that are also due to urbanisation, will grow from 16 to 109 in developing world. As a result of lowering differences in labour costs, manufacturing is rather moving to countries in the same region known as nearshoring (Hausmann et al., 2015).

Nearshoring in case of Europe would mean shifting production to Eastern Europe, in case of the US it would mean Mexico or Brazil. Moreover, companies increasingly rather decide to move production closer to the final market instead of raw materials (Fraunhofer-Institut für Materialfluss und Logistik et al., 2014).

Shared transportation. The emergence of shared economy affects transportation and logistics, as well. Different platforms are challenging traditional postal and logistics service providers. On those platforms, direct interaction and cooperation among parties at different levels of value chain is possible. There are also mobile applications which offer agreements with people, e.g. Facebook friends, to carry out deliveries. Additionally, last-mile delivery problem, more in detail discussed in section 3.6, is to some extent solved by pick-up and drop-off points or so called Packstations (Hausmann et al., 2015).

Digitalisation/disruptive technologies. Digitalisation could be one of the reasons that today so much data is generated (big data discussed under section 2.2). Moreover, customer expectations in terms of logistics service provision requires faster, cheaper, better, more flexible and comfortable deliveries.

Competitiveness/efficiency. Companies are forced to constantly invest into new technologies in order to retain competitiveness and operate efficiently. New channels and markets have to be implemented, too (Hausmann et al., 2015).

Deregulation/consolidation/cooperation. Europe banned high-emission vehicles from the city centres which is just one of the executed requirements addressing environmental concerns. This area is further discussed in section 2.5.

The EU's requirement to completely liberalise postal services by 2013 forced traditional players on the market to reform their services. Consequently, they extended the range of products as well as review pricing strategies (Hausmann et al., 2015).

Deregulation together with value-/cost-conscious world is opening new ways of collaboration as well as cooperation among companies that is more in detail presented in section 3.4.

High input cost/demand volatility. Not only the fuel prices but also the asset costs contribute to volatility that carriers are faced to, especially because they both highly impact the growth and profitability. The costs of assets accounts for between 20 % to 75 % of overall costs (Hausmann et al., 2015).

Another significant cost is fuel cost (Hausmann et al., 2015). E.g. in the US fuel costs account for around 63 % of total US logistics costs (Sahling, 2012).

Additionally, customers are price sensitive and demand is difficult to predict. Hence, a company may easily end up with excess capacity during downturn (Hausmann et al., 2015).

2 RECENT CHANGES

Not only the logistics and transportation sector is under the pressure of recent changes but the effects are also visible on the global economy as a whole. In the sections from 2.1 to 2.5, only those relevant for logistics and transportation are discussed.

2.1 Digitalisation

Digitalisation or digital transformation could be explained as the networking of people and things and the convergence of the real and virtual words that is enabled ICT. In the following decades, it is expected to shape all major industries in the country, e.g. healthcare, energy, manufacturing and mobility (Kagermann, 2015).

Digitisation is one of the industry changes that complicates business for many companies. As a result, frontiers between physical and digital worlds are blurring. Even though there are potential opportunities, many logistics service providers fail to include new practices into existing business processes or adapt them accordingly. However, companies that would successfully implement those practices, e.g. big data, telematics and cloud, would be top performers (Accenture, 2014).

Fraunhofer-Institut für Materialfluss und Logistik et al. (2014) state that technological development will automate business processes and, in this way, make them both faster as well as safer.

The effects of digitalisation can be well summarised with the statement by Pierre Nanterme, CEO of Accenture, who wrote that »… new digital business models are the principal reason why just over half of the names of companies on the Fortune 500 have disappeared since the year 2000 …« (Nanterme, 2016).

Even though transportation and logistics have historically lagged behind other industries in terms of embracing digitalisation, in the recent years those companies determined digitalisation potential, i.e. improving business results as well as making the difference in comparison with competitors (Benton, 2016).

Expectations are also that digitalisation impacts will be similar to those caused by mechanisation and electricity (Kagermann, 2015). Taking into account that digitalisation is taking place at the same time as or in parallel with globalisation and climate change, which are both seen as the most substantial changes faced by mankind, the impact of all these together indicates we are on the verge of significant changes.

In order to make the most out of digitalisation, digitalisation strategy should be developed otherwise the delivered outcomes in terms of return on investment (hereinafter: ROI) and competitive differentiation could not be realised to the expected extent (Benton, 2016).

According to von Leipzig et al. (2017), companies when digitising should constantly have in mind that improving customer experience in terms of better quality products delivered at a faster pace or digitising and improving communication and contact points to the customer further affects efficiency and effectiveness of the bottom line. Hence, improving customer experience should be a focus of the overall digital strategy.

Of equal importance is that digitalisation is taken at scale with the whole company and all organisational units included or else it is likely to fail. First, they should start with their existing assets and strengths and only then build on adjusting business and IT operating models (Hausmann et al., 2015).

Elements of digitalisation. In the research conducted by Westerman et al. (2014) where they interviewed 157 managers in 50 companies, nine elements of digitalisation were outlined as summarised in Table 1. The companies mainly focus on three key pillars inside which they may address different elements. However, not everything is transformed at once but managers should constantly keep an eye on finding new ways to adapt to market trends.

Table 1. Elements of Digitalisation

Key pillars	**Elements**
Customer experience	Customer understanding
	Top-line growth
	Customer touch points
Operational processes	Process digitalisation
	Worker enablement
	Performance management
Business model	Digitally modified businesses
	New digital businesses
	Digital globalisation

Source: adapted according to G. Westerman, D. Bonnet, & A. McAfee, *The Nine Elements of Digital Transformation*, 2014.

Triggers of digitalisation. The technology has been evolving for decades that it has come to the point when we can speak about such high connectivity level among devices (concept of Internet of Things discussed in section 2.2). Nowadays, microcomputers, sensors or actuators can be embedded into every object. Together with radio frequency identification (RFID), by Gartner defined as automated data collection technology that uses radio

frequency waves to transfer data between a reader and a tag to identify, track and locate the tagged item (Gartner, n.d.), this has become basic technology for recording, storing and processing data from surroundings (Kagermann, 2015).

As a result of decreasing cost and simultaneous growing capacity of processing power, memory size and network capacity, digitalisation is developing even further. Internet is ubiquitous using IPv6 Internet protocol, WLAN and also mobile communication. Thus, connection between different technologies is eased and can create synergies due to their convergence (Kagermann, 2015).

Maturity levels of digitalisation. Von Leipzig et al. (2017) define five levels of maturity of digitalisation starting completely without digital strategy and reaching the final stage when digital strategy becomes spread across all products and business processes. The levels are named as follows: unaware, conceptual, defined, integrated and transformed. However, the model only classifies the companies but does not serve as a guide to increase the maturity level.

Benefits from digitalisation. Considering logistics, technological progress can bring the following benefits especially in terms of different sensors (Accenture, 2014):

- Less errors in goods handling,
- Shorter lead times throughout the whole process,
- Less time and money for training the employees,
- Less paper work,
- Improved security.

Opportunities by digitalisation. Hausmann et al. (2015) define the following opportunities taken from going digital:

- Winning market share against rivals with better digital experience,
- Increasing market size with products and services customised using big data the companies own,
- Reducing costs in core processes, e.g. digital interaction with customers, digital back-office processes.

Challenges of digitalisation. Companies are increasingly forced to be proactive in order to retain competitiveness and increase customer value. This means addressing customer needs even before they realise them by themselves. Customer expectations are setting the bar higher and higher. At the same time, they are more informed but less loyal to one single company (von Leipzig et al., 2017).

Often, companies face a challenge of high implementation costs and risks, inadequate business processes, insufficient IT structure and lack of technical skills (von Leipzig et al., 2017).

Last but not least, especially in IT projects, people are a key factor that contribute to the success of companies' digital initiatives. Problematic is their unwillingness to change since they are used to the existing procedures. Moreover, until the employees are convinced there is a meaning in those radical changes they will not accept them openhandedly (von Leipzig et al., 2017).

Models of digitalisation. When companies decide to digitally transform, they may in general pursue one of the following two models, i.e. management models or radical change models. Examples of the former could be the Balanced Scorecard or the Performance Prism. Example of radical change models could be the Matrix of Change (von Leipzig et al., 2017).

Example of digitalisation. Encyclopaedia Britannica is an example of drastic business model change even though they were historically bound to the same business focus. As the oldest British encyclopaedia, its foundation dates back in the 18th century. Starting with printable version, they were, already in the 1990s, forced by the development on the market to move towards electronic version, too. Despite issuing printed version for almost 250 years, they reported a decision of keeping only digital version in 2012 (McCarthy, 2012).

This example perfectly fits to the idea developed in a report from Hausmann et al. (2015) where they state that companies have to "let go and learn". Although Britannica was traditionally known as printed encyclopaedia that served them well for centuries, the key to survival was to detect the trends and transform their business due to declining demand in the previous core business.

2.2 Internet of Things and Big Data

Today, systems and devices are equipped with sensors and actuators that automatically connect to the internet or to other devices, gather data as well as exchange it. Also actors or fields that traditionally did not have anything in common can today be connected or dependent. They communicate with each other by using sensors or microprocessors, e.g. RFID (Fraunhofer-Institut für Materialfluss und Logistik, 2014).

According to the World Economic Forum, there is a forecast of one trillion sensors connected to the internet by 2025 (World Economic Forum, 2015).

As a result of all those data gathering due to digitalisation and networking of objects, we started talking about two concepts, i.e. Internet of Things (hereinafter: IoT) and big data. As defined by Gartner (n.d.):

> »IoT is the network of physical objects that contain embedded technology to communicate and sense or interact with their internal states or the external environment. «

> »Big data is high-volume, high-velocity and/or high-variety information assets that demand cost-effective, innovative forms of information processing that enable enhanced insight, decision making, and process automation. «

These two concepts mean the access to huge amounts of data which are stored with the purpose of analysing and obtaining knowledge that presents key points for improving business decisions with more personalised, innovative goods and services (Kagermann, 2015). Its processing cannot be done manually but requires specific approaches (Nigarika & Ritu, 2015).

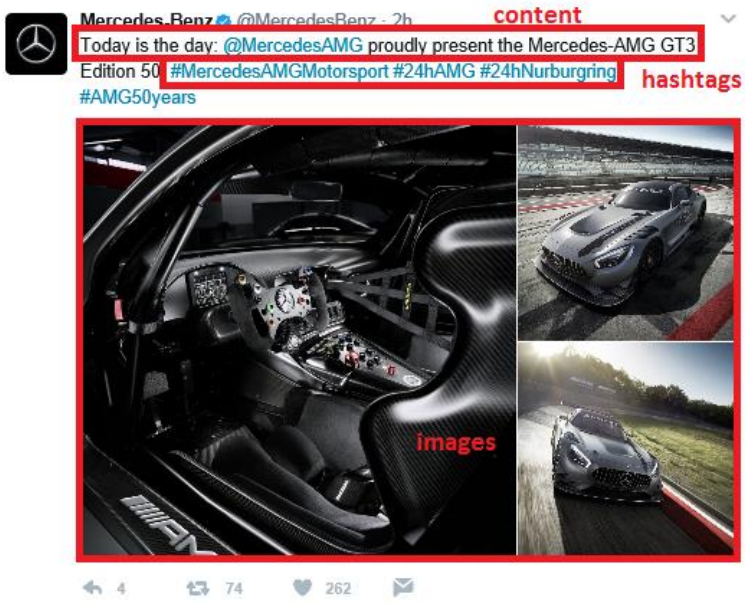
Considering the analysis of huge data amounts, companies encounter on a problem due to data structure. Historically, data models were in the form of tables, e.g. E-R models, that indicate structured data where you exactly know what each column is about. This is easier to analyse. Oppositely, 90 % of data, that is today in the form of tweets and photos from social media, customer purchase history and customer service calls, is usually unstructured (International Business Machines Corp., n.d.).

If the structure is not predefined, there are problems with analysing. Hence, some more advanced methods and tools have to be used, e.g. Hadoop. Usually, prepositions and conjunctions have to be removed before analysing. Moreover, we have to check the context of the post since it may give us the correct meaning only at that time.

Also, the content has to be taken into account to correctly understand the message. When somebody writes in a tweet »I really hate beer, but I love Heineken. «, this can be misunderstood. If a person says »hate« and »Heineken« in the same statement, a tool might understand these two words are related even though each of these them is actually declared in separated part of the statement (Jaklič, 2016/2017).

Taking the example of a tweet on Twitter, Figure 3 shows that there still is some predefined structure but it is not necessarily respected. The main part of the tweet is content part where a text sentence is written. This is followed by hashtag part which outlines keywords. Additionally, images, videos or URLs can be incorporated.

Figure 3. Example of a Tweet



Source: Twitter International Company, *Mercedes-Benz*, 2017.

Importantly, big data is not only about the amount of data, i.e. volume, but other three V's namely velocity, variety and veracity, as well. Only recently the fifth V value has been added to the big data definition (International Business Machines Corp., n.d.). Fast development of new technologies quickly solves the problem of volume while velocity is more problematic. Even if the company gathers data with higher speed, this is not enough until they process it at higher speed, too.

Using big data and data analytics, logistics service providers can improve planning and optimise routes, enhance customer experience in terms of new product development or constant service improvement, mitigate supply chain risks and make the overall supply chain more efficient, transparent as well as visible (Accenture, 2014).

The following two statements summarise the main big data messages (European A.T. Kearney, 2015, pp. 9). Manuel Galitschke, Cadenzza, things that: »There's no shortage of data. Picking out the important data, analysing it, and incorporating it into the ongoing business is crucial. « His thoughts could be continued by the opinion of Franz-Peter Kayser, Tchibo: »The data is already there. It just needs to be utilised and evaluated appropriately. «

The most significant effect of big data analytics for the companies that mostly produce their products to order rather than to stock is expected to be seen on inventory levels, i.e. reduction of 52 % in outbound inventory and 40 % in inbound inventory. Also, there are high expectations to optimise batch sizes and reduce supply chain management risks (A.T. Kearney, Inc., 2015).

2.3 Cloud Services

Cloud services are services made available to users on demand via networks from data centres operated by cloud computing providers (Duan, 2017). Cloud services make the storage for exponentially rising amount of data more affordable. When stored there, it can be processed (Kagermann, 2015).

Cloud services ease connections with different partners that may be many inside the supply chain. It is also easier to comply with diverse standards, formats and communication channels. Several partners are cross-connected and thus only one connection is needed among them (Accenture, 2014).

Other benefits offered by cloud services are as follows (Nigarika & Ritu, 2015):

- lower costs for users,
- higher flexibility for high quality,
- efficient, timely and real-time information,
- adding new rules easily,
- more accurate delivery,
- minimised loss of stock,
- help in forecasting,
- sharing the resources between small and global companies,
- better information security in case of increase in business transactions.

In Germany, EffizienzCluster LogistikRuhr set a project smaRTI introducing cloud services, RFID transponders and bar codes for real-time tracking of load carriers with the following goals: to speed up the processes, reduce waiting times and cut unnecessary costs (Kagermann, 2015).

Nigarika and Ritu (2015) suggest the following six-layer cloud architecture which is briefly described below:

- Data layer is tracking data items, e.g. with barcodes, boxes, containers, pallets, parts, RFIDs, warehouses,
- Identification layer is implementing user interface in order to encode application use of a barcode, e.g. using batch scanners, label printers, mobile scanners, RFID scanners, USB scanners, wireless scanners,
- Information layer is collecting multiple data or information, e.g. from barcode/RFID, about locations/source/destination, operation/action,
- Logistics as a service is providing services anywhere and at any time, e.g. identification of data items, capturing the information, applying business rules, authenticating users,

- Interface layer is accessing the data, information, reports and performing operations, e.g. using Excel spreadsheet, text file, Google Drive, Dropbox,
- Application layer is defining the application of the system for specific business.

2.4 Changes in Population and Customer Habits

Nigarika and Ritu (2015) state that changes in demographics affect logistics services. First, growing world population encourages economic activity that means increased production and distribution of goods. Second, the demand for logistics services is growing and logistics providers have to address those challenges.

Considering customers, factors influencing the phenomenon of urban logistics are consumption patterns of the population, their age structure and climate change (Kauf, 2016).

Individual customers are becoming as demanding as business customers. They expect to experience the services to which they are used to in one industry also in other industries (von Leipzig et al., 2017). Moreover, customers require either provision of services or delivery of goods based on door-to-door strategy and not transport mode anymore (Leviäkangas, 2016).

Urbanisation and the spread of e-commerce have changed consumption behaviour, too. Mobile technologies enable new ways of communication and purchasing which further direct the emergence of new channels, distribution processes or urban logistics terminals, particularly for the last-mile delivery (Kauf, 2016).

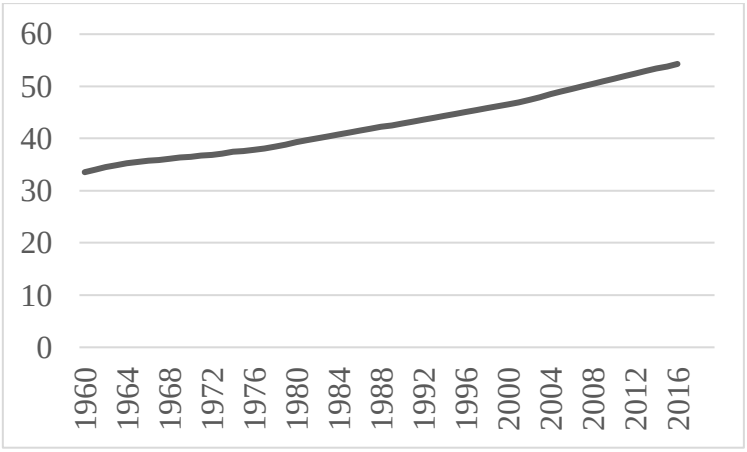
Age structure of population is changing, i.e. the percentage of youths is decreasing while the percentage of middle-age generation and elders is increasing (The World Bank Group, n.d.c).

2.4.1 Urbanisation

Unites Nations Population Division is collecting the data about urban population which is by the same organisation defined as people who live in urban areas. According to Figure 4, the growth of urban population in the world can be detected. In 1960s, there was 34 % of world population living in urban areas while the percent for 2015 was 54 % (The World Bank Group, n.d.b).

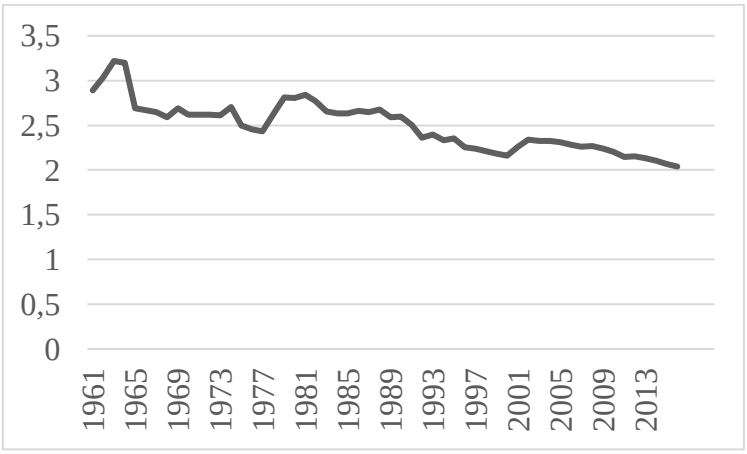
Annual growth of urban population has stabilised between 2 % and 2.1 % after year 2014 which can be seen from Figure 5 (The World Bank Group, n.d.b).

Figure 4. World Urban Population, % of Total, 1960-2015



Source: The World Bank Group, *World Development Indicators*, 2017.

Figure 5. World Urban Population Growth, Annual %, 1961-2015

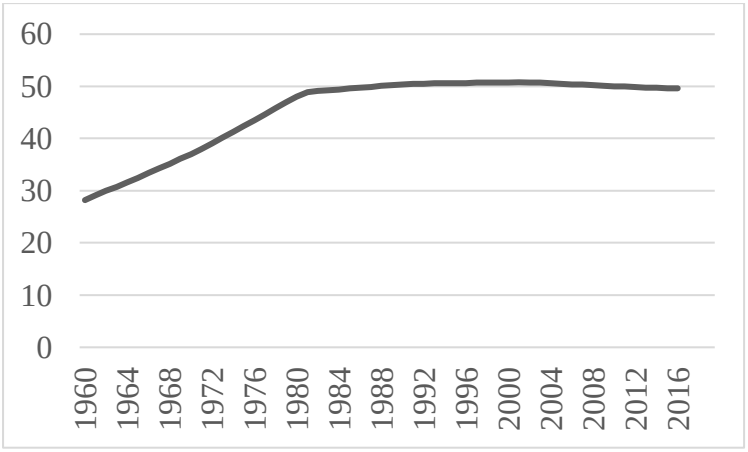


Source: The World Bank Group, *World Development Indicators*, 2017.

Moreover, in the past, the trend was more towards opening retail outlets in peripheral areas where the access with different modes of transport was easier. Oppositely, in the recent years they are being revived in city centres, e.g. railway stations (Kauf, 2016).

Comparing the data above with Slovenian data in Figure 6, we can outline that in the seventies Slovenia started with lower percent of urban population, i.e. 28 %, while it achieved 50 % already in 1990s and is maintaining the level from that time on (The World Bank Group, n.d.a).

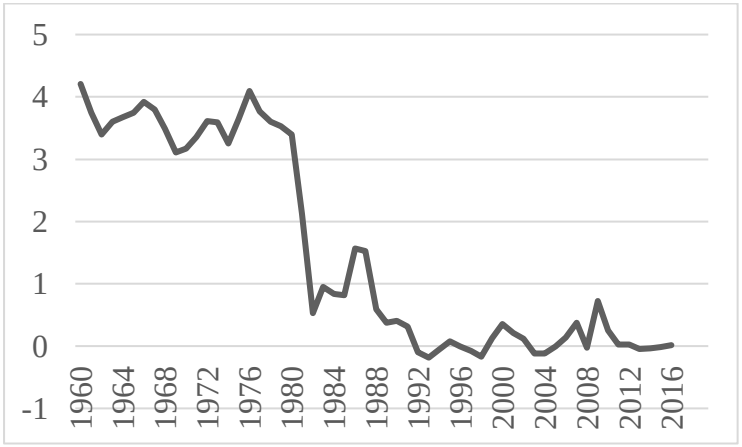
Figure 6. Urban Population in Slovenia, % of Total, 1960-2015



Source: The World Bank Group, *World Development Indicators*, 2017.

In Slovenia, the growth in urban population has also been gradually reducing from the middle of the century when it was 4.2 % to 0 % which is the case from the year 2011 on as presented in Figure 7 (The World Bank Group, n.d.a).

Figure 7. Urban Population Growth in Slovenia, % of Total, 1960-2015



Source: The World Bank Group, *World Development Indicators*, 2017.

One of the reasons for concentration of the people in the cities is their strive towards better quality of life. Megacities with population over 10 million inhabitants are developing and becoming centres of population, economic activity as well as pollutant emissions. Moreover, this worsen traffic congestion and air quality (Taniguchi, Thompson, & Yamada, 2014).

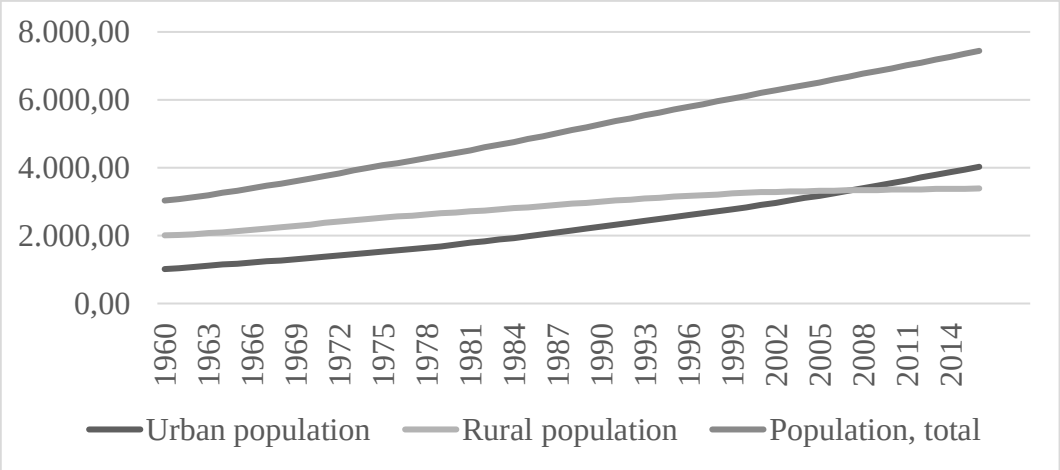
On the other hand, due to CO_2 emissions caused by transport which accounts for one quarter of all emissions, European cities are becoming less liveable and accessible. If the policy remains unchanged and the economic growth fluctuates between 1.2 % and 2.2 %, according

to the EC's scenarios, personal transport is expected to increase by 51 % and freight transport by 82 % in the period from 2005 to 2050 (European Commission, March 2011).

With CIVITAS Initiative, further discussed under section 2.5.2, the authorities aim towards greenhouse gas emission reduction and elimination of CO_2 logistics from major urban centres (CIVITAS Initiative, n.d.a).

Figure 8 summarises above mentioned trends from where we can conclude that declining rural population is compensated by increasing urban population. In 2050, it is expected that over two thirds of population will live in the cities.

Figure 8. Urban and Rural World Populations in Comparison with World Population, millions, 1950-2050



Source: The World Bank Group, *World Development Indicators*, 2017.

2.4.2 Age Structure

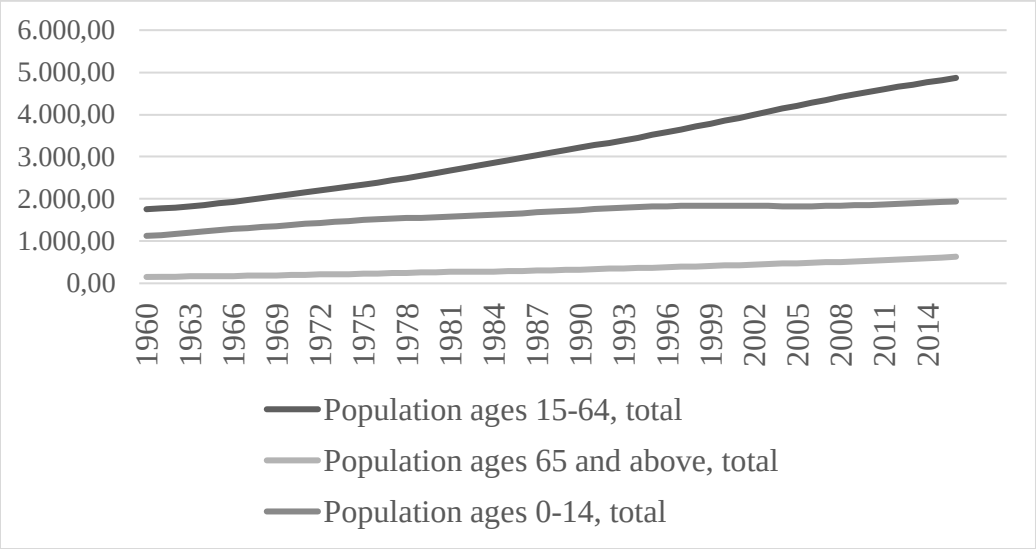
Another trend regarding population that can be noticed in the world is aging population. From 1990 till today, Figure 9 shows a rise in the category above 65 while the youngest age category is maintaining its level.

Changing population structure requires different services in terms of medical treatment. Despite aging, citizens want to retain both fitness as well as activeness that accordingly require different range of products and services addressing their needs with quality, efficiently and cost-effectively, especially regarding everyday use goods, medicines and medical care services (Kauf, 2016).

This incurs the costs which are a burden for country's budget. Kagermann (2015) as a potential solution suggests e-health for lowering the costs with personalised treatment, e.g.

individual patient records with genetic make-up and psychological parameters, algorithms with clinical expertise. Further, new healthcare market actors will offer effective treatment options focusing on prevention and treatment of diseases.

Figure 9. World Population Age Structure, millions, 1990-2016



Source: The World Bank Group, *World Development Indicators*, 2017.

2.4.3 E-Commerce

In addition to technological changes, one of the recent developments, that enabled such progress in terms of either customer habits or distribution, is e-commerce.

E-commerce involves transactions when selling products and services over the internet. Even though this type of business is not yet completely trusted by consumers, there is a continuous growth in its use detected (Tiago, Alhinho, Rita, & Dhillon, 2017).

To consumers, e-commerce offers a chance not to drive to physical stores and hence save money for driving, especially when living farther away. Since ordered goods are delivered to their address, they can decide to live in areas with lower living costs where air quality is better as well as traffic conditions are (Shao et al., 2016).

Ecommerce foundation yearly issues a report about global B2C e-commerce. In the last report about year 2015, not the whole world was covered but only the influential countries in their regions. The selection list is provided in Appendix B.

The report shows growth of 19.9 % in comparison with the year before. The B2C e-commerce turnover accounted for 2.273 billion dollars. Next, the forecasts for the following

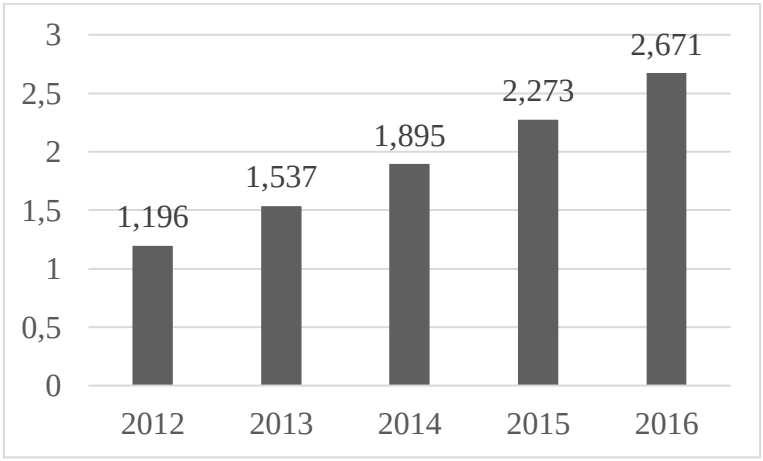
year do not predict any slowing down in growth since planned increase is 17.5 % (Ecommerce Foundation, 2017).

E-commerce represented 3.11 % in GDP while online shopped goods accounted for 7 % in total retail of goods.

Region with the highest amount of online purchased goods and services was Asia-Pacific accounting for almost half of the whole sales (46 %) followed by North America (28 %). The highest growth of 28 % was recorded in both, Asia-Pacific as well as Latin America (Ecommerce Foundation, 2017).

Figure 10 shows that the sales are increasing steadily in the last four years. Even though the growth rates have slowed down as figured out in Figure 11, they are still significant but at the same time indicate the market is becoming more mature (Ecommerce Foundation, 2017).

Figure 10. Global B2C E-Commerce Sales, billions, 2012-2016

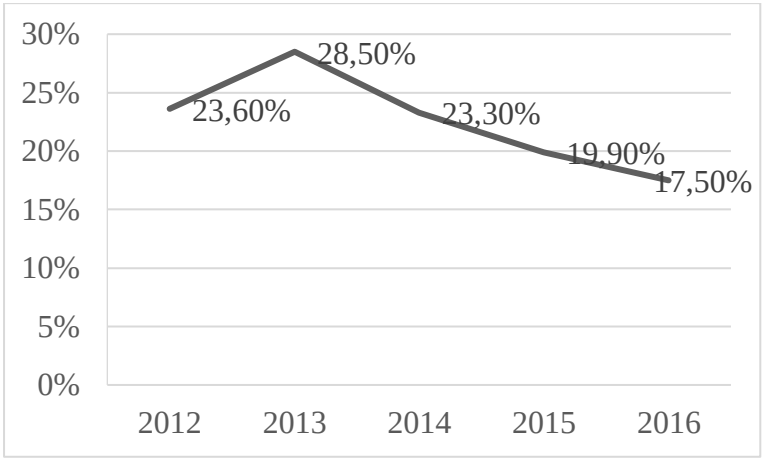


Note. Year 2016 is a forecast.

Source: Ecommerce Foundation, *Global B2C E-commerce Report 2016*, pp. 18, 2017.

In the European Union (EU), the percent of individuals who are purchasing online is also increasing as can be seen from Figure 12 and Appendix C. In 2016, the share of those individuals has almost reached half of all individuals. Although Slovenia is progressing in the same direction, they still lag behind the European average (Eurostat, 2017b).

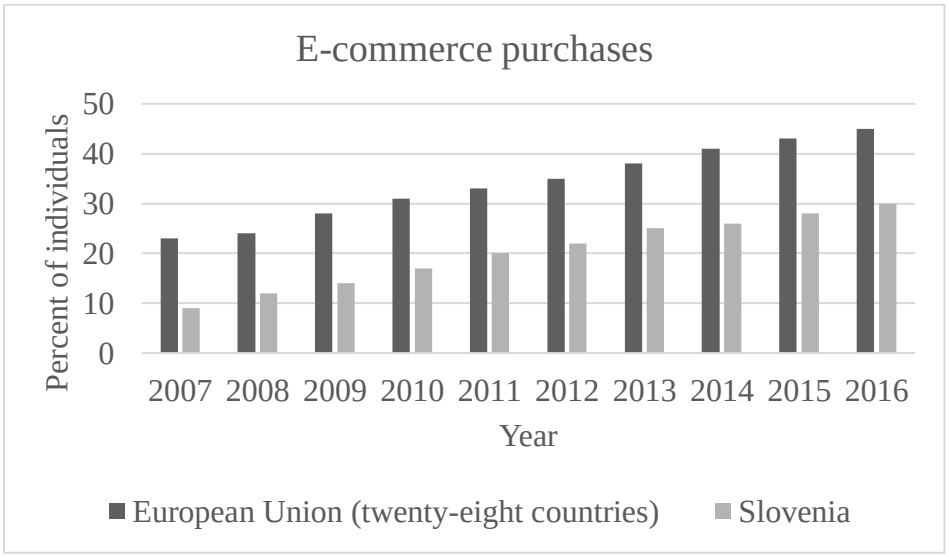
Figure 11. Global B2C E-Commerce Growth Rate, %, 2012-2016



Note. Year 2016 is a forecast.

Source: Ecommerce Foundation, *Global B2C E-commerce Report 2016*, pp. 18, 2017.

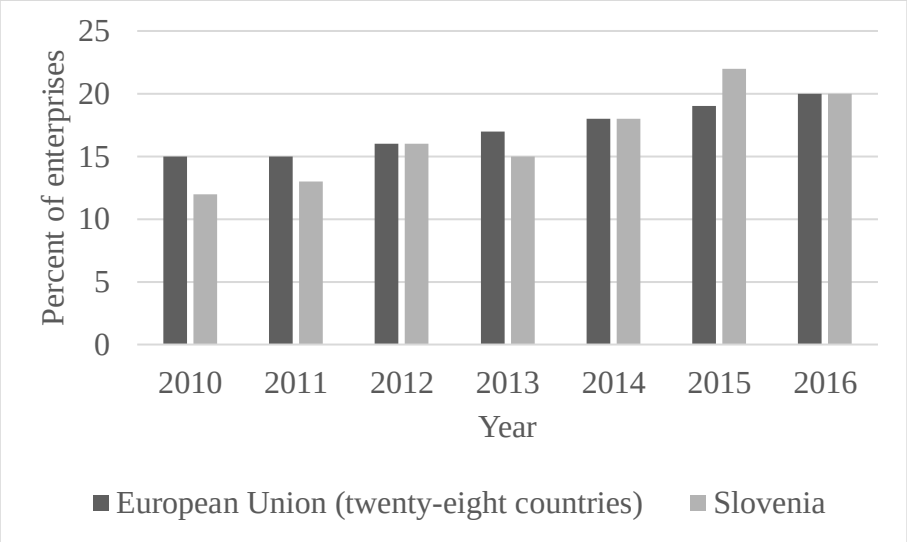
Figure 12. E-Commerce Purchases in EU (Twenty-Eight Countries) and Slovenia, 2008-2016



Source: Eurostat, *Internet purchases by individuals*, 2017.

Considering enterprise level, around 20 % of companies have already received their orders for sales from online sources. Here, the changes from year to year are not as significant as in the case of the growth discussed above. Slovenia matches with the European average as shown in Figure 13 (Eurostat, 2017b).

Figure 13. E-Commerce Sales at Enterprise Level in EU (Twenty-Eight Countries) and Slovenia, 2010-2016



Source: Eurostat, *Internet purchases by individuals*, 2017.

Increased use of e-commerce is making customer demand more and more variable over time which makes forecasting more difficult. If in the past building a model and running it was enough to implement the obtained solution, nowadays strategies have to be reviewed several times before implementation (Speranza, 2016).

Collecting data from social and other digital media results in big data. With the use of data analytics, in-depth understanding of customers can be gained about what makes them happy and what is unsatisfactory for them.

A customer is the one who determines the delivery requirements expected by e-commerce services. Those requirements are reliability, speed, mobility and proximity (Ducret, 2014). Nevertheless, Shao et al. (2016) still point to the issues with e-commerce that lowers its value in comparison with traditional channels, i.e. lack of service, delayed satisfaction and difficulties to return the products that do not suit you.

In the future, the companies will try to find ways how to discourage consumers from fast deliveries or decide based on other factors when shopping online (Fraunhofer-Institut für Materialfluss und Logistik et al., 2014).

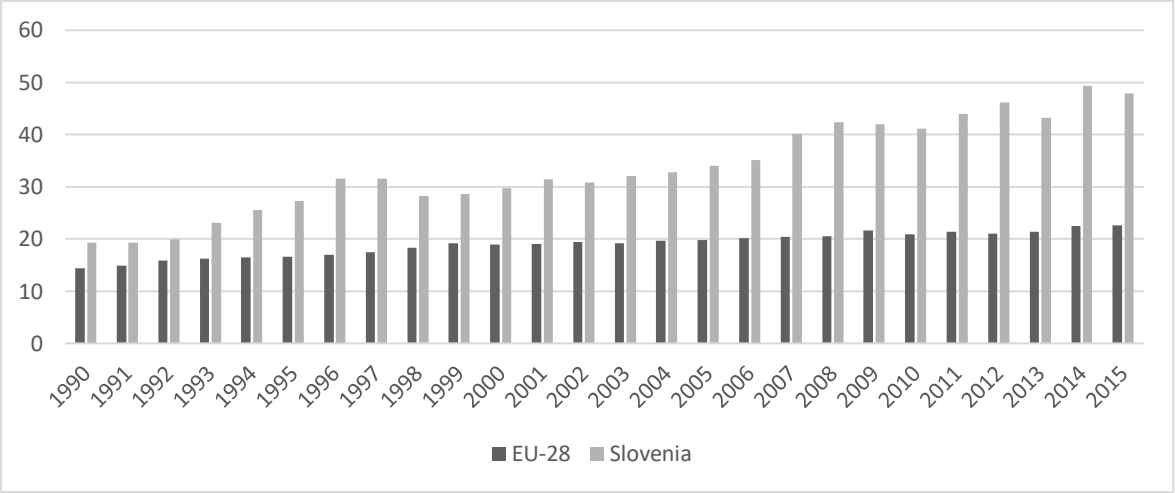
2.5 Sustainable Development and Environmental Concerns

Nowadays, reducing costs and at the same time increasing profits is not anymore the major objective towards which the companies are aiming but sustainability is gaining on its

importance. Operations research is a science that focus exactly on introducing more efficient use of resources not only in terms of reducing costs but also creating less greenhouse gas emissions and finding an appropriate trade-off between those factors (Dekker, Bloemhof, & Mallidis, 2012).

Considering 28 EU member states (hereinafter: EU-28), the share of total greenhouse gas emissions in total emissions is slightly but steadily increasing from year to year. In 2014, it accounted for a little bit less than 21 % which can be seen from Figure 14. The percentage is higher in Slovenia that was at similar levels as the EU at the beginning of the millennium but worsened in the last decade (European Environment Agency (EEA), 2017).

Figure 14. Share of Total Emissions in Transport Share of total emissions (Tg million tonnes), %, 1990-2014



Note: EU-28 is considered in the calculation because the United Kingdom is still included in historical data even though it has exited the European union

Source: European Environment Agency (EEA), *EEA greenhouse gas – data viewer*, 2017.

Increased urbanisation, which was more in detail discussed in section 2.4.1, redirected delivery to city centres to huge extent. Greenhouse gas emissions caused by congestion further worsen the situation with environmental pollution and global warming. These are the concerns that are leading public authorities in strategy development (Ducret, 2014).

They are forced to find a solution taking into account several factors, i.e. sustainability, mobility, quality of life and efficient urban goods distribution in terms of both environmentally friendliness as well as satisfaction for distribution companies (Melo in Melo et al., 2014).

The factors that are affecting CO_2 emissions in transport are mode choice, intermodal transportation, equipment choice and efficiency, fuel choice and carbo intensity. Intermodal transportation and fuel choice are more in detailed discussed in section 3.3 while in the paragraphs below the light is shed on the other two (Dekker et al., 2012).

The decision about mode choice is subjected to the type of the product and the distance to be travelled. In terms of equipment, the choice about the type and size of transportation unit has to be made. The higher the transportation unit the fewer the CO_2 emissions per kilogram transported in case of appropriately utilised level of loading (Dekker et al., 2012).

In many European cities, goods distribution vehicles have at least limited if not forbidden access to the city centre. Limitations used for this purpose are e.g. time windows, pedestrian zones, one-way streets, congestion charges. Also, pilot projects with urban distribution centres were conducted (Ducret, 2014). In case of restrictions, we can speak about low emission zones (hereinafter: LEZ) defined as zones where the focus is on promoting cleaner vehicles in city centres (Taniguchi et al., 2015).

As banned access is already a commonplace in Europe, some cities are planning to go even a step further. Oslo, Milan, Dublin, Paris, Madrid and Brussels announced campaigns to introduce the areas that will be completely car free. On the other hand, they will either strengthen bicycle infrastructure or public transport (Jaffe, 2015).

2.5.1 Europe 2020

In 2010, José Manuel Barroso prefaced Europe 2020, a strategy for smart, sustainable and inclusive growth, with the following words (European Commission, 2010 pp. 2): »To achieve sustainable future, we must already look beyond the short term. Europe needs to get back on track. Then, it must stay on track. That is the purpose of Europe 2020. «

In terms of sustainable growth, priorities are aiming towards more efficient resources, greener and more competitive economy (European Commission, 2010).

In the strategy, five measurable EU targets were set addressing the employment, research and innovation, climate change and energy, education and combating poverty. These serve as a direction for national targets (European Commission, 2010).

Regarding climate change and energy sustainability, more precise targets, that should be achieved by 2020, are defined as follows (European Commission, 2010):

- Greenhouse gas emissions reduction by at least 20 % compared to 1990s levels,
- Increase in the share of renewable energy consumption in final consumption to 20 %,

- Increase in energy efficiency for 20 %.

For Slovenia, country specific recommendations proposed 25 % as the share of renewable energy. In 2014, the country was steadily progressing towards achieving this target with 21.9 %. The problem noticed at that time was a lack of development strategy in the transport sector where the percentage was only 2.6 %. In 2020, the share of renewable energy in transport should be 10 %. Also, achievement of greenhouse gas emission reduction is on track (European Commission, 2016).

It is further proposed to increase energy use by at least 40 % until 2035 and at least 8 % until 2055 (European Commission, 2016).

2.5.2 CIVITAS Initiative

The EC was aware of the importance of urban logistics as an important prerequisite for successful functioning of the cities and started addressing it in the Urban Mobility Package which was launched on the 30th September 2009 (European Commission, 2012). There, they addressed six topics regarding urban logistics which were expected to take place in the three following years. Two out of those six topics directly refer to the content of my master's thesis (Commission of the European Communities, 2009).

First, for greening urban transport the plans consist of introduction of new, cleaner, vehicles using alternative fuels. Also, the users are expected to pay for externalities in terms of congestion, environment or other incurred costs. Second, urban mobility is planned to be optimised, too, where effective integration, interoperability and interconnection play a central role (Commission of the European Communities, 2009).

The EC already in 2002 launched the CIVITAS Initiative which is a network between European cities and also cities from other continents addressing the achievement of cleaner and better transport (CIVITAS Initiative, n.d.a). Its name consists of CI for city, VITA for vitality and S for sustainability. It was cofounded by the EU and one of included thematic categories tackles urban freight logistics (van Rooijen & Quak, 2014).

Almost 70 cities are a part of the initiative as demonstration cities which means they have implemented or are implementing the measures while there are around 250 cities overall which are participating and learning from experience of the demonstration cities. Ljubljana is one of the latter and took place in the second edition of initiative implementation (van Rooijen & Quak, 2014).

There have already been many successfully implemented examples during the initiative. Demonstration measures regarding smart goods delivery took place in 30 cities with 40

measures altogether between 2002 and 2012. The goals were focused on more efficient goods delivery using information systems which support the use of clean vehicles, bikes and boats. Local authorities were also obliged to cooperate with logistics providers. They introduced delivery time windows, delivery to home or park-and-ride sites, urban distribution centres, consolidation of goods and piping logistics (CIVITAS Initiative n.d.c).

The measures listed above can contribute to the positive effects for both, companies as well as cities. By reducing mileage and avoiding road congestion, companies are able to save money and time. Furthermore, streamlining collection and delivery processes can increase productivity. Positive effects on the city can be observed in higher safety, less pollution and less noise (CIVITAS Initiative n.d.c).

CIVITAS ELAN. Slovenian capital city, Ljubljana, is a part of CIVITAS ELAN strategy in which the plans for five European cities regarding more sustainable, cleaner and energy saving progress are set (Prometni institut Ljubljana d.o.o., n.d.b). A lot can be learned on the basis of good practices from abroad. Prometni institut Ljubljana d.o.o. (Eng. Institute of Traffic and Transport Ljubljana l.l.c.) as a responsible authority for this project mentions the examples of Copenhagen, Bristol, Reggio Emilia and Ravenna (Prometni institut Ljubljana d.o.o., n.d.c).

The project's fundamental guideline is to include the citizens into a common vision of city mobility as well as to become an example to show the other cities how to address transportation problems sustainably. More specifically, introduction of new yellow lines for public transport as well as improved pedestrians and cyclist's infrastructure is planned (Prometni institut Ljubljana d.o.o., n.d.a).

Example of implementation in Craiova. In Craiova, Romania, they focused on implementing sustainable mobility in the city centre between 2008 and 2012, especially for fruit and vegetables distribution while industrial and commercial companies are still independent (CIVITAS Initiative, n.d.b).

They limited the access to two periods during the day, i.e. two hours in the morning and two hours during the night. Before implementation, the following characteristics were identified and investigated: existing situation, downtown plans, documentation on closing the city centre, current freight regulations and the area for goods distribution. The expected outcomes were pollution level reduction in the city centre and smoother as well as more regulated goods distribution (CIVITAS Initiative, n.d.b).

3 EFFECTS OF RECENT CHANGES

The number of the world's population and the volume of global trade are growing. Hence, the demand for transportation is higher in both, freight as well as passenger transportation (Fraunhofer-Institut für Materialfluss und Logistik et al., 2014).

Expectations for next-day delivery and more frequent ordering of goods from online stores bring about smaller consignments and thus increased traffic congestion. The latter is also a consequence of urbanisation trends. With all these, environmental status, air and noise pollution, resource consumption, waste disposal and other similar concerns are arising (Fraunhofer-Institut für Materialfluss und Logistik et al., 2014).

Not all industries, countries or sectors make the use of ICT to the same extent since the opportunities as well as challenges are different across different industries. Some industries or companies may even completely reshape their business models or products (A.T. Kearney, Inc., 2015). Also in the opinion of A.T. Kearney, Inc. (2015), the difference in the extent to which companies will transform depends on the industry and company itself.

Additionally, companies or more specifically managers of business functions in the company which is going digital have to be aware that not only digitalisation of their own function is enough but at least the company as a whole if not also external partners of the company have to be covered (A.T. Kearney, Inc., 2015).

Full potential of digitalisation is still not utilised in many industries. Transport is one of the sectors that has only lately in comparison with other sectors moved towards digitalisation (Leviäkangas, 2016).

Leviäkangas (2016) points out that the effects of digitalisation can be negative in the period from the first five to ten years while in the long-term can be anything ranging from extremely negative to extremely positive. The actual result depends on the country's ability to compromise between its natural strengths and weaknesses.

The impacts on companies' profitability are mostly positive which is not the case for employment. Many jobs or even entire sectors may disappear. On the other hand, new jobs could be created (Leviäkangas, 2016).

Reducing transportation may negatively affect countries' budget if the amount of collected taxes lowers. In contrast, reduction in emissions at the same time could improve the state of the environment in terms of pollution and reduced use of natural resources (Leviäkangas, 2016).

Kagermann (2015) on the example of Germany states that the Internet of Things, Data and Services or Internet of Everything will be of vital importance for Germany to maintain its current position as well as stay competitive and successful in the future. The country has to innovate in order to allow its industry to cope with pressure from the environment.

In the following sections from 3.1 to 3.6 some adjustments on all mentioned changes are described. Furthermore, there are also the examples how either companies or governments are addressing those changes in their strategies.

3.1 Greener Logistics

When speaking about environmental concerns in transportation and logistics, a term of green logistics come up to the mind. The decisions about green logistics are mostly strategic. Nevertheless, the decisions may also be taken on a daily basis, e.g. equipment allocation, route navigation and vehicle routing (Dekker et al., 2012).

Green logistics can be a competitive advantage for companies since it could contribute to improve company's image showing social responsibility (Fraunhofer-Institut für Materialfluss und Logistik et al., 2014).

Usually, the algorithms addressing greener logistics focus on minimising travelled kilometres, e.g. travelling salesman problem, while Suzuki (2011) studied the effects of weight of the delivery packages on fuel consumption and pollution emissions. He proved his thesis that not only minimising travel distance leads to lower fuel consumption, and consequently lower pollution, but also other factors have to be taken into account in order to get an optimal solution. The latter is usually different in case of fuel-efficient routes if comparing them to shortest-distance routes.

He focused on more specific travelling salesman problem with time windows where delivery vehicles start from and return to the same depot, visit each customer exactly once and at specific time window. Further, he proposed three different models and made simulations, too. The results showed a decrease in fuel consumption of vehicles when first delivering heavier loads and then moving on to the lighter ones (Suzuki, 2011).

Considering shortest-distance approach, fuel savings between 4.9 % and 6.9 % were detected. In minimal-fuel approach, expected savings were between 1 % and 3.1 % (Suzuki, 2011).

3.2 Traffic Congestion

Increased mobility due to more frequent deliveries causes more traffic and consequently higher level of congestion along with air pollution and noise. Therefore, in optimisation of logistics, addressing the costs is not anymore of higher importance than eco-efficiency or adaptability (Kagermann, 2015).

Shared transportation could ease the traffic congestion in the cities. As soon as the legal barriers will be overcome, this will force traditional operators to respond (Hausmann et al., 2015).

Also, multimodal transportation offers an opportunity to lower congestion (Fraunhofer-Institut für Materialfluss und Logistik et al., 2014). According to Dekker et al. (2012), multimodal or intermodal transport means using multiple transport modes instead of single transport load unit. More coordination is needed in order to organise it efficiently. Even though single transport mode would be the fastest way of transportation, it is costlier and less environmentally friendly.

Interestingly, Shao et al. (2016) in their article state exactly the opposite about traffic congestion. Their affirmation is that e-commerce will alleviate traffic congestion with redirecting consumers from physical stores to online stores. Moreover, it might also reduce costs for consumers since there is no need for traditional channels and driving to the physical stores if using online stores.

Nevertheless, online shoppers receive home deliveries which still incur road usage but economies of scale allow for lowering the usage (Shao et al., 2016). Empirical simulation in Finland indicates the potential reduction is between 54 % and 93 % (Siikavirta, Punakivi, Kärkkäinen, & Linnanen, 2002).

However, in practice the congestion may depend upon several factors ranging from time of the day to road link, usage of road, information provision, demand uncertainty and user characteristics that determine the actual reductions (Shao et al., 2016).

Fernández, Fontana, and Speranza (2016) share the opinion about several factors contributing to the congestion, too. Apart from the number of vehicles, the paths where delivery vehicles drive and the time of the day when they drive are of equal importance.

Problematic is driving at the same time on the same road by too many vehicles. Therefore, today different tools and technologies can propose the most optimal route to a driver taking into account the distance and time travelled (Speranza, 2016).

3.3 Night-Time Deliveries and Alternative Vehicles

As already mentioned, there is a potential for rescheduling deliveries to night-time, especially in case of cities where the population is recently more concentrating. Concerns for this shift are in law which restricts noise creation by current technologies in use depending on the part of the day.

In the decision of the European Parliament and the Council from November 2013, high level of noise is defined as the number higher than 55 decibels during the day or higher than 50 decibels during the night. According to this definition, more than 65 % of European citizens who live in urban areas are exposed to high level of noise and the same holds true for 20 % of citizens in the night time. Too high level of noise has negative consequences on health (The European Parliament & the Council, 2013).

The most concerning noise emitter is road transport since it is widely spread while the airports for air transport are concentrated. Also, the railway transport is more concentrated and road transport has the lowest potential to be controlled (Nugent, 2017).

The European Commission set year 2017 as very important for noise pollution reduction. Hence, they are trying to raise awareness, overview the current practices in this area and introduce new; everything in order to improve the current situation (Nugent, 2017).

Engine noise produced by delivery vehicles can be reduced by replacing conventional engines with electric or hybrid vehicles. Noise barriers and loading technology that is quieter can be used in order to limit the noise by stationary and unloading vehicles. Last but not least, employees should respect the rule of not being louder than devices when using them or in their behaviour in general (Fraunhofer-Institut für Materialfluss und Logistik et al., 2014).

Ducret (2014) proposes several alternative vehicles which are already in use by delivery service providers that want to satisfy regulations as well as meet their own commitments. Those vehicles are electric cargo bikes, electric vans, bicycles and tricycles. Apart from electric vehicles, there is a potential for compressed natural gas-powered and liquefied natural gas-powered vehicles or hydrogen fuel cell, as well (Fraunhofer-Institut für Materialfluss und Logistik et al., 2014).

Melo et al. (2014) studied the effect of small-sized electric vehicles (hereinafter: SEV) on goods distribution. SEVs are defined as smaller vehicles in comparison with conventional commercial vehicles that are powered by electric engine instead of internal combustion engine. They are beneficial because they occupy less space and are easier to park, safer to pedestrians and more environmentally as well as noise friendly. However, they are also less

spacious in terms of capacity, thus being unable to transport bigger and heavier parcels, and slower with the average speed of 28 kilometres per hour. Moreover, not only are the refuelling facilities insufficient in number but also are they difficult to maintain.

Speranza (2016) refers to hybrid electric vehicles, battery electric vehicles and plug-in hybrid electric vehicles as electric vehicles which are seen as an alternative to traditionally used diesel vehicles in order to improve or at least maintain the current environmental status. The increase in their use is further resulting from increasing number of charging stations and also expectations of a decrease in costs.

In 2016, there was a record number of registered electric cars while the sales have slowed down and fallen under 40 % for the first time since 2010 (International Energy Agency, 2017).

It is estimated that the proportion of pure battery vehicles (below: BEV) will reach almost 25 % by 2030 and further increase to 33 % in 2050 considering EU-28 (Kasten, Bracker, Haller, & Purwanto, September 2016). Moreover, the estimates for electricity demand by electric cars will attain the level between 4 % and 5 % in total electricity demand by 2030. The impact will be even more evident in the long-term, i.e. by 2050 when the electricity demand by electric cars will represent 9.5 % of total electricity consumption (European Environment Agency (EAA), 2016).

Bechtsis et al. (2017) studied the effects of Automated Guided Vehicles (hereinafter: AGV) on sustainability which is not the only positive consequence of their use. AGVs are at the maturity stage of development and among others offer the benefits such as increased productivity, labour cost savings, reduced energy consumption and emissions and enhanced safety.

Nonetheless, electric vehicles cannot reduce the number of travelling vehicles on the roads and thus problems with congestion or parking space. Either we have to decrease the number of commuters or increase the number of people travelling together (Speranza, 2016).

People are used to flexibility resulting from owning a private vehicle that speaks against mass transit systems where itineraries and schedules are usually fixed. These systems are not seen as appropriate if transportation demand is dispersed in space and time, it requires quick response as well as short travelling time (Speranza, 2016).

Suzuki (2011) in his research, as one of possible solutions for fuel consumption reduction proposes delivering heavy items at the early stages of delivering and later on continuing with lighter items. In this way, distributors may consume from 4.9 % to 6.9 % less fuel on shortest-distance approach or from 1 % to 3.1 % on minimal-fuel approach.

In addition, Taniguchi (2014) emphasise the differences in fuel consumption depending on the engine size and the driving cycle. In urban areas, accelerations and braking are more often in comparison with rural areas where fuel consumption is then lower.

Dekker et al. (2012) report about limitations of electric vehicles that may require reloading or recharging. Still, they are cheaper than trucks and mostly used for city distribution in combination with a transfer station, i.e. mobile hub, in the city or just outside it.

Browne, Allen and Leonardi (2011) made a trial focusing on the effects of electric vans and tricycles that were used for deliveries from a suburban depot near London to the City of London. As a result, the total travelled distance decreased by 20 % and the CO_2 emissions fell by 54 %. Even though the travelled distance per parcel increased due to smaller capacity in weight as well as volume, CO_2 emissions were eliminated.

Since above explained example has proven as successful project in terms of transport, environment and finance, a company decided to continue with the use of electric vehicles and tricycles for their business. Further, this can be transferred to other companies or cities, too (Browne et al., 2011).

Another option are bicycles which for someone could mean a step backwards in the development but have positive effects for reducing congestion and air pollution. In the United States (hereinafter: the US), they tried this old idea already in year 2013 (Sanburn, 2013).

DHL, the world's leading international express service provider, launched cargo bicycles or so called Cubicycles. At the beginning only a pilot project was conducted for express last-mile delivery inside the cities which is today used in seven cities. The idea is built around City Hubs that can carry up to four containers which are reloaded on Cubicycles. After this, the delivery to final customers is performed. Cubicycles loading capacity is up to 125 kilograms or 1 cubic metres in terms of volume driving around 50 kilometres daily (DHL International GmbH, 2017).

John Pearson, a CEO of DHL Express Europe listed positive benefits of company's announcement and proved its eligibility with the facts that bicycles do not depend on traffic or generate emissions. In this way, environmental footprint can be lowered. At the same time, two times as many stops can be made per hour by bicycles in comparison with delivery vans (DHL International GmbH, 2017).

Reliability and speed of last-mile delivery is expected to increase. Moreover, City Hub can replace up to two standard delivery vehicles and thus save more than 16 tons of CO_2 per year (DHL International GmbH, 2017).

Also at DPD, electrically-powered vehicles have already justified their implementation. The so-called E-CELL vehicles with average speed of 80 kilometres per hour and distance range of 130 kilometres neither generate exhaust gases nor engine noise (DPDgroup, n.d.e).

Additionally, they also introduced hybrid van named ELENA in December 2015. The idea behind it was the combination of diesel and electric engine. The former is meant to be used for traveling longer distances to the delivery area where it is changed to the latter for local delivery. Electric engine is emission-free and offers 50 kilometres without charging (DPDgroup, n.d.e).

Pošta Slovenije already historically uses bicycles for letter delivery while the segment of express delivery was, in this aspect, adjusted only recently. For now, their fleet of vehicles includes many environmentally friendly vehicles ranging from light commercial electric vehicles to liquefied petroleum powered vehicles, bicycles as well as scooters with electric engine (Pošta Slovenije, n.d.).

For express delivery in Slovenia, the shift towards greener deliveries started at the beginning of 2016. Environmental initiative Carbon neutral commitment, a part of a wider project called Driving Change conducted by DPD, started with two-week test of electric Renault Kangoo. The plan was to repeat the process in summer and autumn, too, and based on the data collected analyse the functioning, i.e. if it really is environmentally friendly and at the same time does not affect their business success (DPD Slovenija, 2016).

As another project inside Driving Change, they decided to engage bicycle-delivery inside Ljubljana city centre. The idea was born two years earlier when they only tested it and in April 2016 decided for repetition with bicycles made specifically for this purpose (DPD Slovenija, 2016).

3.4 Integration and Enhanced Cooperation

With digitisation, companies are able to integrate both, internally as well as externally. External integration includes customers and suppliers. Especially the latter is the hot topic among managers who plan the highest investments in this area and also expect the greatest impact from it (A.T. Kearney, Inc., 2015).
Seventy percent of the respondents in the study made by A.T. Kearney, Inc. (2015) plan relevant or high investment into internal integration while the percentage for external integration is 53 %. Investments are particularly focused on demand forecasting and planning (57 %) followed by electronic interfaces with carriers (38 %).

Even though respondents are aware of benefits from streamlining their IT, e.g. lower inventory and more flexible delivery times, they still have concerns about trusting partners

when sharing crucial and confidential data, especially in terms of turning a partner into a competitor (A.T. Kearney, Inc., 2015).

Good planning and cooperation can reduce corrective actions, e.g. emergency deliveries, which further reduce negative environmental impact when avoiding small volume deliveries with fast transport modes (Dekker et al., 2012).

The development of technology is the major enabler of increased cooperation between different parties, i.e. integration of a single company either with suppliers, customers or both becomes feasible. As a result, the organisation of the entire supply chain can be done similar to being one company which indicates high level of dependency and consequently collaboration amongst partners (Kagermann, 2015).

The shift from competition between parties throughout the value chain more towards competition between different supply chains can be noticed. The higher and more transparent the integration, the higher the chance of success (Speranza, 2016).

With higher level of integration, door-to-door transport and connection of the whole lifecycle of goods disposal become more widely used. The latter connects the process from production to transport, storage and consumption while door-to-door transport organises transport between different locations (Kagermann, 2015).

Additionally, increased competition on the market and expected benefits from integration are leading companies to decide for supply chain integration. Speranza (2016) is outlining the following benefits. Not only that the companies aim towards improving their own performance but also, in case of collaboration, are they able to focus on their own business instead of global performance. For successful change in their behaviour due to interactions, individual interests have to be mediated.

Further, Kauf (2016) as well as Fraunhofer-Institut für Materialfluss und Logistik et al. (2014) emphasise synergy effects generated by supply chain participants since collaborating companies can specialise on their core business and better respond to customer requirements.

Authors of A.T. Kearney study report about more just-in-time procurement and thus lowering inbound inventories along with more decentralised warehousing that enables shortening the delivery times. With higher transparency, key data is shared among supply chain partners which is accessible to others in order to improve decision making (A.T. Kearney, Inc., 2015).

However, one of the respondents in the study mentioned a problem that the companies usually do not know how much do vendors charge on transportation routes which can be to

some extent solved by higher transparency. When this kind of data is shared, the savings can be made in the mentioned aspect (A.T. Kearney, Inc., 2015).

Dekker et al. (2012) proposes cooperation in terms of equipment pooling where companies share the equipment and in this way increase load factors as well as reduce CO_2 emissions.

Also, Speranza (2016) drew attention to suboptimal trucks loading that is especially high in city distribution. Additionally, factors such as higher size of carriers, dispersion of customers, short lead time between order and delivery times increase the number of vehicles on the road.

Due to their inflexible shape, Euro-pallets are not anymore preferred mode for goods handling (Fraunhofer-Institut für Materialfluss und Logistik, IML; Daimler AG; DB Mobility Logistics AG, February 2014) but being replaced by different corrugated pallets which for example PalletKraft Europe is producing. Differential factors that speaks in favour of theirs use are flexible size, lower weight and better shock absorption. Moreover, they are made of recyclable materials (Corrugated pallets, 2017).

IKEA introduced several solutions for improving the situation of both, optimally loaded packages as well as trucks. Loading Ledge is a flexible pallet which is adjustable according to the size of the package. At the same time, the air is compressed out of the packages in order to gain space. Next, those pallets are loaded on the transportation unit with the highest density possible. The goal for IKEA's trucks is to make them as utilised as possible otherwise their number would increase (Manfreda, 2016/2017).

In order to survive on the market, companies will have to find other types of cooperation, too, e.g. consolidation of transport volumes and supply flows, integration of different transport modes, forming regional clusters (Fraunhofer-Institut für Materialfluss und Logistik et al., 2014).

Hausmann et al. (2015) see mergers and acquisitions (hereinafter: M&A) as critical for long-term growth of companies, especially among transport and logistics companies in today's cost- and value-conscious world. DHL, Fedex and UPS as parcel logistics providers uses this way of cooperation already since 1980s.

European examples, e.g. Veolia, RATP, KMB, showed that joint ventures offer a stepping stone to enter new markets while positive consequences of other creative cooperative behaviour are reduced empty miles, number of trucks and transportation costs (Hausmann et al., 2015).

Cooperation can also be established among a group of carriers as Fernández et al. (2016) proposed. In this case, carriers decide to share a set of customers, who are less demanding and farther from the depot, with the others. Customers, who are more valuable and with higher demand, will usually not be shared but served by the carrier. When delivering to the customers, a carrier may choose the combination of customers that is the most convenient at that time according to geographical location.

Moreover, carriers may share the vehicles or borrow them from each other in case they do not have the appropriate size of the vehicles to fill in certain number of packages (Fernández et al., 2016). However, the analysis for transportation and logistics companies showed that the costs are between 3 % and 7 % higher in comparison with benefits that shared or leased assets bring (Hausmann et al., 2015).

3.5 Energy Recovery System and Intelligent Traffic Guidance Systems

Only 40 % of the energy from the fuel is used for actual vehicle moving (Fraunhofer-Institut für Materialfluss und Logistik et al., 2014). Hence, the researches, how to use more of this wasted energy, are ongoing all the time.

In motorsport, especially at the higher levels of competition, e.g. Formula 1 (hereinafter: F1), a lot of new technologies are developed, then tested and potentially further implemented in the car industry. Already a decade ago, in F1 so called concept of Kinetic Energy Recovery System (KERS) was introduced. Idea of KERS was to convert the energy, which is collected through braking, into electricity that can be used as an extra engine power (Formula One Digital Media Limited, n.d.).

The concept was further developing, and still is, and is today called Energy Recovery System (hereinafter: ERS). ERS enables drivers in F1 to use additional 160 brake horse power per lap or approximately 33 seconds obtained from heat energy from exhaust gases. Using similar system in distribution industry can reduce both, fuel consumption as well as air pollution.

Next, Intelligent Traffic Guidance systems are an extension of traditional navigation systems. They take into consideration division of private and business routes, use highways as well as minor roads. In addition to this, the route is suggested depending on environmental zones, preferred routes for trucks, congestion reports and road closures. Not only can the congestion be avoided using different routes but also different time of the day (Fraunhofer-Institut für Materialfluss und Logistik et al., 2014).

As a result of IoT, vehicles are equipped by sensors monitoring certain vehicle from its manufacturing till disposal (Benton, 2016). We can speak about intelligent freight cars (Fraunhofer-Institut für Materialfluss und Logistik, et al., 2014).

Combining above mentioned and similar systems together with RFID technology allow for communication among devices. In this way, they can exchange the data that can be used for optimisation, e.g. automated departure time (Fraunhofer-Institut für Materialfluss und Logistik et al., 2014).

3.6 Last-Mile Delivery

Increased transportation flows in the city from companies require a focus on so called last-mile delivery where cooperation between different logistics service providers is emphasised. Especially problematic are the deliveries to individual customers who may not be at home at the time of delivery and hence requires more attempts in order to deliver the package successfully. Moreover, their addresses may be difficult to find (Dekker et al., 2012).

Potential solutions for last-mile delivery problem proposed by Kauf (2016) are the following:

- Terminals and centres in the city are necessary for smooth implementation of last-mile delivery. However, it is further reported about low success of the implementation of those terminals and centres. This may be due to complexity of logistics tasks, large number of companies supplying the city and the shortage of information.
- Drop-off and pick-up points can be placed at petrol stations, in retail outlets or any other convenient location in order to allow the access twenty-four hours per day and seven days per week. Moreover, collecting goods there is fast and reliable.
- Multi-channelling offers different channels which can be used for different purposes according to individual needs.
- Temporary delivery shifts during reduced traffic hours, e.g. at night.

4 OVERVIEW OF PRACTICES OF PLAYERS IN THE WORLD AND IN EUROPE

Taking into account that Slovenia is under the EU-28's average in terms of development, e.g. GDP per capita (Eurostat, 2017a), we are more often so-called followers rather than first-movers when speaking about new strategy implementation. If this holds true, the practices that other companies or governments around the world implement can be taken as examples of good practice from which we can learn.

Therefore, in the following sections from 4.1 to 4.5 I am presenting some examples what either governments or privately-owned companies have introduced in their business in the recent years.

4.1 Actions by Policy Makers in the UK, Japan, the Netherlands and France

Browne, Allen, Nemoto, Patier, and Visser (2012) in their article provide examples how did the policy makers address the current issues regarding social, environmental and economic impacts caused by urban freight transportation. Mainly, the focus of those initiatives was on reducing environmental consequences including air pollution, noise pollution and traffic congestion. Below, I am explaining a few of their studied examples.

In London, the United Kingdom, they established a consolidation centre within the City of London where they started using electric tricycles and vans in the area of 2.9 square kilometres. All electricity was produced from renewable sources and hence neither fuel was used nor CO_2 emissions created (Browne et al., 2012).

Moreover, they reduced the number of deliveries per day and introduced plans for better management of vehicle movement in order to reduce congestion (Browne et al., 2012).

In Yokohama, Japan, they implemented consolidation centre to relieve highly trafficked Motomachi street. Almost all delivery vehicles, which means around 20 companies, decided to join the system in which they deliver the parcels to the centre by trucks. Then, those parcels are delivered to eco-cargo-stations by low emission vehicles or man-powered carts to and from shops (Browne et al., 2012).

The program in the Netherlands included more cities. Low emission zones did not produce the expected results due to insufficient standards about the type of vehicles that can access those zones. Oppositely, different transport companies consolidated their deliveries for large clients and, in this way, the efficiency of vehicle operation increased as well as vehicle kilometres did reduce (Browne et al., 2012).

As alternative vehicles, electricity and liquid natural gas have been used, e.g. Cargohopper and beer boat in Utrecht. Moreover, as a part of national programme the promotion of early morning, evening and night delivery started. In order not to disturb the community, more quiet vehicles with low noise for loading and unloading were introduced (Browne et al., 2012).

Project in France was again comprised of several cities and many local initiatives ranging from air quality action zones, where the access was forbidden for most polluting vehicles, to

space sharing among industry and pedestrians. Urban logistics space was necessary implementation, as well, from where the deliveries to the city centre are carried out with electric vans while local logistics points with the size from 500 square kilometres to 1,000 square kilometres serve as consolidation points to perform the deliveries to specific arrondissements. Furthermore, all urban delivery companies were/are obliged to respect the environmental standards. As a result of all these, less large vehicles congest and pollute the city centre (Browne et al., 2012).

Browne et al. (2012) expect that this kind of initiatives will further develop during the next 10 years stimulating public and private sector cooperation.

4.2 DPD NOW

DPD in cooperation with Tiramizoo introduced DPD NOW as a solution for delivering the parcels from door to door in 90 minutes after placing an order that can be done online. The delivery can be additionally specified by the receiver of the package. However, it has to include the cities inside the same city area considering the postal code (DPDgroup, n.d.f).

The limit is set to 31.5 kilograms and up to five parcels per single shipment. For now, the service is offered in 18 German cities but expected to expand further (DPDgroup, n.d.f).

4.3 Amazon Prime Air

Amazon Prime Air is a delivery concept introduced by Amazon with which they are offering 30-minute delivery by drones to their customers (Amazon.com, n.d.).

Even though for some this still acts as a science fiction, on the 6th of December 2016 they successfully delivered the first package to the customer and from that time on the plan is to include more and more customers. Also, the range of products is for the moment limited but with the intention to increase (Amazon.com, n.d.)

Despite testing different delivery vehicles, in the meantime delivery by drones is planned. Testing is done over time in different countries using different modes of transport but for now only during daylight, with low wind and good visibility. Once the safety as their top priority is improved to the satisfactory level, they will move forward to rain, snow and icy conditions, as well (Amazon.com, n.d.).

4.4 Distribution of Perishable Food

A distribution company can learn a lot from a company which is distributing either fresh meat or vegetables or perishable food in general. For them, the speed of delivery is of crucial

importance. Many papers have studied different approaches to this problem. In the following paragraphs, a few examples are provided.

Guo et al. (2017) proposed two stages of fresh food e-commerce, i.e. forward and reverse logistics network, on the example of Shanghai fresh food e-commerce enterprises. The model was verified with different calculations and its deployment could positively affect not only the company itself but also economy and environment as a whole. Carbon emissions and costs could be minimised while customer satisfaction improved. Already the authors state that the model can also be valid for at least any other sector of food industry if not generally, too.

In Greek fresh meat industry, their goal was to minimise total distribution travelling costs and vehicle distribution operating costs using non-mathematical programming methods and algorithms. As a result, the total travelled distance was reduced by 17 % when comparing it to previous algorithms (Tarantilis & Kiranoudis, 2002).

Osvald and Zadnik Stirn (2008) studied distribution of fresh vegetables in Slovenia where it is important that the goods are delivered to final consumers in the shortest time period after harvesting. There, the distance as well as time of the day affect the travel times between two locations. Modified Solomon's problem was used and more than 47 % improvements in different categories, e.g. kilometres travelled, loss in quality, stop time at depot, time of food on the vehicle, vehicle number, were achieved.

4.5 CIVITAS Initiative

As a part of CIVITAS initiative, already presented in section 2.5.2, practices supporting sustainability in urban mobility were introduced in different European cities. To give an impression about the development, below an example is described.

In Iasi, to stimulate companies to respect time windows in the early morning and in the afternoon, some benefits were offered. The authorities promised a chance to avoid peak hours, fees or tax reductions and better parking facilities. The implementation proved as successful since the number of vehicles distributing goods decreased (CIVITAS Initiative, February 2013).

5 OVERVIEW OF PRACTICES OF PLAYERS ON SLOVENIAN MARKET

Up to this point, the research has mostly been conducted from secondary sources. Already there, practices that current distribution service providers are carrying out have been

emphasised. In order to get the actual insights into the business of three important players on Slovenian market presented below, I conducted interviews in those three companies, namely Pošta Slovenije, DHL Express and DPDgroup.

The interviews were conducted as semi-structured interviews with important decision makers from these three companies. Mr Andrej Rihter is a deputy general director and a member of management board at Pošta Slovenije. With him, I had an open conversation that offered me deep insights into their business as well as industry as a whole.

At DPD Slovenija, they thought it would make sense to meet with two responsible persons. Mr Jakob Bertole is operations director at DPD Slovenija and Mr Silvester Vučak is quality and security director at DPD Slovenija. They both presented their views on certain aspects and complemented each other in some areas that were more specific.

An interview with Mrs Lucija Kokelj, HR and Quality manager at Slovenian branch of DHL Express, became structured since it was conducted via email as the answers on my questions.

5.1 Slovenian Market

Pošta Slovenije is a traditional player in CEP sector (defined in section 1.2). As wholly owned by Republic of Slovenia, their primary focus from their foundation has been on universal postal services and only due to development of market demand, they were forced to expand also into distribution of goods (Pošta Slovenije d.o.o., n.d.c).

Oppositely, DHL Express and DPDgroup are subsidiaries of larger logistics and distribution groups which has goods distribution as their number one priority. Being under the parent company gives them a range of directions that are set in the headquarters where their development comes from to the high extent.

Hence, market approach of those companies is fundamentally different. Since the frontiers between service providers are less and less evident, the question to what extent those differences are seen on the market pops up. In the following sections from 5.2 to 5.4, we will see where the differences lie. Those sections are based on the interviews with key decision makers in studied three companies.

From the interviews, I would like to additionally test the following two hypotheses that were already outlined in the introduction and are indicating the direction of the sector in near future:

- Goods distribution providers will increasingly choose alternative vehicles, e.g. electricity powered vehicles and bicycles, or their combination rather than diesel powered vehicles.

- In Slovenia, cooperation between companies is not yet at the level where they would be prepared to share the customers in order to improve their performance. Hence, advanced forms of cooperation will still lag behind.

In the section 6, I am also presenting some ideas that might become viable in the future.

5.2 Pošta Slovenije

Pošta Slovenije has started its business at the beginning of year 1995 when the former PPT Slovenia split (Pošta Slovenije d.o.o., n.d.a). At that time, they were offering universal postal services and covering the country in terms of postal network (Pošta Slovenije d.o.o., n.d.b).

After 2002, it became wholly owned by Republic of Slovenia. In their current strategy, they emphasise the importance of continuous development and state they are moving »from traditional postal service provider, we are transforming towards modern, development focused postal-logistics provider of electronic services« (Pošta Slovenije d.o.o., n.d.b).

Their range of services varies from package delivery to direct mail delivery, morning delivery of newspapers, supply chain logistics, and i-services for individuals, businesses as well as the state (Pošta Slovenije d.o.o., n.d.b). Moreover, their activities include money services and sales of goods (Pošta Slovenije d.o.o., n.d.a).

The areas covered in their logistics segment range from logistics of car spare parts, logistics of beverage and food industry, logistics in pharmaceuticals, logistics in wholesale and retail to B2C and B2B segments (Pošta Slovenije d.o.o., 2016).

They are organised in five business units and more professional services of the company. Altogether, there are 554 post offices all over the country (Pošta Slovenije d.o.o., n.d.a).

Important component of their business is sustainability where green logistics is at the forefront. At the moment, they own five light electric powered vehicles, sixty delivery cars powered by liquified petroleum gas, sixty electric bicycles and twenty electric motors (Pošta Slovenije, n.d.).

Development trends in Pošta Slovenije. Mr Andrej Rihter, a deputy general director and a member of management board at Pošta Slovenije, is a part of the company for more than two decades and following its development from 1993. He started as a postman and has later on been promoted to higher level positions. Therefore, he is the right person to be asked about where Pošta Slovenije currently is, how it has come to this position and in which direction it is planning to move.

Being a traditional postal service provider at the beginning gave them an advantage earlier than an impediment. Their network was/is spread throughout the whole country "in every village" and hence offers parcel distribution over the same network, as well. Even though they do not have as strong position as global players since they are not present over the whole world, they are at least changing their strategy orientation more towards IT and logistics that is mainly a result of electronic communication and a decline in physical letter writing.

In fact, Pošta Slovenije does not want to compete with postal service providers over the world but rather be present on the logistics market within 500 kilometres taking Ljubljana as a centre.

In logistics, Pošta Slovenije is achieving significant growth that almost doubled from 2013 to 2014. It accounted for 45 % (Pošta Slovenije d.o.o., 2016). Taking into account that the market of logistics services in Slovenia totals over two million euros, Mr Rihter is sure that there is space for further expansion and growth.

In Europe, majority of national postal service providers are owned by the state. Comparing Pošta Slovenije to other national postal service providers in Europe, it is one of the most developed. Partnering with Luka Koper and Slovenske železnice means additional advantage for them.

Pošta Slovenije established cooperation with several global service providers that can be noticed as the roots of new cooperation ways as those global logistics companies rather take a benefit of existing network instead of building its own. For example, DPD was searching for a partner in the area of Brežice, Krško and Sevnica. They engaged Pošta Slovenije but after February 2017 were unable to reach new agreement about the price.

Pošta Slovenije currently work in the name and for the fee of TNT and UPS. For the latter, they cover around two thirds of Slovenia in terms of both, pick-ups as well as deliveries. This kind of cooperation is usually agreed only for specific part of the value chain, e.g. the beginning of the value chain or last-mile delivery. The logic behind says that it does not make sense to have another delivery guy from e.g. UPS in one area if there is already a guy from Pošta Slovenije.

Next, they are a member of Universal Postal Union (hereinafter: UPU) where members benefit from several agreements. Altogether the union joins 189 countries while Pošta Slovenije additionally has also bilateral agreements, e.g. with Austria, Croatia, Germany (Deustche Post), Serbia. Recently, they are in negotiations with Russian post which is strong on the Chinese market.

In one of the last bigger challenges, project Interconnect, they are cooperating with the EU aiming to establish the same conditions as well as interface for final user on the market. This would mean that a Norwegian user has completely the same e.g. monitoring of the package as Slovenian user. It is supposed to be user friendly where the conditions and package flows are predefined.

Regarding global cities, the trend is in the closure of strict city centres. For example, Ljubljana is only opened between five and eight o'clock in the morning for deliveries. At this moment, we can find there many different companies providing their services for B2B and especially B2C customers.

Going a step further from closures would be a decrease in the number of delivery vehicles in city centres. The unification of distribution service providers is expected where one distribution provider would serve the whole city centre in his name and the name of the others, too.

Mr Rihter sees this development mainly in two directions, i.e. electrification and mobile hubs. Regarding the former, Pošta Slovenije already introduced electric vehicles, e.g. Piaggo, in Ljubljana city centre with which they deliver the packages as well as provide other logistics services for companies. Piaggo is also used in Celje and Koper city centres.

All in all, their whole fleet of vehicles consists of around 2,400 vehicles out of which around 8 % is outsourced. Beside electric vehicles they use the following vehicles: bicycles, electric bicycles, motor bicycles, motor two-wheeled vehicles, electric motor two-wheeled vehicles, light delivery vehicles, e.g. Kangoo, vans and for relational drives and logistics services also trucks, e.g. Krafter.

Considering the second direction, the idea behind mobile hubs is the exchange of packages situated in an area before entering the city centre. Let us take an example. The delivery trucks from all different distribution companies in the last-mile delivery, e.g. UPS, TNT, GLS, Pošta Slovenije, come to the mobile hub which is temporary opened between eight o'clock in the morning and five o'clock in the evening. Afterwards only one of companies performs the deliveries to the city centre and is paid for this. The costs are distributed throughout the entire value chain and depend on what the mobility in the city means.

The one, who will be entitled the permission for service provision, will be the quickest company in terms of accepting and introducing new technologies. Nevertheless, his contract will be limited for certain period of time in order to retain competitiveness and innovation among competitors since the technology and solutions on the market are changing all the time.

In addition to mobile hubs, there are two more futuristic ideas that showed their potential and are by now being tested. First, DHL already introduced drones. For example, they are being used for the delivery of the medicines to one smaller island.

Second, it is expected to implement delivery of packages in the parking garage. Again DHL in cooperation with Audi is testing the idea's potential in München and Berlin. If a person agrees, his car is opened with remote key and the package left in the trunk instead of served personally at the time when a person is at work.

This is the way to lower the pollution since it is logistically easier to catch the car than the person in the last-mile delivery. Furthermore, the garage may be situated on the outskirts of the city where the access is easier and a delivery vehicle may serve more than just one customer at one place which makes the service cheaper for both, delivery provider as well as final customer who pays for it.

Pošta Slovenije is delivering spare parts for cars as a logistics package, too. They call it night jump since it is performed over the night while in the morning the spare part already waits in front of the car workshop, even before it is opened, to be installed into the car. Its success is a result of deliveries without a contact that means no person has to wait in the early morning to accept the packages and sign the receiving documents.

Additional benefits are achieved due to just-in-time inventory and improved customer service. A customer brings the car to the workshop. In the evening, the spare part is ordered from Salzburg and sent to Ljubljana. Only the next day the customer is able to pick up the repaired car.

The contract is for now signed with 84 services among which are the following car makers: Audi, BMW, Mercedes, Porsche.

To be in front of the competitors or at least at their level, Mr Rihter mentions the subsequent four decisive factors: follow technological progress, implement new technologies and knowledge, be cost efficient and provide high service quality.

His view is that the price of the delivery is not anymore the most important aspect but the service quality is increasingly gaining on its importance. Youths, who were born with technology, have different way of thinking compared to elders. Accordingly, they choose the provider who is able to deliver them the product ordered from the web immediately. The winner among distribution companies will be the one who will be able to fulfil requirements of those customers. The shopping malls may become just the meeting points where women will drink a coffee, men will go to the gym while kids will play on the playground. In the shops, clothes will only be tried and later on ordered online with home delivery.

Regarding logistics, the flow is not going to disappear. If it becomes without contact or performed by drones, we will see. However, definitely we will not avoid electrification.

5.3 DHL Express and DHL Express Slovenija

DHL is the world largest mail and logistics company and a part of wider network Deutsche Post DHL Group that is the leading postal and logistics company, spread across many sectors, namely automotive and engineering, energy, life sciences and healthcare manufacturing and technology (DHL International GmbH, n.d.d).

Their motto in terms of corporate responsibility is "living responsibility" according to which they focus on environmental protection, disaster management, education and employee volunteerism.

In their mission statement, they have set so called green goals for year 2050 which are spread over their whole supply chain. Besides improving carbon efficiency, one of local goals is implementing bikes and electric vehicles for first- and last-mile delivery in order to improve air as well as noise pollution (DHL International GmbH, n.d.b).

In the research from 2008, DHL was the market leader with 50 % market share. It is the first service provider in Slovenia, too, with headquarters in Trzin (DHL International GmbH, n.d.c).

Development trends at DHL Express. Mrs Lucija Kokelj, HR and Quality manager at Slovenian branch of DHL Express, proved the developments in the industry with more practical examples they are working on currently. She emphasised that not only DHL follows the trends but also shape them. Accordingly, they want to be prepared to fast-changing environment at all times.

In the last year, DHL Express Slovenia is observing double digit growth in B2C segment delivery that may be especially due to increased number of packages of online merchants. The leaders there are AliExpress, Amazon and eBay. From global perspective, online shopping is increasing significantly and expected to become the second strongest industry till 2020. International e-commerce's growth will be 25 % per year from 2015 to 2020 which is two times faster in comparison with domestic.

Being aware that airplane package transportation is increasing, too, Deutsche Post DHL Express in their strategy till 2020 set a goal of reducing CO_2 emissions. In addition, they plan to improve carbon efficiency by 30 % in comparison with 2007.

In terms of environmental requirements, DHL is constantly on the hunt for new solutions which are at the same time environmentally friendly. They have introduced different alternative vehicles and besides this energy efficient warehouses. In this way, the effects in terms of CO_2 and other emissions generated during transport and storing are minimised.

More ambitious goal set in year 2017 is aiming towards zero emissions in the area of logistics. Therefore, the following years will involve high investments into service improvement and the change from current transport vehicles into more environmentally friendly vehicles.

Regarding quality and environmental protection, they have implemented ISO 9001 and ISO 14001. Next, they started with the implementation of ISO 50001. The employees are selected on the basis of the right attitude, i.e. Can-Do attitude, and constantly educated in compliance with Certified International Specialist program.

Electric vehicles fleet includes electric vans and electric cargo bicycles. DHL's idea of Cubicycles was already briefly presented in section 3.3. It can be combined with mobile hubs that Mr Rihter mentioned, as well. Since the shape of the container offers easy loading on the van, the containers are delivered to this kind of hub and from there the last-mile delivery performed.

Cubicycles can boast with the following advantages. They reduce kilometres and time in comparison with standard vehicles which further significantly reduce emissions. Substituting two vehicles could save more than 16 tonnes of CO_2.

Additionally, the cycle is equipped with GPS and transmitter for IoT, offers comfortable, safe as well as fast-driving seat while the containers are waterproof and can be removed. With its volume they do not hinder the view neither for the biker himself nor for the other bikers (DHL International GmbH, 2017).

Another vehicle named Work, manufactured by StreetScooter, is specifically adapted for postal services and package delivery. Comparing them with cars that have equal power but gasoline or diesel engine, the former generates half lower service and maintenance costs. As the vehicle has less spare parts that become mechanically worn, service costs can be reduced even by 80 %.

Not only DHL is transforming their fleet into more ecological direction but changing also indirect factors. With specific tools, routes are designed in order to reduce the number of vehicles on the roads, fuel consumption and other negative environmental effects at the same time with increasing the capacity of used vehicles. Moreover, the length of vehicles as well as the number of two-storey vehicles are increasing (DHL EXPRESS (Slovenija), 2017).

In the last-mile, DHL introduced a program and process called Route Management that helps when planning the delivery routes between distribution centre and final consumer, i.e. territory distribution, schedule, appropriateness of vehicles, equipment, employees.

Mostly, the warehouses are managed manually while DHL started testing the robots which are integrated with warehouse managers. The example of those robots is automatically driven trolley. The robot follows the manager; when it is full, it returns to the packing station and sends empty trolley to the manager.

For addressing the issue of empty space either on the pallet, in the vehicle or warehouse, they introduced sensor technology. Those sensors detect movement and depth in order to identify the empty space and optimally allocate the packages inside the given capacity.

Moreover, the future is in drones from which DHL expects a lot. Many projects were conducted in the last years and also the rivals are aware of the progress in this area, e.g. Mr Rihter from Pošta Slovenije.

One of the pilot projects took place in 2014 in the North Sea's island Juist. Till today, they already presented three generations of drones that between January and March 2016 delivered 130 packages in Bavarian Alps. Also in Germany in May 2016, the testing of so called Parcelcopter was successful.

Next, virtual reality is gaining in its importance. The employees in the warehouse tested virtual glasses to sort out the packages there. With the glasses, they are able to scan bar codes, show a list with current location of packages and its intended location. They have already been launched in the warehouses in Asia, Europe and the USA.

Digitisation of the part regarding final users includes many tools from online solutions to locally installed or integrated solutions that ease the order of the service even for the most demanding users. Furthermore, solutions are adjusted for technology sector and biological sciences sector. Among offered tools are the following:

- MyDHL for parcel preparation, ordering a pick-up, saving addresses and following a parcel proactively.
- DHL ProView for users who are sending the parcels often.
- DHL InstraShip for users with regular pick-ups.

According to Mrs Kokelj's opinion, the winner in the battle for future leading position on the market will be the one "who will go faster, farther, better and cheaper, will be more innovative and customer friendly along with social and environmental responsibility."

5.4 DPDgroup and DPD Slovenija

DPDgroup is the second biggest delivery network with parcel distribution in B2B sector as its main service. The name DPD is an abbreviation which stands for dynamic parcel distribution. Their depots are in more than 40 countries while delivering to more than 230 countries over 3.6 million parcels per day (DPDgroup, n.d.d).

The company is major-owned by GeoPost, which is a subsidiary of French postal service company Le Groupe La Poste (DPDgroup, n.d.d), and was founded in 1976 in Aschaffenburg whereas in Slovenia they celebrated tenth anniversary of its operations there in 2016 (DPDgroup, n.d.c).

Being aware of the importance of strategic direction, their main focus is on offering competent, friendly and services close to the customers by offering them exactly what they need. Moreover, their goals are maximal flexibility, top quality and first-class standards.

In Slovenia, there is one depot in Ljubljana and one in Maribor. They only use vans for last-mile and in small proportion consequently cooperate with other delivery companies which perform delivery in their name. Trucks are usually used for line haul transfers between depots and bigger clients' collection or delivery.

In internal documents of DPD Slovenija, they keep vision and mission statement as follows (translated from Slovenian):

- We want to be one of the most successful companies in Slovenian B2B and B2C segments. Our business is based on high-quality domestic and international service, quality and motivated employees who help us to meet the needs and the expectations of our employees.
- Being a successful company, whose core values are knowledge and quality in order to create a trusted environment.
- We are continuously raising the satisfaction of our customers, our employees and shareholders.
- Providing high quality service for our customers and at the same time enable the employees to focus on core strengths.
- Implementing and executing all activities associated with four principles of a dedicated implementation with environmental and socially responsible business.

Their values are dedicated towards (DPDgroup, n.d.a):

- absolute customer orientation,

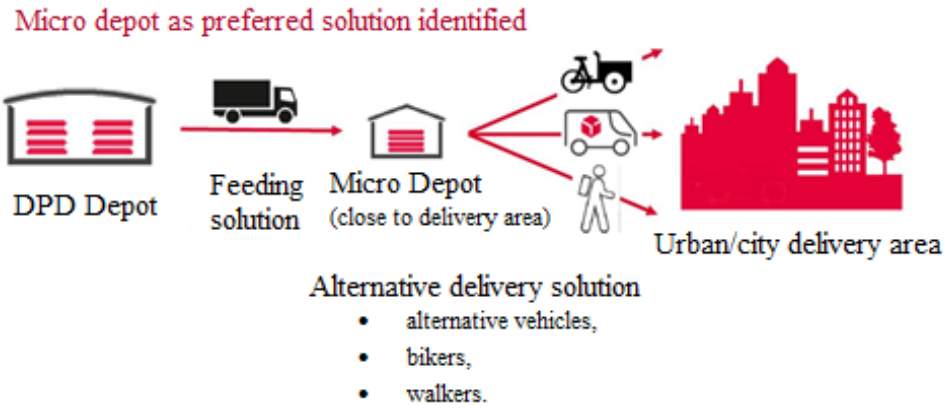
- local dynamics,
- sustainable development,
- efficiency,
- professional competence.

As already mentioned, they are striving to social responsibility which is seen from different projects. One change in that direction includes reducing carbon emissions. At DPD Slovenija, they started testing electric cars. Further, they introduced package delivery by specifically developed bicycles in Ljubljana city centre (DPDgroup, n.d.b).

Development trends at DPD Slovenija. Mr Jakob Bertole, Operations Director at DPD Slovenija, and Mr Silvester Vučak, Quality and Security Director at DPD Slovenija, share the view that urban logistics is one of the current trends even though it is just a component of wider social responsibility and sustainability. In their opinion, sustainable mobility is not anymore exclusively marketing category but new transport mentality which is a focus of all important transport companies.

DPD Group (DPD) is focusing on the terms above by following the development as presented in Figure 15 that shows the future in micro depots from which the last-mile delivery will be performed by electric vehicles of different size or on foot. In B2C segment, this is possible since the parcels are of smaller size. What DPD Slovenija has already done in this aspect and what it is planning to do is presented in the following paragraphs together with some other factors that also affect the overall direction about which Mr Bertole and Mr Vučak spoke.

Figure 15. Future Perspective of Delivery Services by DPD



Source: DPD, *internal documents*, 2017.

Being a decentralised entity means that the changes in terms of development can be encouraged by any country inside the group. Specific country, e.g. Slovenia, can form a

working group that finds a potential solution. The result is later on presented to the executives who implement best practices to other countries, too. Also local solutions are acceptable since some regions may have specific characteristics due to which general solution may not work. This is the difference when comparing DPD Group to other logistics service providers, e.g. UPS or Fedex, where centralisation predicts the same solution throughout the whole chain without asking themselves if it is feasible.

DPD Slovenija for now operates with two depots in Ljubljana and Maribor and one micro depot situated in Ljubljana at Tobačna ulica. There, they cooperate with a subcontractor, so called cyclist group, that delivers the parcels in Ljubljana city centre by bikes already for four years.

Those bikers operate with four bicycles, out of which two are electric bicycles and two normal, daily delivering around 100 parcels. The last-mile delivery process starts when the subcontractor picks up the parcels in the warehouse and delivers them to micro depot by van. From micro depot, cyclists perform the deliveries to the final addresses. To further lower the impact on the environment, diesel-engine van is planned to be replaced by electric one. Moreover, the fleet will be extended by more bicycles that will not only deliver to the areas which are closed for traffic but to other areas, too.

DPD as a whole and DPD Slovenija as its part follow the environmental standards. DPD has set the guidelines how many electric delivery vehicles should each country have in operation and in many countries they have already achieved these standards.

DPD can praise itself with a certificate of being carbon neutral. Carbon neutral deliveries are offered to customers at no extra cost while the competitors charge for them.

According to EcoVadis ranking, a global platform for assessment of supply chains in the area of sustainable development, DPD is ranked 20 points above the average when comparing it to postal, courier and other multimodal transport activities. Furthermore, it has progressed for 7 % from last year.

Mr Bertole and Mr Vučak say that they have implemented many IT solutions as a result of increased e-commerce. Due to the latter, finding the customer already in the first attempt of the delivery has gained on the importance. Examples of this kind of solutions are FollowMyParcel, DPD Predict and PUDO points.

With FollowMyParcel, the delivery is forecasted one day in advance and the customer is able to change either the delivery time or delivery address. In cooperation with Pošta Slovenije and Petrol, they established around 500 PUDO points where customers can pick-up their parcels in case they are not at home at the delivery time.

Mr Bertole and Mr Vučak compared PUDO points to what in Germany is in place. There, rivals are more cooperative and form agreements on a voluntary basis, e.g. common packet stations, common deliveries, routes sharing.

Similar sharing is expected in Slovenia, too, when the deliveries in city centres will be assigned to only one service provider. However, he will be granted the license by the authorities with which potentially not everybody will agree.

While Mr Rihter from Pošta Slovenije thinks the provider with the license will be the best of the current providers, Mr Bertole would not agree with him. He thinks that the position will be given to one of start-ups that are specialised in this area since it consists of many details with which their working groups deal. Hence, connecting with them could be a winning formula.

For implementing electric vehicles, DPD Slovenija tries to follow best practices from abroad and test them. For example, in Bratislava around six electric Voltas are in use. DPD is paying the leasing and will refactor them to the subcontractors. In Ljubljana, they have tested Kangoo and are planning some further tests. The biggest problem still is the length of the route which the vehicles are able to make without charging.

Those vehicles are appropriate for city centres where the customers are concentrated. Nevertheless, the consumption depends on driving style and weight of parcels, as well. To solve this problem, Mr Bertole thinks that deliveries could be organised in two shifts. After the first one, the driver would return to the depot or wait just in the city leaving the car at the charging station. He would make lunch break and at the same time leave the vehicle to charge. Then, the second half of packages could be delivered. To save on weight, electric vehicles will be mainly used for light parcels delivery.

Mr Silvester is sure that DPD's success is strongly connected with the environment and thus he concluded his thoughts as follows: "We are aware of the impact that we have on the society and environment with our industry. Therefore, it is our duty to return as much as possible to them through social responsibility projects."

Inclusion in several projects, e.g. solidarity transfers and financing charities, is not only done because it is expected from them but more because they feel and see it is the right approach. Since the employees form the company, they are constantly educated in order to adopt the common awareness.

When raising the question of the progress in a decade or even less, Mr Bertole expects autonomous vehicles till 2025 and definitely not later than 2030. In the logistics industry,

there is a potential for so called travelling packet stations where customers will be able to pick-up their packages on locations the most appropriate for them.

6 EXPECTATIONS FOR THE FUTURE

If the way of business was unchanged for decades in the 20th century, this does not anymore hold true in the last time. Hence, the companies have to quickly respond to nowadays trends. The actions, which were unimaginable 10 years ago, have become the reality. At the same time, we ask ourselves if those in a decade will be completely replaced with now still unknown activities.

For example, Hallett and Hutt (2016) in their article presented 10 jobs that did not exist a decade ago. Also, their development is/was shaped by the market events. Interesting from the perspective of this master thesis are driverless car engineer and drone operator since they may affect distribution service providers, as well.

There is already guessing where this development will take us. Therefore, in the following paragraphs I am outlining what do authors think. Next, I am comparing those opinions with the findings from interviews with responsible persons either in DPD, DHL or Pošta Slovenije.

In most capitals in Europe or bigger cities in general where public transport is commonly used as means of transport, bus/metro/train stations are equipped with information boards in order to inform passengers about bus arrivals. They are even further upgraded with mobile applications.

Taking the example of Craiova, Romania, the implementers saw the main benefits of information boards, together with GPS/GPRS implementation, in monitoring the schedule of buses and its changes as well as announcements for passengers. Additionally, the information is available to drivers, too, so they are aware of being late/early and can try to adapt the driving to be closer to the schedule while transit agents can monitor fuel consumption (Institute of Studies for the Integration of Systems (ISIS), 2013).

Above described case of information boards in public transport, for example buses, is kind of upgraded in Kagermann's (2015) work. He sees a potential in autonomously managed traffic if buses, cars, trains and other vehicles are equipped with smart navigation systems which communicate with each other and in this way share the information.

I see a potential of similar systems in goods distribution where the customers could be informed in real-time about the time when the driver is expecting to come to their place.

For example, DPD is already using SMS messaging with which they inform the customers about one-hour time window in which they could expect the delivery. However, this information is provided only in the morning while the actual driver's route may vary throughout the day. Hence, customers contact call centre where referents have to contact the driver and altogether this causes many unnecessary calls.

If the information was available online or in the mobile application in real-time, the customers would be able to follow the driver's route and get prepared to the delivery. For example, if they needed to make a quick grocery shopping in the nearby store, they could check where the driver is located at a certain moment and accordingly plan their time.

It could become increasingly important also when Mr Bertole's idea of two shifts deliveries by electric vans would be implemented. Since the time when the driver will have to charge the car is not completely predictable in advance, it may happen at different times of the day. Informing the customers in real-time would help to retain service level as the customers would be informed in case of any changes, even if just in the last moment.

Autonomous vehicles. According to The U.S. Department of Transportation (2013):

> "Automated vehicles are those in which at least some aspects of a safety-critical control function (e.g., steering, throttle, or braking) occur without direct driver input. […] Automated vehicles may use on-board sensors, cameras, GPS, and telecommunications to obtain information in order to make their own judgments regarding safety-critical situations and act appropriately by effectuating control at some level."

Autonomous vehicles are defined on five levels from zero to four as follows (U.S. Department of Transportation, 2013):

- Level zero, named no-automation level, gives the whole primary control of the vehicle, i.e. brakes, steering, throttle and motive power, to the driver.
- On level one, named function-specific automation, the vehicles only assist the driver in some specific control functions while the driver still has his responsibility. The examples of this kind of systems are cruise control, automatic braking and lane keeping.
- Level two, named combined function automation, means that the driver and the vehicle share the control over the car. The driver can be disengaged from the driving but is still responsible to be available for vehicle control in case of safety concerns.
- Level three, named limited self-driving automation, cedes the whole control of safety-critical functions to the vehicle. The latter also monitor the changes in the conditions in case there is a necessity to delegate the control back to the driver when the conditions deviate from predicted traffic and environmental conditions. Automated or self-driving car is an example of vehicles on the third level.

- On level four, named full self-driving automation, the vehicles are able to monitor and control the whole trip and all safety-critical driving functions while the driver only provide destination address.

Even though the area is still developing, there are already commercial uses noticed. For example, at the end of 2016 in Singapore they planned the implementation of self-driving vehicles for street cleaning and waste collection (Mediacorp Pte Ltd., 2016). No more information has followed about how or if the actual implementation has happened. Nevertheless, this is not the only initiative that Singapore announced. In the future, the transport could be shaped by autonomous or more specifically driverless vehicles (Government of Singapore, n.d.).

Also, important car makers for personal car usage are walking hand in hand with self-driving vehicles. Volvo Car Corporation (n.d.) reports about the existence of the latter on Swedish roads and estimate that around 100 vehicles will be in use by 2017 on public roads. This is indicated as the first large-scale project of autonomous vehicles endorsed by the Swedish Government partnering Volvo Car Group and Swedish authorities, i.e. Swedish Transport Administration, Swedish Transport Agency, Lindholmen Science Park and the City of Gothenburg.

Next, DHL is monitoring and addressing nowadays trends already in advance aiming not to be a follower but rather an innovative forerunner there. Categories from sharing economy to IoT and self-driving vehicles are presented also on their website where they show the understanding of the topic through different reports (DHL International GmbH, n.d.a).

Since their opinion is that logistics industry will use self-driving vehicles to higher extent than other industries, special report is dedicated to self-driving vehicles in logistics that may be used either for warehousing operations, outdoor logistics operations, line haul transportation or last-mile delivery. The difficulty of implementing self-driving vehicles into these categories grows from the first one till the last one (Deutsche Post DHL, 2014).

Starting inside a company means knowing the processes while moving outside the company introduces uncertainty, i.e. unpredictable impact and influence. Not only that the report covers the areas which are relevant at the moment but also provides the overview what to expect in the future (Deutsche Post DHL, 2014).

Fraunhofer-Institut für Materialfluss und Logistik et al. (2014) see a potential of autonomous assistance systems in accidents reduction remedying human errors, e.g. insufficient safety distance, inappropriate speed or turns, parking manoeuvres. Using radar, infrared and video cameras, the vehicles are able to detect threats on the road and at the same time maintain the safety throughout the whole drive already preventively.

Taking lessons from rail transportation, the use of autonomous systems may benefit logistics with more accurate forecasting of arrival times at certain customers. Moreover, overall level of service can increase as well as flexibility and the frequency of deliveries can (Fraunhofer-Institut für Materialfluss und Logistik et al., 2014).

CONCLUSION

While working on a thesis, many people asked me what are the main research questions with an explanation that the title is too complicated to extract them by themselves. The term future urban logistics really might not seem obvious for those who are not the experts in the logistics industry. However, it is easy to clarify in a few sentences what existing distribution companies are faced to nowadays. What is not easy here is the way how those companies should approach to the current trends.

Recent changes in terms of technology, customers and sustainability have brought both, opportunities as well as threats. The customers are increasingly using online stores even for small purchases as the delivery costs have achieved affordable levels. They have become more demanding, wanting door-to-door strategy, and ironically speaking not anymore satisfied with the same day delivery but rather one day before ordering. They are also prepared to pay more for higher level of service.

Next, urbanisation entails more and more deliveries into more urban areas and city centres which increases congestion as well as pollution.

At the same time, the authorities require more sustainable approach towards the environment to prevent further damage and improve its current state. Different strategies, one of which is Europe 2020, are in place to force companies' executives to thing greener. In Europe, city centres in bigger cities are closing for traffic leaving only limited time window to delivery vehicles when they are allowed to enter the centre to perform the deliveries.

Even though transportation and logistics was historically behind the other industries, the technology today helps service providers to be a step closer to those requirements since they are able to more accurately predict the deliveries in addition to avoid unnecessary driving, consume less fuel and therefore lower the impact on the environment.

Alternative means of transportation, e.g. electric vehicles, natural gas-powered vehicles, bicycles or even walkers, can substitute currently used diesel- and gasoline-powered engines. Not only this would lower the air pollution but also positively affect noise pollution. Next, congestion can be addressed by multimodal transportation despite requiring more coordination to be really efficient.

Service providers are searching for new way of cooperation. In Germany, they have voluntary agreed upon common packet stations and deliveries or route sharing, that proved successful for them. More joint action is expected to take place in other countries, too. Yet, it might not necessarily be of voluntary nature. Ljubljana city centre could in near future be opened just for one service provider who will perform the deliveries in the name of the others. His license will be granted on the basis of the best development program and not with the agreement of the others.

While the important actors in three biggest distribution companies in Slovenia, i.e. DHL, DPD and Pošta Slovenije, share the view how strongly they are affected by what is happening on the market in the last years, they not necessarily agree about how the future will look like.

Pošta Slovenije is traditional player on the CEP market which might be either a benefit or a disadvantage for them. They have not been founded as an express service provider. On the other hand, being present on the market for decades gave them already established network and they had used bicycles as delivery vehicles far before it has become a common standard.

Mr Bertole thinks that national postal service provider is always somehow protected while the others, e.g. DHL and DPD, cannot that widely propose the changes. Nonetheless, all three are searching for ways how to establish their position on the market with higher service level in the eyes of the customers than the others. For now, DHL as a market leader in Slovenia seems the most successful but falling asleep on the current success could bury them. In the fast-changing environment, constant adaption is a must otherwise you are overtaken by competitors and from the actions of those three it is evident they keep innovating.

DPD started with DPD NOW solution that offers 90-minute delivery in 18 German cities. As it turned out as successful, further expansion is planned. Amazon would not be noticed as their rival at first sight. However, with Amazon Prime Air they expanded into this area and demonstrated the delivery can be completed in 30 minutes by drones.

The future is in micro or mobile hubs that will serve as an intermediate point from the warehouse to the final customer. Their idea is to pick up the packages in the early morning by a van, that is for now in the case of DPD still diesel-powered, deliver the packages into the hub from where either electric vehicles, bicycles or people walking would be used for last-mile delivery. Once the concept will be developed to higher extent, the whole chain will include environmentally friendly vehicles.

According to all literature review and data obtained from the interviews, I can confirm both hypothesis set in the introduction. It is true that alternative vehicles are on the rise as well as it is that cooperation in Slovenia is not that common as in the other countries.

What the studied service providers speak the most about is the environment and its protection. There are aware of strong impact their industry has on the environment and hence prepared to accept the actions to offset the effects of everyday business. One way is to introduce alternative vehicles and another is to participate in socially responsible project. DPD is the only distribution service provider that can praise itself with a certificate of being carbon neutral. Moreover, according to Eco Vadis ranking they are ranked far above the average of the industry.

DHL, DPD and Pošta Slovenije are testing different solutions considering the vehicles. Moreover, ideas are constantly put into practice since the industry never sleeps but winning a battle does not mean getting the whole war.

Despite some kind of cooperation between the players on the market, where having in mind services that e.g. Pošta Slovenije is performing for the others due to its spread network throughout the whole country, there is no other similar solution that would boost either the success of individual players or the whole industry. DHL, DPD and Pošta Slovenije are still more competitors than partners. However, as the best practices from abroad shows this might be an important factor when speaking about further development of the industry.

How the industry will look like in a decade is impossible to predict. At that time, we will not speak only about electric vehicles and closures of city centres anymore but have to look on the city from a perspective of smart city. The components of the country, market players and technology will become even more connected and dependent. Therefore, the strategies that are showing positive results today will become useless which may put a company on the edge a survival on the market.

REFERENCE LIST

1. A.T. Kearney, Inc. (2015). *Digital Supply Chains: Increasingly Critical for Competitive Edge.* WHU Logistics Study 2015. Retrieved March 12, 2017, from https://www.atkearney.com/operations-performance-transformation/article?/a/digital-supply-chains-increasingly-critical-for-competitive-edge
2. Accenture. (2014). *Next Stop Digital: How Logistics Service Providers Can Rethink Operating Models to Benefit From Emerging Technology.* Retrieved March 12, 2017, from https://www.accenture.com/t20150523T030128__w__/my-en/_acnmedia/Accenture/Conversion-Assets/DotCom/Documents/Global/PDF/Dualpub_4/Accenture-Digital-Future-For-LSPs.pdf
3. Alarcón, R., Antún, J. P., & Lozano, A. (2012). Logistics competitiveness in a megapolitan network of cities: A theoretical approach and some application in the Central Region of México. Procedia – Social and Behavioral Sciences, 39, 739-752.
4. *Amazon Prime Air*. Retrieved April 30, 2017, from https://www.amazon.com/Amazon-Prime-Air/b?node=8037720011
5. Bechtsis, D., Naoum, T., Vlachos, D., & Iakovou, E. (2017). Sustainable supply chain management in the digitalisation era: The impact of Automated Guided Vehicles. Journal of Cleaner Production, 142(4), 3970-3984.
6. Behrends, S. (2016). Recent developments in urban logistics research – a review of the proceedings of the International Conference on City Logistics 2009-2013. Transportation Research Procedia, 12, 278-287.
7. Benton, D. (2016, November 3). How can business digitisation drive the transport industry? Retrieved May 10, 2017, from http://www.supplychaindigital.com/logistics/how-can-business-digitisation-drive-transport-industry
8. Browne, M., Allen, J., & Leonardi, J. (2011). Evaluating the use of an urban consolidation centre and electric vehicles in central London. IATSS Research, 1, 1-6.
9. Browne, M., Allen, J., Nemoto, T., Patier, D., & Visser, J. (2012). Reducing social and environmental impacts of urban freight transport: A review of some major cities. Procedia - Social and Behavioral Sciences, 39, 19-33.
10. CIVITAS Initiative. (n.d.a). About CIVITAS. Retrieved April 24, 2017, from http://civitas.eu/about-us-page
11. CIVITAS Initiative. (n.d.b). Craiova. Retrieved April 25, 2017, from http://civitas.eu/content/craiova
12. CIVITAS Initiative. (n.d.c). Distribution schemes. Retrieved April 25, 2017, from http://civitas.eu/freight/distrdisibution
13. CIVITAS Initiative. (February 2013). ANNEX E: IASI MERTs (Final Evaluation Report). Retrieved March 23th, 2017, from http://civitas.eu/content/measure-result-all-measure-result-sheets-iasi

14. Commission of the European Communities. (2009, September 30). *Action Plan on Urban Mobility*. Retrieved May 23, 2017, from http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52009DC0490&from=EN
15. Crainic, T. G. (2008, July). City Logistics. Montreal, Canada: Interuniversity Research Centre on Enterprise Networks, Logistics and Transportation (CIRRELT) and Department of Management and Technology, Universite du Quebec a Montreal. Retrieved August 3, 2017, from https://www.cirrelt.ca/DocumentsTravail/CIRRELT-2008-25.pdf
16. Dekker, R., Bloemhof, J., & Mallidis, I. (2012). Operations Research for green logistics – An overview of aspects, issues, contributions and challenges. European Journal of Operational Research, 219(3), 671-679.
17. Deutsche Post DHL. (2014). Self-driving vehicles in logistics. Retrieved August 13, 2017, from http://www.dhl.com/content/dam/downloads/g0/about_us/logistics_insights/dhl_self_driving_vehicles.pdf
18. DHL EXPRESS (Slovenija) (2017). *Spopasti se z izzivom trajnosti* [Tackle the challenge of sustainability] (internal publication). Trzin, DHL EXPRESS Slovenija.
19. DHL International GmbH. (n.d.a). DHL Trend Research. Retrieved August 10, 2017, from http://www.dhl.com/en/about_us/logistics_insights/dhl_trend_research.html
20. DHL International GmbH. (n.d.b). Environment and solutions. Retrieved July 13, 2017, from http://www.dpdhl.com/en/responsibility/environmental-protection.html
21. DHL International GmbH. (n.d.c). Ključna dejstva [Key facts]. Retrieved July 13, 2017, from http://www.dhl.si/sl/country_profile/kljucna_dejstva.html
22. DHL International GmbH. (n.d.d*)*. Sector Overview. Retrieved July 13, 2017, from http://www.dhl.com/en/about_us/sector_overview.html
23. DHL International GmbH. (2017, April 26). DHL nadgradi svojo zeleno mestno dostavo s City Hub-i za tovorna kolesa [DHL expands green urban delivery with City Hub for cargo bycicles]. Retrieved September 15, 2017, from http://www.dhl.si/sl/tisk/obvestila/objave_2017/lokalno/dhl_nadgradi_svojo_zeleno_mestno_dostavo.html
24. DHL International GmbH. (2017, March 1). DHL expands green urban delivery with City Hub for cargo bicycles. Retrieved May 25, 2017 http://www.dhl.com/en/press/releases/releases_2017/all/express/dhl_expands_green_urban_delivery_with_city_hub_for_cargo_bicycles.html
25. DPD Slovenija. (2016, April 22). Na kolo za zdravo in čistejšo Zemljo! [On the bycicles for healthy and cleaner Earth!]. Retrieved May 25, 2017, from https://www.dpd.com/si/home/o_dpd/medijski_center/obvestila_za_javnost2
26. DPD Slovenija. (2016, February 2). Podjetje DPD Slovenija nadaljuje v smeri zmanjšanja izpustov CO_2 v okolje [DPD Slovenija continues with reduction in CO_2 emissions]. Retrieved May 25, 2017, from https://www.dpd.com/si/home/o_dpd/medijski_center/obvestila_za_javnost2

27. DPDgroup. (n.d.a). DPD corporate philosophy. Retrieved November 19, 2016, from https://www.dpd.com/sk_en/business_customers/about_dpd/the_company/corporate_vision
28. DPDgroup. (n.d.b). DrivingChange. Retrieved November 26, 2016, from https://www.dpd.com/sk_en/business_customers/drivingchange2
29. DPDgroup. (n.d.c). Milestones in DPD history. Retrieved July 13th, 2017, from https://www.dpd.com/master/home/about_dpd/the_company/history
30. DPDgroup. (n.d.d*). O podjetju* [About company]. Retrieved November 16, 2016, from https://www.dpd.com/si/home/o_dpd/podjetje
31. DPDgroup. (n.d.e). Parcels delivered by electro-mobility. Retrieved May 25, 2017, from https://www.dpd.com/de_en/company/responsibility/drivingchange/carbon_neutral_parcel_shipping/parcels_delivered_by_electro_mobility
32. DPDgroup. (n.d.f). Same-day delivery with *DPD NOW*. Retrieved July 10, 2017, from https://www.dpd.com/de_en/sending_parcels/our_shipping_services/dpd_now
33. Duan, Q. (2017, May). Cloud service performance evaluation: status, challenges, and opportunities – a survey from the system modeling perspective. *ScienceDirect*. Retrieved June 25, 2017, from http://www.sciencedirect.com.nukweb.nuk.uni-lj.si/science/article/pii/S2352864816301456
34. Ducret, R. (2014). Parcel deliveries and urban logistics: Changes and challenges in the courier express and parcel sector in Europe – The French Case. Research in Transportation Business & Management, 3(2), 15-22.
35. Ecommerce Foundation. (2017). *Global B2C E-commerce Report 2016*. Facts, Figures, Infographic & Trends of 2015 and the 2016 Forecast of the Global B2C E-commerce Market of Goods and Services, Amsterdam. Retrieved April 15, 2017, from https://www.ecommercewiki.org/wikis/www.ecommercewiki.org/images/5/56/Global_B2C_Ecommerce_Report_2016.pdf
36. Ehmke, J. (2012). City logistics. In J. Ehmke, *Integration of Information and Optimization Models for routing in City Logistics* (1 ed., pp. 9-22). Springer-Verlag New York. doi:10.1007/978-1-4614-3628-7
37. European Commission. (2010). EUROPE 2020 – A strategy for smart, sustainable and inclusive growth. *Communication from the Commission*. Brussels. Retrieved April 21, 2017, from http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:2020:FIN:EN:PDF
38. European Commission. (2012, April). *Urban Logistics*. Retrieved May 18, 2017, from https://ec.europa.eu/transport/themes/urban/urban_mobility/urban_mobility_actions/urban-logistics_en
39. European Commission. (2015). *Cilji strategije Evropa 2020* [The goals of strategy Europe 2020]. Retrieved April 21, 2017, from http://ec.europa.eu/europe2020/europe-2020-in-a-nutshell/targets/index_sl.htm

40. European Commission. (2016, February 26). *Country Report Slovenia 2016.* Retrieved April 21, 2017, from http://ec.europa.eu/europe2020/pdf/csr2016/cr2016_slovenia_en.pdf
41. European Commission. (March 2011). *Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system.* Impact Assessment. Retrieved May 25, 2017, from http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=SEC:2011:0358:FIN:EN:PDF
42. European Environment Agency (EAA). (2016, September 26). *Electric vehicles and the energy sector - impacts on Europe's future emissions (Briefing 2/2016)*. Retrieved July 8, 2017, from https://www.eea.europa.eu/themes/transport/electric-vehicles/electric-vehicles-and-energy
43. European Environment Agency (EEA). (2017, June 6). *EEA greenhouse gas – data viewer*. Retrieved May 17, 2017, from http://www.eea.europa.eu/data-and-maps/data/data-viewers/greenhouse-gases-viewer
44. Eurostat. (2017a, June 1). *GDP per capita in PPS*. Retrieved July 13, 2017, from http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&plugin=1&language=en&pcode=tec00114
45. Eurostat. (2017b, March 24). *Internet purchases by individuals.* Retrieved April 26, 2017, from http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=isoc_ec_ibuy&lang=en
46. Evangelista, P., Colicchia, C., & Creazza, A. (2017). Is environmental sustainability a strategic priority for logistics service providers? Journal of Environmental Management, 198(1), 353-362.
47. Fernández, E., Fontana, D., & Speranza, M. (2016). On the Collaboration Uncapacitated Arc Routing Problem. Computers & Operations Research, 67, 120-131.
48. Formula One Digital Media Limited. (n.d.). *Power unit and ERS*. Retrieved May 15, 2017, from https://www.formula1.com/en/championship/inside-f1/understanding-f1-racing/Energy_Recovery_Systems.html
49. Fraunhofer-Institut für Materialfluss und Logistik, IML; Daimler AG; DB Mobility Logistics AG. (February 2014). *Visions of the future: Transportation and Logistics 2030.* Examining the potential for the development of road and rail transportation to 2030. Retrieved March 12, 2017.
50. Government of Singapore. (n.d.). Driverless vehicles: A vision for Singapore's transport. Retrieved August 10, 2017, from https://www.mot.gov.sg/Transport-Matters/Motoring/Driverless-vehicles--A-vision-for-Singapore-s-transport/
51. Guo, J., Wang, X., Fan, S., & Gen, M. (2017). Forward and reverse logistics network and route planning under the environment of low-carbon emissions: A case study of Shanghai fresh food E-commerce enterprises. Computers & Industrial Engineering, 106, 351-360.

52. Hallett, R., & Hutt, R. (2016, June 7). *10 jobs that didn't exist 10 years ago*. Retrieved August 7, 2017, from https://www.weforum.org/agenda/2016/06/10-jobs-that-didn-t-exist-10-years-ago/
53. Hausmann, D., Nangia, I., Netzer, D., Rehm, W., & Rothkopf, D. (September 2015). *Pathway to value creation.* McKinsey & Company. Retrieved March 12, 2017, from http://www.supplychain247.com/paper/pathway_to_value_creation
54. Institute of Studies for the Integration of Systems (ISIS). (2013). *CIVITAS MODERN.* Final Evaluation Report. Retrieved August 9, 2017, from http://civitas.eu/sites/default/files/d12.3_-_modern_final_evaluation_report_revised.pdf
55. International Business Machines Corp. (n.d.). *Extracting business value from the 4 V's of big data*. Retrieved April 19, 2017, from http://www.ibmbigdatahub.com/infographic/extracting-business-value-4-vs-big-data
56. International Energy Agency. (2017). *Global EV Outlook 2017.* Retrieved from https://www.iea.org/publications/freepublications/publication/GlobalEVOutlook2017.pdf
57. Internet of Things. (n.d.). In *Gartner*. Retrieved August 3, 2017, from http://www.gartner.com/it-glossary/internet-of-things/
58. Jaffe, E. (2015, October 20). *6 Big European Cities Have Plans to Establish Car-Free Zones in Central Areas*. Retrieved May 27, 2017, from http://www.citylab.com/cityfixer/2015/10/6-european-cities-with-plans-to-go-car-free/411439/
59. Jaklič, J. (2016/2017). *Text Mining* (PowerPoint presentation). Faculty of Economics, University of Ljubljana. Retrieved July 5, 2017.
60. Kagermann, H. (2015). Change Through Digitization – Value Creation in the Age of Industry 4.0. In: Albach, H., Meffert, H., Pinkwart, A., Reichwald, R. *Management of Permanent Change* (pp. 23-32). Springer Gabler, Wiesbaden.
61. Kasten, P., Bracker, J., Haller, M., & Purwanto, J. (September 2016). *Assessing the status of electrification of the road transport passenger vehicles and potential future implications for the environment and European energy system.* Retrieved July 7, 2017, from https://www.oeko.de/fileadmin/oekodoc/Assessing-the-status-of-electrification-of-the-road-transport-passenger-vehicles.pdf
62. Kauf, S. (2016). City logistics – a strategic element of sustainable urban development. Transportation Research Procedia, 16. 158-164.
63. Leviäkangas, P. (2016). Digitalisation of Finland's transport sector. Technology in Society, 47, 1-15.
64. Manfreda, A. (2016/2017). *Management oskrbne verige* (Supply chain management; PowerPoint presentation). Ljubljana: Faculty of Economics, University of Ljubljana. Retrieved July 10, 2017.
65. McCarthy, T. (2012, March 13). *Encyclopedia Britannica halts print publication after 244 years*. Retrieved May 26, 2017, from

https://www.theguardian.com/books/2012/mar/13/encyclopedia-britannica-halts-print-publication?newsfeed=true
66. MDS Transmodal Limited. (april 2012). *European Commission: Study on Urban Freight Transport.* Final Report. Retrieved May 18, 2017, from https://ec.europa.eu/transport/sites/transport/files/themes/urban/studies/doc/2012-04-urban-freight-transport.pdf
67. Mediacorp Pte Ltd. (2016, October 17). *Singapore exploring use of driverless vehicles for street cleaning, rubbish collection*. Retrieved August 10, 2017, from http://www.channelnewsasia.com/news/singapore/singapore-exploring-use-of-driverless-vehicles-for-street-cleani-7734624
68. Melo, S., Baptista, P., & Costab, Á. (2014). Comparing the use of small sized electric vehicles with diesel vans on city logistics. Social and Behavioral Sciences, 111, 1265-1274.
69. Mercedes-Benz. (2017, May 26). *Twitter*. Retrieved June 28, 2017, from https://twitter.com/MercedesBenz/status/868001366433816576
70. Nanterme, P. (2016, January 17). *Digital disruption has only just begun*. Retrieved June 28, 2017, from https://www.weforum.org/agenda/2016/01/digital-disruption-has-only-just-begun/
71. Nigarika, G., & Ritu, V. (2015). Cloud Architecture for the Logistics Business. Procedia Computer Science, 50, 414-420.
72. Nugent, C. (2017, March 15th). *Noise pollution in the spotlight*. Retrieved July 8, 2017, from https://www.eea.europa.eu/articles/noise-pollution-in-the-spotlight
73. Osvald, A., & Zadnik Stirn, L. (2008). A vehicle routing algorithm for the distribution of fresh vegetables and similar perishable food. *Journal of Food Engineering*, 85(2), 285-295.
74. *Corrugated pallets*. Retrieved May 15, 2017, from http://www.palletkraft.eu/corrugated-pallets
75. Pošta Slovenije d.o.o. (n.d.). Osnovne informacije. Retrieved July 13, 2017, from https://www.posta.si/o-nas/predstavitev/osnovne-informacije
76. Pošta Slovenije d.o.o. (n.d.). Prestavitev [Presentation]. Retrieved July 13, 2017, from https://www.posta.si/o-nas/predstavitev
77. Pošta Slovenije. (n.d.). Trajnostni razvoj [Sustainable development]. Retrieved July 13, 2017, from https://www.posta.si/o-nas/predstavitev/trajnostni-razvoj
78. Pošta Slovenije. (n.d.). Zelena logistika [Green logistics]. Retrieved May 25, 2017, from https://www.posta.si/o-nas/predstavitev/trajnostni-razvoj/zelena-logistika
79. Pošta Slovenije d.o.o. (2016, May). *Povečanje vrednosti in širitev poslovanja Skupine Pošte Slovenije* [Increase in customer value and business expansion of Pošta Slovenije group] (PowerPoint presentation).
80. Prometni institut Ljubljana d.o.o. (n.d.a). Glavni poudarki in cilji [Main highlights and goals]. Retrieved July 17, 2017, from http://www.dostave.si/CivitasElan.aspx

81. Prometni institut Ljubljana d.o.o. (n.d.b). O nas [About us]. Retrieved July 16, 2017, from http://www.dostave.si/Onas.aspx
82. Prometni institut Ljubljana d.o.o. (n.d.c). Trajnostno urejanje dostav [Sustainable delivery management]. Retrieved July 16, 2017, from http://www.dostave.si/Aktualno/Dobreprakse/Trajnostnourejanjedostav.aspx
83. Radio-Frequency Identification (RFID). (n.d.). In *Gartner*. Retrieved August 3, 2017, from http://www.gartner.com/it-glossary/radio-frequency-identification-rfid/
84. Sahling, L. (2012, February). *How Fuel Costs Affect Logistics Strategies*. Retrieved July 17, 2017, from http://www.naiop.org/en/Research/Our-Research/Reports/How-Fuel-Costs-Affect-Logistics-Strategies.aspx
85. Salehi, F., Ryssel, L., & Matuska, J. (2015). *Europe's CEP Market: Steady Growth Begins to Shift.* A.T. Kearney. Retrieved August 13, 2017, from http://www.atkearney.co.uk/en/transportation/ideas-insights/article/-/asset_publisher/LCcgOeS4t85g/content/europe-s-cep-market-steady-growth-begins-to-shift/10192?_101_INSTANCE_LCcgOeS4t85g_redirect=%2Fen%2Ftransportation%2Fideas-insights
86. Sanburn, J. (2013, March 13). Deliver a Fix for Traffic Jams. Retrieved May 25, 2017, from http://ideas.time.com/2013/03/14/10-big-ideas/slide/deliver-a-fix-for-traffic-jams/
87. Shao, J., Yang, H., Xing, X., & Yang, L. (2016). E-commerce and traffic congestion: An economic and policy analysis. Transportation Research Part B: Methodological, 83, 91-103.
88. Siikavirta, H., Punakivi, M., Kärkkäinen, M., & Linnanen, L. (2003). Effects of E-Commerce on Greenhouse Gas Emissions. Journal of Industrial Ecology, 6(2), 83-97.
89. Speranza, M. (2016). Trends in transportation and logistics. European Journal of Operational Research, 264(3), 1-7.
90. Suzuki, Y. (2011). A new truck-routing approach for reducing fuel consumption and pollutants emission. Transportation Research Part D: Transport and Environment, 16(1), 73-77.
91. Taniguchi, E. (2014). Concepts of city logistics for sustainable and liveable cities. *Procedia – Social and Behavioral Sciences*, 151, 310-317.
92. Taniguchi, E., Thompson, R., & Yamada, T. (2014). Recent Trends and Innovations in Modelling City Logistics. Procedia – Social and Behavioral Sciences, 125, 4-14.
93. Tarantilis, C., & Kiranoudis, C. (2002). Distribution of fresh meat. Journal of Food Engineering, 51(1), 85-91.
94. Tiago, O., Alhinho, M., Rita, P., & Dhillon, G. (2017). Modelling and testing consumer trust dimensions in e-commerce. Computers in Human Behavior, 71, 153-164.
95. U.S. Department of Transportation. (2013, May 30). *U.S. Department of Transportation Releases Policy on Automated Vehicle Development*. Retrieved August 9, 2017, from https://www.transportation.gov/briefing-room/us-department-transportation-releases-policy-automated-vehicle-development

96. United Parcel Service of America, Inc. (n.d.). UPS Access Point Network. Retrieved May 23, 2017, from https://www.ups.com/us/en/services/e-commerce/b2c-delivery-solutions.page?
97. United Parcel Service of America, Inc. (n.d.). Kiala Point. Retrieved May 23, 2017, from https://www.ups.com/es/en/locations/kiala-index.page?
98. van Rooijen, T., & Quak, H. (2014). City Logistics in the European CIVITAS Initiative. Procedia - Social and Behavioral Sciences, 125, 312-325.
99. Volvo Car Corporation. (n.d.). Autopilot. Retrieved August 13, 2017, from http://www.volvocars.com/au/about/innovations/intellisafe/autopilot
100. von Leipzig, T., Gamp, M., Manz, D., Schöttle, K., Ohlhausen, P., Oosthuizen, G., Palm, D., von Leipzig, K. (2017). Initialising customer-orientated digital transformation in enterprises. Procedia Manufacturing, 8, 517-524.
101. Westerman, G., Bonnet, D., & McAfee, A. (2014, January 7). *The Nine Elements of Digital Transformation*. Retrieved April 25, 2017, from http://sloanreview.mit.edu/article/the-nine-elements-of-digital-transformation/
102. What Is Big Data? (n.d.). In *Gartner*. Retrieved August 3, 2017, from https://research.gartner.com/definition-whatis-big-data?resId=3002918&srcId=1-8163325102
103. The World Bank Group. (n.d.a). *Urban population growth (annual %), Slovenia*. Retrieved April 21, 2017, from http://data.worldbank.org/indicator/SP.URB.GROW?locations=SI
104. The World Bank Group. (n.d.b). *Urban population growth (annual %), world*. Retrieved April 21, 2017, from http://data.worldbank.org/indicator/SP.URB.GROW
105. The World Bank Group. (n.d.c). *World Development Indicators*. Retrieved May 6, 2017, from http://databank.worldbank.org/data/reports.aspx?source=2&series=SP.POP.65UP.TO.ZS&country=
106. World Economic Forum. (2015, September). *Technology Tipping Points and Societal Impact.* Retrieved May 5, 2017, from http://www3.weforum.org/docs/WEF_GAC15_Technological_Tipping_Points_report_2015.pdf
107. World Economic Forum. (2016). *Digital Transformation of Industries: In collaboration with Accenture.* World Economic Forum. Retrieved May 25, 2017, from http://reports.weforum.org/digital-transformation/wp-content/blogs.dir/94/mp/files/pages/files/wef-dti-logisticswhitepaper-final-january-2016.pdf
108. World Trade Organization. (2016, April 7). *2016 Press Releases – Trade growth to remain subdued in 2016 as uncertainties weigh on global demand – Press/768*. Retrieved April 26, 2017, from WTO: https://www.wto.org/english/news_e/pres16_e/pr768_e.htm

109. World Trade Organization. (2017). *World Trade Statistical Review 2016.* Retrieved May 24, 2017, from https://www.wto.org/english/res_e/statis_e/wts2016_e/wts2016_e.pdf

APPENDIXES

TABLE OF APPENDIXES

APPENDIX A: Summary of the thesis in Slovenian language

Kratek povzetek magistrskega dela v slovenskem jeziku. Prehod s proizvodnje na osnovi predvidevanja povpraševanja (ang. push proizvodnega koncepta) na proizvodnjo po prejemu naročila (ang. pull koncept) pomeni proizvodnjo po meri, ki brez elektronskega poslovanja ne bi bila mogoča. Poleg tega kot posledica interneta stvari (ang. Internet of Things) podjetja z neskončno količino zbranih podatkov lahko že na splošno bolj ciljno usmerijo svoje izdelke. Tudi na splošno je v literaturi moč zaznati osredotočenost na stranko in njene potrebe ter mnenja, da bi se morala vsaka digitalna transformacija pričeti ravno s tem, ker izboljšanje uporabniške izkušnje v končni fazi vpliva na dobiček podjetja (von Leipzig, Gamp, Manz, & Schöttle, 2017).

Udobje, širina izbire, cena in ostali dejavniki, ki govorijo v prid e-nakupovanju, so potrošnike prepričali, da je smiselno opravljati tudi manjše, a zato bolj pogoste, nakupe. Skladno s tem zahtevnost strank narašča tako kot tudi obseg spletnega nakupovanja in posledično dobav za logistično-transportna podjetja. Pogostejših, še bolj pa hitrejših, dobav se zagotovo zavedajo podjetja, ki pokrivajo področje sveže hrane. Guo in ostali (2017) so v tem sektorju naredili študijo, ki bi lahko svoje koncepte prenesla tudi na dostave drugih izdelkov.

Vpliv omenjenih trendov je viden v večini sektorjev gospodarstva, čeprav vsi ne izkoriščajo tega do enake mere. Logistika in transport definitivno nista izključeni dejavnosti pri žetvi uspeha ali soočanju prehitevanja s strani konkurence. Resda je to industrija, kjer je zgodovinsko zaznati slabše poslovne rezultate v smislu ekonomskih dobičkov, a obstajajo podjetja, ki pri tem izstopajo z nadpovprečnimi dobički (Hausmann, Nangia, Netzer, Rehm, & Rothkopf, september 2015). Tovrstni t. i. zmagovalci so dokazali, da lahko prehitijo trende in na ta način oblikujejo industrijo, kar je npr. uspelo podjetju Über z vpeljavo sistema deljenja vozil (ang. car sharing) kot neke vrste alternativo tradicionalnim taksijem. Watanabe, Naveed, Neittaanmäki in Fox (2016) so le eni izmed mnogih avtorjev, ki raziskujejo, kaj stoji v ozadju njihovega uspeha.

Če se pomaknemo bolj k logističnemu delu sektorja, se tam poraja vprašanje, kako lahko tradicionalno podjetje, kot je Pošta Slovenije, drži tempo nedavnega dogajanja ter, kako naj se pri tem bori s konkurenti, ki so bili že v osnovi ustanovljeni kot ekspresni ponudniki poštnih storitev, npr. DHL ter DPD.

Ob tem so trenutni tržni igralci omejeni še z regulativnimi in okoljskimi spremembami. Do neke mere slednje naslavlja Evropska unija v svoji Strategiji 2020, kjer se med drugim zavzema za zmanjšanje izpustov toplogrednih plinov za 20 % do leta 2020 glede na vrednost v letu 1990 (European Commission, 2015).

Hkrati oblasti zapirajo mestna jedra ali pa vsaj postavljajo omejitve znotraj njih. Govori se celo o možnosti, da bi bile dostave v jedrih dovoljene zgolj določenim podjetjem ali pa bi si dostavna podjetja razdelila določena območja med seboj, kar spodbuja razvoj novih oblik sodelovanja celo med konkurenti (Fraunhofer-Institut für Materialfluss und Logistik; Daimler AG; DB Mobility Logistics AG, februar 2014). Tovrstna sodelovanja nadalje vplivajo na zmanjševanje t.i. praznih kilometrov, transportnih stroškov in števila tovornjakov (Hausmann, Nangia, Netzer, Rehm, & Rothkopf, september 2015).

Ne samo da spremembe prinašajo izzive, ampak istočasno obetajo vrsto potencialnih priložnosti, ki lahko podjetjem pomagajo pri poslovanju, tj. že zgoraj omenjenim pristopom do kupcev ali pa zgolj notranji oskrbovalni verigi podjetja. Vseprisotno komuniciranje pametnih naprav prinaša boljši nadzor, preglednost dobrin ter lahko zmanjša napake, pospeši iskanje izgubljenih pošiljk ter skrajša dostavne čase. Henning (2015) meni, da bi ravno internet stvari lahko omogočil digitalizacijo logističnega centra s povezavo vseh členov v verigi od same proizvodnje do končne dostave.

Bodoče strategije podjetij bodo pod vplivom številnih kompromisov (ang. trade-offov), ki jih lahko povzamemo s sledečimi dejstvi. Strankam bo potrebno ugoditi z dostavo v tekočem dnevu ali vsaj naslednjem. Kako nasloviti to zahtevo, ko pa je podjetje na drugi strani pod pritiskom, da ne povečuje prometa na cestah zaradi obilice vozil? A bi bilo za izognitev gneči pri dostavah tekom dneva bolj smiselno le-te opravljati ponoči? Po drugi strani pa so Shao, H. Yang, Xing in L. Yang (2016) svoje domneve, ki kažejo ravno nasprotno, podkrepili z empirično analizo. Po njihovem mnenju bo prav spletno nakupovanje zaradi zgoščevanja na dostavna podjetja namesto osebnih vozil, ko gredo ljudje po nakupih, vplivalo na izboljšanje stanja prometa.

Distribucijska podjetja za povrh vsega odpirajo dostavne točke (ang. pick-up in drop-off points), kjer lahko stranke ali prevzamejo ali odložijo pakete, s čimer si podjetja zmanjšajo prevožene kilometre, ko se izognejo nepotrebnem oglašanju na dostavnem naslovu (Kauf, 2016).

Ker pogostejše dostave negativno vplivajo tudi na onesnaževanje, bo vozila z dizelskim motorjem potrebno zamenjati za druge alternative, npr. električna. A bi se popolnoma usmeriti na vozila z električnim motorjem ali raje izbrati kombinacijo z dizelskim? Moč je pričakovati tudi vgraditev v moto športu že pred skoraj desetletjem razvitega sistema ERS (ang. Energy Recovery System), ki del izpustov pretvarja za ponovno uporabo (Formula One Digital Media Limited, brez datuma).

Melo in ostali (2014) v svojem članku vidijo potencial tudi v majhnih električnih vozilih, ki bi na krajše razdalje lahko zamenjali sedaj uporabljena dostavna vozila. Podjetje DPD je za dostavo znotraj ljubljanskega mestnega jedra že uvedlo podobno rešitev, saj dostave paketov vršijo vozniki s kolesom.

Ne velja zaman dejstvo, da bo digitalizacija ena največjih sprememb, ki jih je doživelo človeštvo poleg klimatskih sprememb ter globalizacije (Leviäkangas, 2016). Glede na to, da slednji dve potekata vzporedno s prvo oz. vplivajo ena na drugo, lahko sklepamo, da se "bodo temelji gospodarskih panog še majali".

Za uspešen obstanek v poslu bodo morala podjetja nasloviti nič koliko izzivov, med katere sodijo pogostejše dobave z istočasnimi pritiski po skrbi za okolje, ki ciljajo na izboljšanje njegovega stanja ali vsaj ohranjanje trenutnega, pridobivanje koristi od sodobnih tehnologij in predvsem prilagodljivost aktualnemu dogajanju, saj razvoj digitalizacije z eksponentno rastjo še ne kaže znakov pešanja.

Magistrska naloga predstavlja zgornja dejstva tako z vidika sekundarnih kot primarnih virov. Njen namen je bil potrditi sledeči dve hipotezi, ki naj bi vplivali na stanje industrije v bližnji prihodnosti:

- Distribucijska podjetja bodo vse več uporabljala alternativna vozila, npr. električna vozila in kolesa, ali njihovo kombinacija namesto vozil z dizelskim motorjem.
- Sodelovanje med podjetji v Sloveniji še ni nivoju, kjer bi si bili konkurenti pripravljeni deliti stranke, da bi izboljšali poslovanje, zato bodo napredne oblike sodelovanja še vedno zaostajale.

Med pisanjem naloge me je veliko ljudi vprašalo, kaj naj bi pojem »Urbana logistika prihodnosti« predstavljal. Koncept se da zelo preprosto razložiti in predstaviti, rezultat katerih trendov je. Kar tukaj ni preprosto, je, kako morajo sodobna logistična podjetja k le-temu pristopiti.

Nedavne spremembe na trgu tehnologije, strank in trajnosti so torej prinesle tako priložnosti kot grožnje. Stranke vse več uporabljajo spletno nakupovanje, ki jih opravljajo tudi v majhnih obsegih, saj so se stroški dostave zmanjšali do nivoja, da si jih večina lahko privošči. Poleg tega so stranke postale zahtevnejše in si želijo dostave od vrat do vrat. Ironično rečeno niso več zadovoljne z dostavo isti dan, ampak bi le-to želele že kar pred samim naročilom. So pa za visoko kakovostno storitev vsaj pripravljene več plačati.

Nadalje, urbanizacija povzroča povišano število dostav na urbana območja ter mestna jedra, kar povečuje gnečo na cestah ter onesnaženost.

Oblasti hkrati zahtevajo bolj trajnosten pristop do okolja z namenom preprečitve slabšanja njegovega stanja. V izvajanju so različne strategije, ena izmed katerih je Evropa 2020, ki poskušajo menedžerje v podjetjih usmeriti v »razmišljati zeleno«. V Evropi se mestna jedra v večjih mestih zapirajo za promet, medtem ko imajo dostavna vozila zgolj omejeno časovno okno, kdaj lahko tam opravljajo dostave.

Čeprav je transportno-logistični sektor zgodovinsko zaostajal za ostalimi industrijami, mu tehnologija danes pomaga biti korak bližje vsem zgoraj omenjenim omejitvam, npr. izognitev nepotrebnim vožnjam, manjša poraba goriva in s tem zmanjšanje vpliva na okolje zaradi možnosti natančnejšega predvidevanja časa dostave.

Alternativne transportne oblike, npr. električna vozila, vozila na zemeljski plin, kolesa ali celo pešci, lahko zamenjajo trenutno uporabljena dizelska in bencinska vozila. Ne samo da bi to zmanjšalo onesnaženje zraka, ampak tudi pozitivno vplivalo na hrup. Poleg tega pa je težave z gnečo mogoče rešiti tudi s prevozi, ki v celotni dostavni verigi obsegajo več različnih vozil.

Ponudnike dostavnih storitev zanimajo nove oblike sodelovanja. Primeri iz Nemčije obsegajo prostovoljne dogovore, znotraj katerih so se podjetja dogovorila za skupna paketne postaje, dostave ter delitve dostavnih poti. Pri njih se je to izkazalo kot uspešno, zato je podobno sodelovanje mogoče pričakovati tudi v ostalih državah, kjer pa le-to ne bo nujno na prostovoljni osnovi. V Ljubljani se za prihodnost napoveduje odprtje mestnega jedra zgolj za enega ponudnika, ki bi v svojem imenu in imenu ostalih opravljal dostave. Licenca bo podeljena na osnovi najboljšega razvojnega programa, ampak ne nujno s strinjanjem ostalih podjetij.

Medtem ko so pomembnejše osebe iz treh večjih dostavnih podjetij v Sloveniji, tj. DHL, DPD in Pošta Slovenije, enotni glede tega, kako močno dogajanje na trgu zaradi digitalizacije in ostalih sprememb vpliva na njih, pa industrije v prihodnosti ne vidijo nujno z istimi očmi.

Pošta Slovenije je tradicionalni ponudnik storitev, kar bi lahko pomenilo prej prednost kot slabost, čeprav niso bili ustanovljeni kot ekspresni ponudnik storitev. Ker so na trgu prisotni že desetletja, imajo vzpostavljeno mrežo po vsej državi, v namene pisemskih pošiljk pa so kolesa uporabljali že mnogo pred tem, ko je to postalo splošna praksa.

G. Bertole iz DPD-ja meni, da so državna poštna podjetja na nek način zaščitena s strani države, zato ostali, npr. DHL ali DPD, ne morajo tako široko podajati novih idej oz. obstaja manjša verjetnost, da so sprejete. Ne glede na to pa želijo vsi trije ponudniki najti svoje mesto na trgu z višjim nivojem storitve v očeh kupcev. Zaenkrat je na DHL tržni vodja v Sloveniji, ampak v hitro spreminjajočem se okolju je vse prej kot to dovolj za ohranjanje prednosti. Pri vseh treh podjetjih je zaznati, da se tega zavedajo in ves čas vpeljujejo nove prakse.

Na primer, DPD je v osemnajstih nemških mestih začel z 90-minutnimi dostavami, ki so se izkazale za uspešne. Podobno idejo je udejanjil tudi Amazon, ki na prvi pogled sicer ne bi deloval kot konkurent. S ponujeno 30-minutno dostavo z droni so se razširili na področje dostavljanja.

Prihodnost je v manjših depojih, ki bodo služila kot vmesna točka med skladiščem in končno stranko. Ideja v ozadju pravi, da se paketi zgodaj zjutraj poberejo v glavnem skladišču ter prepeljejo v manjši depo, ki je po navadi na obrobju mestnega jedra. Od tam naprej se za dostave v t. i. zadnji milji uporabijo električna vozila, kolesa ali pešci. Ko bo koncept dovolj razvit, bo v celoti obsegal okolju prijazna vozila.

Glede na pregled literature ter podatke, pridobljene z intervjuji, lahko potrdim obe hipotezi. Uporaba alternativnih vozil je res v porastu, sodelovanje med ponudniki na trgu pa ni tako pogosto kot v drugih državah.

Preučevani ponudniki zagotovo največ govorijo o okolju in njegovi zaščiti. Zavedajo se lastnega močnega vpliva na okolje, zato so s svojimi dejanji pripravljeni izravnati negativnosti iz vsakdanjega poslovanja. Ena možnost je uvajanje alternativnih vozil, druga pa sodelovanje v družbeno odgovornih projektih. DPD se lahko pohvali s certifikatom ogljične nevtralnosti ter hkrati uvrščenostjo visoko nad povprečje panoge z vidika trajnosti po merjenju Eco Vadis.

DHL, DPD in Pošta Slovenije testirajo različne rešitve v povezavi z vozili. Ideje ves čas tudi udejanjajo, saj panoga nikoli ne spi in zmaga v bitki še ne pomeni dobljene vojne.

Čeprav je na trgu zaznati določena sodelovanja, npr. Pošta Slovenije zaradi razširjenega omrežja za nekatere ponudnike opravlja dostave in pobiranja paketov, ne moramo govoriti o podobnih rešitvah, kot jih podjetja v tujini uporabljajo za izboljšanje poslovanja. DHL, DPD in Pošta Slovenije so še vedno bolj konkurenti kot partnerji. Vseeno pa znajo biti tovrstne prakse ključne za nadaljnji razvoj panoge.

Kako bo panoge zgledala čez deset let, ne moremo napovedati. Takrat verjetno ne bomo več govorili o električnih vozilih in zaprtjih mest, ampak bomo na mesto gledali kot pametno mesto. Sestavni elementi države, tržnih igralcev ter tehnologije bodo postali še bolj povezani in odvisni, zato bodo strategije, ki se danes kažejo kot uspešne, postale neuporabne, kar bo lahko določena podjetja postavilo na rob propada.

APPENDIX B: Covered Countries for E-Commerce Report

Table 1. Covered Countries in E-Commerce Report

Country	**Capital**	**VAT (%)**	**Currency**	**Population (millions)**
Argentina	Buenos Aires	21,00	Peso (ARS)	43,4
Australia	Sydney	10,00	Dollar (AUD)	23,8
Brazil	Brasilia	17,00 19,00	Real (BRL)	207,8
Canada	Ottawa	5,00 Local Sales Tax	Dollar (CAD)	35,9
Chile	Santiago	19,00	Peso (CLP)	17,9
France	Paris	20,00	Euro (EUR)	66,4
Germany	Berlin	19,00	Euro (EUR)	81,2
India	New Delhi	12,00 15,00	Rupee (INR)	1.311,1
Indonesia	Jakarta	10,00	Rupiah (IDR)	257,6
Israel	Jerusalem	17,00	New Shekel (ILS)	8,4
Italy	Rome	22,00	Euro (EUR)	60,8
Japan	Tokyo	8,00	Yen (JPY)	127,0
Mexico	Mexico City	16,00	Peso (MXN)	127,0
Russia	Moscow	18,00	Ruble (RUB)	146,3
Saudi Arabia	Riyadh	0,00	Saudi Riyal (SAR)	31,5
South Africa	Pretoria, Bloemfontein and Cape Town	14,00	Rand (ZAR)	55,00
South Korea	Seoul	10,00	Won (KRW)	50,6
Spain	Madrid	21,00	Euro (EUR)	46,4
United Kingdom	London	20,00	Pound (GBP	64,9
United States	Washington D.C.	Differ by state	Dollar (USD)	321,4

Source: Ecommerce Foundation, *Global B2C E-commerce Report 2016*, 2017.

APPENDIX C: Internet Purchases by Individuals

Table 2. Internet Purchases by Individuals

GEO/TIME	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
European Union (28 countries)	23	24	28	31	33	35	38	41	43	45
European Union (27 countries)	23	24	28	31	33	35	38	41	43	46
European Union (25 countries)	24	26	30	33	:	:	:	:	:	:
European Union (15 countries)	27	29	33	36	39	40	44	46	49	51
Euro area (EA11-2000, EA12-2006, EA13-2007, EA15-2008, EA16-2010, EA17-2013, EA18-2014, EA19)	23	24	27	30	33	35	37	40	42	44
Belgium	15	14	25	27	31	33	36	41	42	46
Bulgaria	2	2	3	3	5	6	8	10	12	11
Czech Republic	8	13	12	15	16	18	21	25	26	29
Denmark	43	47	50	54	57	60	65	66	67	71
Germany (until 1990 former territory of the FRG)	41	42	45	48	54	55	60	61	64	64
Estonia	6	7	12	13	16	17	16	37	46	45
Ireland	26	30	29	28	34	35	37	43	44	41
Greece	5	6	8	9	13	16	17	20	24	23
Spain	13	13	15	17	19	22	23	28	32	35
France	25	28	32	40	40	42	44	49	49	52
Croatia	5	5	6	9	11	16	19	22	26	25
Italy	7	7	8	9	10	11	14	15	18	20
Cyprus	8	7	13	14	16	17	20	23	19	22
Latvia	6	10	8	8	10	18	21	24	27	31
Lithuania	4	4	6	7	10	14	19	19	22	24
Luxembourg	37	36	46	47	52	57	59	62	63	69
Hungary	7	8	9	10	12	15	17	20	23	27
Malta	16	16	27	32	35	37	38	41	43	41
Netherlands	43	43	49	52	53	52	55	59	59	63
Austria	26	28	32	32	35	39	46	43	46	48
Poland	11	12	18	20	20	21	23	24	24	31
Portugal	6	6	10	10	10	13	15	17	23	23

table continues

Table 2: Internet Purchases by Individuals (con.)

GEO/TIME	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Romania	2	3	2	2	4	3	5	6	8	8
Slovenia	9	12	14	17	20	22	25	26	28	30
Slovakia	10	13	16	19	23	30	30	31	35	41
Finland	33	33	37	41	45	47	49	53	49	48
Sweden	39	38	45	50	53	58	57	62	56	63
United Kingdom	44	49	58	60	64	64	71	72	75	78
Iceland	32	32	27	29	31	35	34	48	:	:
Norway	48	46	54	53	57	62	56	60	61	61
Switzerland	:	:	:	:	:	:	:	62	:	:
Montenegro	:	:	:	:	:	4	:	:	:	:
Former Yugoslav Republic of Macedonia, the	:	2	2	2	:	3	4	7	8	11
Serbia	1	:	3	:	:	:	:	:	15	:
Turkey	2	3	2	4	:	7	7	9	11	13
Canada	:	:	:	:	:	:	:	:	:	:

Source: Eurostat, *GDP per capita in PPS*, 2017.

APPENDIX D: List of Abbreviations

Table 3. List of Abbreviations

Abbreviation	Meaning
AGV	Automated Guided Vehicles
B2B	Business to Business Segment
B2C	Business to Consumer Segment
CEP	Courier, Express and Parcel Sector
C2C	Consumer to Consumer Segment
EBITA	Earnings Before Interest, Taxes and Amortisation
EC	European Commission
ERS	Energy Recovery System
EU-28	28 EU member states
EV	Enterprise Value
F1	Formula 1
GDP	Gross Domestic Product
ICT	Information and Communication Technology
IoT	Internet of Things
LEZ	Low Emission Zones
M&A	Mergers and Acquisitions
ROI	Return on Investment
ROIC	Return on Invested Capital
SEV	Small-Sized Electric Vehicles
TRS	Total Returns to Shareholders
US	United States
UPS	United Parcel Service
UPU	Universal Postal Union
WTO	World Trade Organisation