E-commerce and urban planning – comparing knowledge claims in research and planning practice

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ABSTRACT
In planning for a future sustainable transport system, it is important to consider the likely effects of e-commerce. This paper analyses the understanding of impacts of e-commerce on urban planning as expressed in planning practice in a number of Swedish municipalities. Knowledge claims concerning the potential effects of e-commerce are studied through an analysis of planning documents and supplementing interviews. These knowledge claims in planning practice are contrasted with the findings presented and discussed in the research literature. The results indicate that the current understanding of e-commerce in Swedish planning practice is limited and that it is primarily viewed as an opportunity to address transport system issues by reducing passenger transport. However, the overview of the literature shows that e-commerce has so far only had limited effects on prevailing mobility habits and that freight transport has increased in parallel with increased e-commerce. Furthermore, e-commerce challenges city centres as commercial areas. Thus, from a planning perspective e-commerce should not be regarded as an easy solution for an unsustainable transport sector. To harness its potential benefits, there is a need to develop pro-active planning strategies that address the potential impacts of e-commerce.

1. Introduction
E-commerce in its various forms – including business-to-business, business-to-consumer, and consumer-to-consumer – has grown considerably in recent years. World sales of goods through e-commerce channels are growing at about 20% annually, and total e-commerce sales in 2014 were estimated to be about $750 billion (Prologis, 2014). In Sweden, national business-to-consumer e-commerce turnover increased by more than 500% between 2007 and 2014, and in 2014 alone sales increased by 16% (HUI Research, 2015). By 2020 it is estimated that e-commerce will entail some 200 million consignments in Sweden (HUI Research, 2016). This fast growth indicates that e-commerce is becoming an important phenomenon with various potential impacts for the future development of cities. There is now a variety of e-commerce solutions emerging besides traditional online sales. If ‘brick
and mortar’ is defined as the traditional retail store, ‘click-and-mortar’ is defined as a form of e-commerce in which customers shop over the Internet, but are also able to physically visit the retailer’s brick-and-mortar store. There is also a wide variety in the way consumers can pick up goods purchased online, e.g. in the retailer’s physical store or at pick-up points provided by a specific retailer or at common pick-up stations.

Shopping, regardless of form, generates transport of goods. Typically, shopping also generates transport of consumers, and shopping trips account for approximately 20% of all trips and for approximately 10% of the total passenger mileage according to data from Sweden and other European countries (Trivector, 2011). More than one third of shopping trips are made by car (Winslott Hiselius, Smidfelt Rosqvist, & Adell, 2015). It is not entirely clear, however, what the impacts of e-commerce are concerning things like travel distances and modal distribution compared to conventional forms of shopping, (e.g. Edwards, McKinnon, & Cullinane, 2010), although the strong trend towards more Internet shopping is likely to have impacts on future transport volumes. Additionally, apart from the impacts on the volume of transport, mobility patterns might also change.

There are several examples in the transport and planning literature where increasing e-commerce is discussed as an important phenomenon with the potential to be a ‘game changer’. Visser and Lanzendorf (2004), p. 203 argue that the ‘distribution of goods ordered over the Internet will over time provide (transport) planners with a huge challenge.’ According to Cervero (2000), p. 14 the cyber city of tomorrow implies (among other things) that ‘with e-commerce, truck delivery trips will replace personal shopping trips’ and that ‘e-commerce suggests the emergence of goods distribution centres in many pockets of the city.’ Cervero (2000) thus sees e-commerce and its implications as one aspect of an ongoing structural shift that will exert strong land-use influences just as past transport innovations have done. Shao, Yang, Xing, and Yang (2016) sees e-commerce as an alternative demand-management mechanism with the potential to relieve traffic congestion as consumers are re-directed from physical stores to online stores. Crocco, Eboli, and Mazzulla (2013) stress that an increasing share of online shopping will likely lead to changes not only in travel behaviour but also in the use of transport systems and in how shopping locations are distributed.

While it is widely acknowledged that the trend towards increasing e-commerce might have important short-term and long-term effects on transport, mobility, and land-use structures, there is limited knowledge on how the impacts of increasing e-commerce are handled in planning practice. Little research has dealt with this issue and empirically analysed this topic, especially in a Swedish context.

The aim of this paper is to analyse the understanding of the impacts of e-commerce on land-use planning as expressed in Swedish planning practice. The aim is pursued by addressing the following research questions. How is e-commerce discussed in planning practice? Are the impacts of e-commerce that are discussed in planning practice consistent with the results and discussions in the research literature on transport and planning? What are the implications of any possible differences?

In section 2, the research design and analytical approach in the paper are explained, and in section 3 a review of the current literature on the potential impacts of e-commerce is presented. This is followed in section 4 by an analysis of knowledge claims about transport and land-use impacts of e-commerce in Swedish planning practice. Finally, differences and similarities between the research literature and planning practice knowledge claims are
discussed, and some implications for future research and planning practice are outlined in section 5.

2. Research design

This study focused on the Swedish case, and in order to discuss the understanding of the potential effects of e-commerce on urban planning, the method comprised a review of international research literature concerning the impacts of e-commerce, an analysis of planning documents, and interviews with planners in the Swedish context.

To analyse the knowledge claims in practice, we reviewed a number of Swedish public sector plans and programmes, which were scanned for arguments about the effects of increasing e-commerce and the consequences these effects will have for urban planning. The document analysis was supplemented with three interviews with planners in two Swedish municipalities. Through this analysis of local and national planning documents complemented with a limited interview study, we believe that our results have captured the prevailing view among the responsible planning authorities on the impacts that increasing e-commerce will have on urban planning in the studied areas.

Finally, the knowledge claims on the impacts of e-commerce on urban planning in the public sector are discussed in light of the findings of the literature review. Here the effects identified in the literature are compared to the effects that are considered in planning practice, some suggestions for future research are made, and conclusions are drawn.

2.1. Analytical approach – comparing knowledge claims in planning practice with the research literature

The analytical approach in this paper is based on Næss, Hansson, Richardson, and Tennøy (2013, p. 470) who in a study on land-use and transport planning analysed consistencies and gaps between ‘research-driven “state-of-the-art” knowledge, and knowledge claims made in practice’. The approach of Næss et al. (2013) is characterised by an interest in the outcomes of planning, and a key attribute of research focusing on planning outcomes (as opposed to process-oriented research focusing on power dynamics and the output of planning processes) is the ‘recognition of the possibility to anticipate likely impacts of alternative spatial solutions’ (p. 474).

From this perspective, studying knowledge claims in planning practice is important because they can influence the development of urban and transport system structures along certain trajectories. The way that phenomena are understood (as problems, threats, solutions, or opportunities) is underpinned by knowledge of the phenomenon at hand (see, e.g. Pettersson, 2013; Rein & Schön, 1993; Tennøy, 2010).

Knowledge (in a broad sense) clearly does not have to be the result of research processes conducted in academia, but according to the approach in Næss et al. (2013) a distinction between different forms of knowledge is possible (and advisable). Knowledge published in academic journals is valued more because it has passed through the filters of academic scrutiny and been measured against the standards of a scientific field.

In the case of land-use and transport planning, Næss et al. (2013) argue that there is widespread agreement on the generality of a number of linkages between various urban structural dimensions (e.g. density, residential/workplace location, mixed land use, public
transport system, road capacity, and parking policy) that form a rather stable foundation for 'the-state-of-the-art' claims concerning the outcomes of certain planning proposals. In their study, Naess et al. (2013) identified a number of 'planning myths', some of which were found in official planning documents and indicated that the knowledge base of local planners was in need of an update. The literature overview of the research in section 3 of this paper will, to the extent it is possible, form a similar evaluative position regarding the impacts of e-commerce to which we can compare and discuss the knowledge claims found in public sector plans and programmes. This evaluative position comprises both empirical identification of short-term effects and discussion on potential long-term effects. The research literature might not be the primary choice as a source for the identification of short-term effects because there are more empirical results to be found in the 'grey literature' produced by organisations outside of the traditional commercial and academic publishing and distribution channels. This literature is, however, not peer reviewed and in many cases might be regarded as subjective. There is furthermore a general lack of statistical data in Sweden connected to e-commerce and related transports, which has recently been acknowledged by the Swedish authority Transport Analysis (2017). However, when looking at capturing and discussing potential long-term effects, the research literature is here regarded as the best source.

2.2. Analytical framework

In order to operationalise the approach inspired by Naess et al. (2013) we draw on Visser and Lanzendorf (2004), where the potential impacts of e-commerce are divided into direct mobility effects and indirect accessibility effects. These two concepts are used to structure the analysis and more specifically to make the comparison between knowledge claims in the research literature and in planning practice. Direct mobility effects refer to short-term effects on transport patterns, where e-commerce can replace or complement individual transport behaviour and can modify the logistics systems of businesses. Indirect accessibility effects refer to long-term changes in the activity systems of people, the configurations of supply chains, the choices of location, and patterns of land use. These effects also affect mobility patterns in the long term (as already discussed by Salomon (1986) and more recently by, for example, Seebauer, Kulmer, Bruckner, and Winkler (2015)), including modality choices and car ownership and use. In the analysis presented here, we highlight the following four interrelated dimensions where increasing e-commerce has potentially significant implications for land use and transport system planning in both the short and long term (based on Visser & Lanzendorf, 2004):

- Passenger transport, including travel distance, transport mode, and frequency
- Location and type of shops, including external shopping centres, city centre, brick and mortar, show room, etc.
- Logistics, including locations of warehouses, supply chains, etc.
- Freight transport, including transport distance, type of vehicle, and frequency
3. E-commerce trends and impacts

3.1. Short term/Direct mobility effects

3.1.1. Passenger transport

The consequences of increasing online shopping on individual travel behaviour have been the focus of many studies (Corpuz & Peachman, 2003; Farag, Krizek, & Dijst, 2006; Farag, Schwanen, Dijst, & Faber, 2007; Keskinen, Delache, Cruddas, Lindjord, & Iglesias, 2002; Rotem-Mindali & Weltevreden, 2013; Tonn & Hemrick, 2004; Visser & Lanzendorf, 2004; Weltevreden & van Rietbergen, 2007; Weltevreden, 2007). The main message from this growing body of literature is that the empirical evidence for the impacts on individual travel behaviour varies considerably. E-commerce can both increase and decrease the amount of travel and can alter the travel patterns of individuals in different ways within the existing infrastructure. Some researchers, e.g. van Wee, Chorus, and Geurs (2013), interpret the collected research as pointing in the direction of a complementarity effect. In other words, buying online complements the shopping done at physical stores and thus does not reduce the total number of shopping trips made. As an example, Farag et al. (2007) carried out a study of shopping online and/or in-store and found that searching online positively affected the frequency of physical shopping trips, which in turn positively influenced buying online. At the same time, the type of product being purchased is one central factor explaining whether or not the direct mobility effects of online shopping result in a substitution of physical shopping trips (Rotem-Mindali & Weltevreden, 2013). Rotem-Mindali and Weltevreden (2013) analysed Israeli consumers and concluded that e-commerce did not reduce passenger transport. The argument was that shopping is a leisure activity and that the Internet functions largely for searching for new products and opportunities. The result of that study showed that the decline in travel due to e-shopping is offset by an increase in travel for other purchases generated by information gathered by searching online. Another study found that home deliveries of food reduces emissions of carbon dioxide, but no more so than a change of transport from cars to buses for these trips would have done (Edwards et al., 2010).

In summary, and as stated by Friederiszick and Glowicka (2015), the question of whether online retailing is a complement or a substitute to traditional retailing is still unanswered.

3.1.2. Location and type of shops

Based on current land-use structures, research has been carried out on the relationship between e-commerce and the development, attractiveness, and accessibility of today's city centres. For instance, Farag et al. (2006) present results indicating that good shop accessibility has a negative impact on the frequency of e-shopping. Weltevreden (2007) stresses that because the potential for e-commerce varies depending on the type of product, it is also important to consider the type of retail categories at different locations because they are affected differently by e-commerce.

Empirical results from Weltevreden and van Rietbergen (2009) indicate that city centres are the most likely to be affected by the substitution of e-shopping for in-store shopping, followed by city district centres, and that village centres are less likely to be affected by e-commerce than city centres. In analysing the effect of e-commerce on Dutch inner cities, Boschma and Weltevreden (2004) found that retail sectors with the highest rates of
e-commerce (i.e. books, CDs, and clothes) are largely concentrated in Dutch inner cities, indicating that these areas will be the most affected by e-commerce.

3.1.3. Freight transport
The most obvious and direct mobility effect of e-commerce on freight transport is that the last segment of the supply chain is modified when trucks deliver the purchased goods either to a pick-up point or to the home of the customer. Earlier research has identified the following three commonly used supply chains in e-commerce retailing: retailers that are only active in the online segment with dedicated vehicles for delivery to customers, retailers using a parcel carrier’s existing distribution network to deliver the goods to the customer, and click-and-mortar retailers (retailers selling through brick-and-mortar stores as well as through an online channel) sometimes using a dedicated fleet of vehicles for delivery to customers (Vanelslander, Deketele, & Van Hove, 2011).

According to the literature reviewed in van Loon, McKinnon, Deketele, and Dewaele (2014), an increase in demand for e-commerce might result in a direct increase in truck kilometres. This is due to the descaling of transport operations when using smaller vehicles and longer routes for home deliveries (including failed deliveries) and new return flows (Kröger, Fergusson, & Skinner, 2003; van Loon et al., 2014). Also, for e-commerce to become more attractive from a customer perspective, fast home delivery at all hours is desired (Karlsson & Rosén, 2003), but this could lead to inefficient routes and a low loading factor (Sui & Rejeski, 2002; Visser, Nemoto, & Browne, 2013).

On the other hand, with e-commerce, the transport trucks and small vans could take the place of consumers travelling to shops. However, as pointed out earlier, the impacts on individual mobility are not clear; it is not evident that e-commerce necessarily leads to reduced passenger transport (Rotem-Mindali & Weltevreden, 2013), and if substitution does take place then home delivery might replace travel that would otherwise be made on foot, by bike, or by public transport (Visser & Lanzendorf, 2004). Furthermore, if there is a complementary effect as suggested by, for example, van Wee et al. (2013), there will be freight transport both to the traditional brick and mortar shop and for home delivery.

3.2. Long term/Indirect accessibility effects
3.2.1. Location and type of shops
Empirical research on the spatial effects of the adoption of e-commerce by retailers and consumers is limited. Boschma and Weltevreden (2004) suggest that due to their centrality, inner cities are attractive locations for retailers to develop a brick and mortar strategy in which the customer might order products either online or physically in a store and then might either pick up the order directly at a local branch of the store or have it delivered to their home. Inner cities also provide an advantage over other shopping locations because it is easier for consumers to pick up and pay for the goods they ordered via the Internet at a central location where they can also perform other activities, including other shopping activities (i.e. trip chaining) (Boschma & Weltevreden, 2004).

Another claim about indirect accessibility effects is that e-commerce affects the spatial distribution of brick and mortar shops. Visser and Lanzendorf (2004) discuss how the current process of decentralisation and suburbanisation of distribution systems for
business-to-consumer e-commerce might gradually extend into more remote and less densely populated areas.

Friederiszick and Głowicka (2015) argue that it is clear that brick and mortar retailers either need to scale down their shop networks or need to find a new role for brick and mortar stores in an omni-channel (offline/online) environment. Another argument about indirect accessibility effects is that e-shopping (in combination with the potential for working remotely enabled by the Internet) can allow for greater opportunities to live in remote locations. This argument, expressing an ‘end of geography’ view, is aligned with ideas stated by some commentators arguing that space and place are becoming meaningless in the digital era. More closely linked to e-commerce, this argument proposes that living near a shopping location becomes less important when it is possible to order everything online and have it delivered to the home (Visser & Lanzendorf, 2004).

At the same time, e-commerce is not the only trend affecting retailing, which makes it difficult to disentangle it from other trends. For example, in Sweden a growing desire for ‘fun shopping’ and the growth of externally located out-of-town retailing are as much (or even more) important for the retailing sector as e-commerce (Hagson, 2003; Haraldsson & Svensson, 2002).

3.2.2. Passenger transport

The indirect accessibility effects from e-shopping due to changes in location of retail outlets also include long-term influences on mobility patterns, for example, through changing conditions for modal choice (Visser & Lanzendorf, 2004). Research has shown that retail outlets in locations without conditions for sustainable modes of transport have a major impact on the amount of travel (Carling, Håkansson, & Rudholm, 2013; Jia, Carling, & Håkansson, 2013; Seebauer et al., 2015). E-shopping might thus indirectly reduce the opportunities for shopping trips made with slow transport modes such as walking and cycling and for living without a car, and it might increase the average trip length and frequency of car use for shopping trips. Studies focusing on restricted external locations for retailers and shopping centres in Sweden indicate a potential reduction of vehicle kilometres (Swedish Transport Administration (Vägverket), 2008). At the same time, the long-term effect of e-shopping on locations can be argued to go both ways. Weltevreden and van Rietbergen (2007) showed that a location’s attractiveness in terms of the accessibility of different modes of transport, the supply of shopping, and the availability of leisure activities influence how e-shopping alternatives are used. Average trip lengths and car use for shopping trips might on the whole increase due to spatial redistribution in retailing facilities (Visser & Lanzendorf, 2004).

In the long term, on-line shopping might reduce the need for owning a car (which of course would greatly influence the choice of transport mode and the total distance travelled for shopping purposes) (Visser & Lanzendorf, 2004). It is, however, debatable if there is any empirical evidence supporting this claim. Casas, Zmud, and Bricka (2001) found no evidence for e-commerce leading to less travel. Another study of Swedish Internet shoppers by Winslott Hiselius et al. (2015) did, however, find that there were some mobility pattern differences between frequent online shoppers and those with less frequent online shopping behaviour, although there were no simple and conclusive overall differences in total travel patterns. However, a significant overall difference in mode choice could be seen in which frequent online shoppers used sustainable transport modes to a greater extent than those who do not shop regularly online.
3.2.3. **Freight transport**

The indirect accessibility effects for freight transport include demand effects and shifts in consumption patterns (Fichter, 2003). Demand effects refer to the possibility that having more information available and lower transaction costs for purchases will lead to more purchases. E-commerce means that people can buy more for the same amount of money, which in turn could increase freight transport volumes. Shifts in consumption patterns refer to increases in impulse purchases and increased demand for products found on the Internet. This could also entail that products are shipped over longer physical distances and would thus influence both freight transport volumes and patterns (Visser & Lanzendorf, 2004).

3.2.4. **Logistics**

Through indirect accessibility effects, e-commerce not only affects the operations related to transportation, but also the structure of the entire supply chain, e.g. through the purchase of goods from locations very far away (Romm, 2002). Moreover, in e-commerce, large central warehouses seem generally to be preferred over local distribution centres, (e.g. Matthews, Hendrickson, & Lave, 2002), although Visser and Lanzendorf (2004) discuss a decentralisation of distribution systems that locates distribution centres close to the homes of consumers. With regard to space needs, Romm (2002) estimated that e-commerce could reduce the need for one-and-a-half billion square feet of retail space in the US – about 5% of the total – and up to one billion square feet of warehouse space.

New delivery options such as pick-up points and parcel lockers related to online shopping have been identified. These are often located at key nodes in the public transport system and allow consumers to collect products that have been ordered online. In these cases there is no need for express couriers to make the delivery, thus reducing travel distance (e.g. Taniguchi & Kakimoto, 2003; Weltevreden & van Rietbergen, 2009). Although there are a number of hypotheses regarding the effects of e-commerce, it is not yet established how the impending restructuring of freight transport systems will affect sustainable transport as a whole (Mokhtarian, 2004; Weltevreden, 2007; Cairns, 2005).

3.3. **Summary**

Research within this area has mostly been conducted over the first decade of the 21st century, and empirical evidence for the effect of online shopping is sparse. Empirically validated effects identified in the research literature so far include direct mobility effects for a relatively short time horizon with e-commerce being carried out within more or less unchanged land-use structures. Stronger trends and changes are likely to come with increasing e-commerce, but these are not possible to empirically verify yet. The main findings from the literature are summarised in Table 1.

| Dimensions       | Short term/Direct mobility effects                        | Long term/Indirect accessibility effects                                      |
|------------------|----------------------------------------------------------|-------------------------------------------------------------------------------|
| Passenger transport | Inconclusive                                              | Decreasing volumes                                                           |
| Location         | Some effects in city centres                             | Change of mobility patterns, vehicle type, etc.                              |
| Freight transport | Increasing volumes                                       | Locations closer to customers, effects on types of shops                      |
| Logistics        | Existing structures prevail                               | Inconclusive regarding volumes                                               |
|                  |                                                          | New logistic systems closer to customers                                       |
4. Knowledge claims in planning practice

4.1. The Swedish context

In the Swedish context, the majority of current shopping trips are destined for external shopping centres or peripherally located big-box retailers. Currently, 78% of purchases in Sweden are made in brick and mortar shops and 22% are made online (HUI Research, 2016). Of the brick and mortar purchases, 33% are made in city centres, 31% in external shopping centres, and 14% in other big-box retailing areas (HUI Research, 2016). Because big-box retailing areas are typically located in peripheral areas, this means that current mobility patterns for shopping trips are dominated by trips to external or peripherally located brick and mortar shops.

4.2. National planning documents

We identified three planning documents regarding policies and planning for commerce produced at the national level in Sweden. The reports are produced by the Swedish Transport Administration (2011); the National Board of Housing, Building and Planning (2015), and the Swedish Association of Local Authorities and Regions (2015), and an explicit purpose of all three documents is to provide support to local-level planners. A common denominator in these planning documents is the conclusion that e-commerce so far has not contributed to a decrease in passenger transport for shopping, while freight transport has increased. Therefore, considering the observed short-term mobility effects, it is concluded that e-commerce has not had a positive effect from a sustainability standpoint. However, in all three reports it is argued that if long term and indirect accessibility effects are considered, there is potential for e-commerce to support less car-dependent lifestyles for individuals. It is also argued that more long-term structural adjustments, e.g. the facilitation of pick-up points and other new forms of logistics systems close to the customers, will have the potential to mitigate the problems caused by increasing freight distribution in the short term.

4.3. Local planning documents

In Sweden, the municipalities have the monopoly on spatial planning and can thus steer the location of business, shopping, and residential areas. This is regulated through the Planning and Building Act (SFS 2010: 900, §2), which states: ‘It is a municipal affair to plan the use of land and water according to this Act’ (authors’ translation).

Thus, Swedish municipalities have extensive control over spatial planning and the use of land within the borders of the municipality (Koglin, Holmberg, & Hiselius, 2014). Spatial planning is also connected to the mobility of the people living in the city or municipality and therefore influences travel behaviour (Koglin, 2013, 2015). In connection to e-commerce, it is therefore interesting to take a closer look at the planning documents and policies from the municipalities and to analyse what impact e-commerce has had on planning and travel behaviour.

The research for this paper included a study of planning documents and policies in the larger Swedish cities of Malmö, Gothenburg, Lund, Umeå, Västerås, and Stockholm. The cities were chosen in order to have a variety of cities across Sweden. Moreover, we also chose cities that, in a Swedish context, are known for their work with sustainable transport
issues and are of larger size because we assumed that larger cities would be more at the forefront of dealing with e-commerce in their plans and policies. Overall, 16 documents were analysed (see Appendix 1 for an overview). The documents included development plans, transport strategies, climate strategies, freight transport strategies, and environmental strategies. The oldest document was the development plan from the city of Umeå from 1998, but the other documents were all from 2005 and onwards. The selected documents were chosen because they seemed to be the most likely to deal with e-commerce and urban planning. The documents were analysed for how e-commerce is handled or if it is handled at all. The documents were searched with the following keywords: e-commerce; Internet; freight/goods. The latter key word was added when the analysis indicated that very few of the documents mentioned e-commerce or the Internet.

4.4. The occurrence of analysed key words
This initial review of planning documents showed that e-commerce/Internet and the effects of e-commerce are rarely mentioned in important strategy documents such as the comprehensive plans, and the mobility effects of e-commerce are typically absent. Also, freight transport in general is not addressed in much detail in the planning documents. For example, the Traffic Data Report from the city of Umeå (City of Umeå, 2010) is concerned with neither freight transport nor e-commerce. In the document concerning climate change (City of Västerås, 2012a) and the comprehensive plan from the city of Västerås (City of Västerås, 2012b), freight transport is only addressed briefly and e-commerce not at all. Similar findings apply to the climate change programme of the city of Gothenburg (City of Gothenburg, 2014), the Sustainable Mobility Plans of the cities of Lund and Malmö (City of Lund, 2014; City of Malmö, 2015), and Stockholm’s action plan for climate and energy (City of Stockholm, 2012).

4.5. Effects of e-commerce
Only in a few of the case cities could we find documents that mentioned freight transport and e-commerce in connection to urban planning. The city of Gothenburg's comprehensive plan (City of Gothenburg, 2009) does, for instance, make some reference to e-commerce. At the time Gothenburg's comprehensive plan was written, the city had already observed that e-commerce's revenue had grown. In the plan, it is stated that the retail market is changing and that Gothenburg needs to consider that if e-commerce continues to grow as it has there will be a need to promote the creation of logistic areas in collaboration with local distribution centres (City of Gothenburg, 2009). Such planning would thus affect the spatial distribution of retail and logistics operations.

The city of Stockholm discusses the trend of increasing e-commerce in their comprehensive plan, which states that this might change the supply and structure of services in the city centre. However, exactly how e-commerce might affect urban planning is not addressed in the plan (City of Stockholm, 2010). Similar ideas are mentioned by the city of Lund in their comprehensive plan where it is argued that the structure of services and the demand for logistics space might change if e-commerce continues to grow. It is stated in the plan that such changes might also affect the supply of retail stores and shopping in the city centre and the urban form and land use in the city (City of Lund, 2010). E-commerce is also mentioned
in the comprehensive plan of the city of Malmö, although it is a minor aspect of the plan and the only thing that is mentioned is that e-commerce is growing (City of Malmö, 2014a).

E-commerce plays a small but important role in the environmental programme for the city of Gothenburg. Gothenburg wants to support e-commerce for everyday goods in order to allow for consolidation and coordination of the deliveries and thus decrease the pollution produced by distribution vehicles in the city and to reduce the need for customers to drive to physical stores. Although the programme does not explain how this measure is to be carried out, the measure is described as supporting a decrease in car use (City of Gothenburg, 2013).

Both the city of Malmö and the city of Västerås have programmes for freight transport in which e-commerce is mentioned. In the programme of the city of Malmö, it is assumed that e-commerce will increase and that this will change transport patterns in the city. It is also assumed that e-commerce will lead to more home deliveries substituting for deliveries to shops. According to the programme, this could lead to a different traffic safety situation in Malmö, especially concerning increasing use of delivery vans within residential areas, which could increase the risk of accidents involving children. Urban freight consolidation centres are seen as an opportunity to reduce the environmental impact of freight transport. Thus, according to Malmö, e-commerce is both a challenge from a traffic safety perspective and an opportunity to reduce motorised transportation in the city (City of Malmö, 2014b).

The city of Västerås sees similar opportunities for decreasing the impact of freight transport and individual shopping journeys. In the city’s freight programme, it is expected that as e-commerce increases it will support a situation where individual mobility will decrease. Through consolidation of city logistics centres, distribution can be coordinated for home deliveries and thus the impact of freight transport will also decrease (City of Västerås, 2015).

In summary, for many documents no direct mobility effects of e-commerce are mentioned. Moreover, the arguments found concerning long-term impacts/accessibility effects of increasing e-commerce on urban planning indicate that while the issue is on the radar, so far little is known about the effects of e-commerce on urban form, the service structure, and the way e-commerce might change people’s travel behaviour. Overall, it can be concluded that the review of e-commerce in planning documents shows that the understanding of the potential impacts of e-commerce on urban planning is tentative. On the occasions where it is mentioned in the documents, e-commerce appears to be seen more in terms of opportunities than challenges. Above all e-commerce is viewed as beneficial for addressing environment-related and climate change-related transport challenges.

### 4.6. Interviews with local planners

The municipalities of Malmö and Västerås were approached in the interview study because these cities are at the forefront in working with freight transport planning programmes. Both cities have developed freight transport programmes quite recently, and in the Swedish context these cities can be considered to be at the frontier of working with issues concerning sustainable transport systems, especially freight and logistics.

Two different planners in Malmö were interviewed, one from the Planning Office and one from the Roadworks Department. In Västerås, a strategic planner with a focus on freight was interviewed. All three of the planners had been involved in developing the freight transport programmes.
The following questions were posed in the interviews. What do you consider the most important effects e-commerce will have in the short and the long term? How do you think these effects will affect the development of cities and regions? Which Swedish cities/regions will be most affected? Do you think that the potential consequences of e-commerce are adequately addressed in current planning practice? If not, what should be changed?

The interviews confirmed the findings of the planning document study, which indicated that from the perspective of planners the understanding of the potential impacts of growing e-commerce is limited. The interviewees agreed that both direct mobility effects and possible future indirect impacts of e-commerce currently receive inadequate attention in plans and programmes, and they offered some reflections on why this is the case. The subheadings below describe the main messages in these reflections.

### 4.6.1. Lack of knowledge and uncertainty

Key reasons for the current inadequate attention paid to e-commerce were reported to be a lack of knowledge of direct mobility effects and the uncertainties in predicting what e-commerce will mean for urban development, i.e. uncertainties about the possible indirect accessibility effects of increasing e-commerce. One of the planners from Malmö saw the current phase in e-commerce as being in the midst of ‘…revolutionary developments of which the long-term consequences are not well understood.’ (Planner, the City of Malmö, Planning office) The planner from Västerås said that the difficulty in predicting the consequences of increasing e-commerce was one reason for not paying much attention to it. So far, the work on developing freight transport programmes and strategies in Västerås has been focusing primarily on addressing issues on a more general level, e.g. concerning national and global freight flows.

### 4.6.2. Limited substitution

The interviews also gave a more balanced picture concerning the opportunities and challenges related to growing e-commerce. While the review of planning documents showed that growing e-commerce is often associated with assumptions that passenger transport will be substituted by home-delivery and that e-commerce will consequently be beneficial for addressing transport-related challenges, the interviewed planners expressed more cautious views. As a counterpoint to what is argued in their freight programme (City of Västerås, 2015), the planner from Västerås said that they were aware that ‘that at least so far online shopping had not contributed to decreasing mobility.’

### 4.6.3. Impacts on retail location

The planner from Västerås and the planners from Malmö had slightly different opinions on the potential impact of increasing e-commerce on the inner city. The planner from Västerås argued that e-commerce will probably not influence the retail structure of the inner city much because shopping is also a social activity and not just determined by economic rationality. According to this view, the indirect accessibility effects on localisation will be limited and the inner city will retain its function as both a commercial centre and as a social meeting place regardless of the increases in online shopping. This planner also thought that e-commerce will influence the development in semi-rural and rural areas more than in urban areas. The argument was that e-commerce will provide increased opportunities for
consumption outside cities and that this will in turn lead to more mobility, both for freight distribution and for individuals having to travel to pick-up points.

The planners from Malmö also had slightly different opinions concerning the long-term indirect accessibility effects on localisation that will follow from changes in consumer behaviour. They argued that if e-commerce reinforces the current trends in retailing, where small, specialised inner city shops disappear or relocate to external shopping centres, it will deplete the range of available goods in the city centre. According to the planners, this will also necessitate a response from the city to make sure that the inner city retains its function as a social meeting place. One such response could be for the city to focus on creating conditions for experiences rather than commerce in the city centre.

4.6.4. A limited tool box to meet planning challenges
However, as a counterpoint to the trend of inner city retail depletion, one of the planners from Malmö also confirmed the trend towards omni-channel retailing. The planning office in Malmö now frequently receives requests from companies looking for facilities that are suited both for keeping large stocks and for functioning as traditional brick and mortar shops. According to the planner, it is quite challenging to find suitable premises and sites for this type of retailing concept. This indicates that the indirect accessibility effects on localisation are now becoming an important planning issue. Furthermore, it highlights that keeping stock of suitable sites and premises for omni-channel retailing is one important planning task for cities aspiring to safeguard the role of the city centre as a commercial district.

Omni-channel retailing also emphasises the need for ‘micro terminals’ within the city to enable consolidation and to provide efficient routes for last-mile delivery. Here a conflict between current planning approaches and the trend towards more e-commerce was highlighted. In general, both the cities of Malmö and Västerås aim to densify and to reduce motorised traffic. The current planning approach to handle distribution of freight in urban areas is to put forward freight consolidation and coordinated distribution from city logistics centres as a solution. However, the interviewees argued that there is a conflict between these ambitions and the current rationality among logistics companies. First, these operators often run their own distribution vehicles for reasons of branding and competition, and second there is a conflict between aiming to speed up deliveries as a competitive advantage and consolidating and coordinating urban freight distribution.

This is a major challenge for a municipality to address. According to one of the planners, the lack of viable business models enabling the public sector to take the lead in developing micro consolidation and coordination facilities in the city is one important barrier to address the challenge of increasing urban freight distribution following from e-commerce. Public engagement runs the risk of distorting competition in the logistics sector, and this might be irreconcilable with current laws on competition. The planner discussing this issue visualised the proposed solution as a kind of public transport service for freight distribution and argued that the public sector, especially the state, has an important role to play in establishing a playing field that creates a willingness to pay for such a service.

To summarise, because we only conducted three interviews with planners from two different municipalities, the generalisability of the results of the interviews are clearly limited. However, the interview study confirmed the findings from the document analysis that e-commerce is only treated to a very limited extent in Swedish planning practice. The interviews also gave some insights as to why this is the case, for example, the lack of knowledge
on the impacts of increasing e-commerce on mobility habits and on transport and logistics patterns. Another issue raised by one of the planners from Malmö is the limited toolbox available for local planners to address challenges or to take advantage of opportunities when it comes to impacts (both direct and indirect) of e-commerce. Even if the impacts and causal mechanisms of increasing e-commerce were well-understood, the possibility of using planning to pro-actively harness potential benefits or mitigate negative effects seems to be restricted. Given the limited scope of the interview study, we acknowledge that there is a need for more research in order to make more grounded claims on the state of knowledge on e-commerce among Swedish planners, but also to increase our understanding of how planning can be used to address the direct and indirect impacts of e-commerce.

5. Discussion

The aim of this paper was to analyse the understanding of the potential impacts of e-commerce on land-use planning in Swedish planning practice. Three research questions were posed, and these are answered below.

(1) How is e-commerce discussed in planning practice?

The review of municipal planning documents showed that direct mobility effects of e-commerce are rarely mentioned. The arguments found concerning long-term impacts, or indirect accessibility effects, of increasing e-commerce on urban planning indicate limited knowledge about the effects of e-commerce on urban form, the service structure, and the way e-commerce might change people's travel behaviour. When e-commerce was addressed, the arguments were generally based on the notion of substitution, where online shopping will replace physical passenger travel with freight distribution.

Consequently, the impacts of e-commerce on mobility are often put forward as a positive force in ambitions to mitigate the problems associated with transport, most notably for curbing CO$_2$ emissions. Urban freight consolidation centres are often put forward as a solution to the challenge of increasing freight distribution in cities.

The interviews with local planners gave a more balanced view on the opportunities to reduce individual mobility as a consequence of increasing e-commerce. A potential conflict was identified between current planning strategies emphasising consolidation and coordination of city logistics and the increasing emphasis by e-commerce actors on the need for speedy home deliveries. The interviews showed that one reason for not including the impacts of e-commerce in plans and programmes is that the current knowledge base is limited. This is not surprising because research within this area has mostly been conducted within the past 10 or 15 years, and the empirical evidence for the effect of online shopping is sparse. The possibility to capture urban land-use planning and the effects related to things like spatial distribution, lifestyle choices, and changes in the logistic system are therefore also limited.

(2) Are the impacts of e-commerce as discussed in planning practice consistent with results and discussions in the research literature on transport and planning?

The analysis of the planning documents showed that the impacts of e-commerce on transport and urban development have not yet become a prominent feature in plans and programmes in Swedish cities.
Comparing the effects as stated in the interviews and as described in local planning documents (to the degree that e-commerce is mentioned) with the findings of the literature review in Table 1, the effects recognised in planning practice seem to be concentrated on the long-term accessibility effects. The national planning documents discuss direct mobility effects to a higher degree than the local planning documents and are more in line with the empirical results presented in the research literature. The direct mobility effects that have been observed so far in the national planning documents coincide with the effects presented in the research literature. The same goes for the long-term effects that are mentioned in the national planning documents as being possible but not yet observed.

(3) What are the implications of possible differences?

First, the review of the available research indicates that so far e-commerce has done little to alter prevailing individual mobility habits in terms of travel frequency and trip lengths. This is important from a planning perspective for the following reasons. As shown in section 4, it is often assumed in planning documents that e-commerce will result in fewer shopping trips through substitution. However, the general picture emerging from the research literature is that there is currently no evidence to support this assumption. It can be argued that the expectation of substitution, i.e. that e-commerce will replace individual mobility, is still a ‘planning myth’ (c.f. Næss et al., 2013). One implication for urban planning is consequently that the continued trend towards e-commerce should not be taken as meaning that e-commerce will be an unproblematic solution for sustainability problems with urban transport. This is not to say that the impacts of e-commerce on mobility patterns necessarily contradict sustainability ambitions. It rather says that the possible sustainability benefits of changes to consumer and mobility habits from more e-commerce cannot be taken for granted. If, for example, the ambition is that the impacts of e-commerce on mobility patterns should contribute to reducing transport energy use, decreasing carbon emissions, reducing congestion, and to other sustainability objectives, then this will require a strategic approach to urban mobility and a holistic perspective on the relationship between urban functions and the transport system. This becomes even more important because the results of Boschma and Weltevreden (2004); Friederiszick and Głowicka (2015); Weltevreden and van Rietbergen (2009) suggest that increasing e-commerce reinforces a tendency where the role of the city centre as the primary location for commercial exchange and retail services is challenged. It is often the case that the rationale of current public transport systems is to provide access to city centres, while access between peripheral urban areas is a neglected issue. If e-commerce reinforces tendencies towards retail localisation in external shopping centres and peripheral big-box areas, the long-term accessibility implications are important. In the Swedish context this could mean, for example, that improving the possibilities to use public transport or cycling to get to external shopping centres or big-box retailing areas could be essential to support and facilitate a less car-dependent lifestyle (e.g. Smidfelt Rosqvist & Winslott Hiselius, 2016). Second, for freight transport the review of the literature showed that the direct mobility effects are more straightforward and better understood. The overall effect of e-commerce on freight transport is an increase in volume through more home deliveries and deliveries to pick-up points complementing logistic patterns delivering to
brick and mortar shops, both in city centres and in peripheral or external areas. One important planning challenge identified here concerns how to reconcile trends towards more and faster home deliveries with current approaches to addressing problems with urban freight transport through consolidation and coordination of urban distribution transports. It might, however, be possible to find synergies between sustainable urban freight initiatives and the ambitions to provide fast and flexible home delivery options with a proactive approach. An example of such an approach could, for instance, be that the city uses traffic restriction zoning to only allow for motorised distribution traffic at certain hours while allowing for freight distribution by electric cargo bikes at all hours. This could encourage the development of services and business models that currently stand little chance in competition with traditional freight distribution models.

The results of this study also have implications for future research. The interviews with the planners showed that even though e-commerce is typically only mentioned in passing in policy and planning documents, the different effects, including both direct mobility effects and long-term accessibility, are important issues in planning practice. Broader studies, for example, using surveys to establish a general understanding of how planners view the effects of e-commerce, or what kind of planning measures they see as relevant to realising the benefits of e-commerce, could be useful. More research is also needed on how the effects of e-commerce can be integrated into urban planning strategies in order to promote the potential benefits of increased online shopping. Systematic reviews of international experiences could be important to facilitate best practice transfer. Statistical evidence for the effects of e-commerce is currently lacking in Sweden, and there is a need for a national initiative to start collecting this type of information. Since the key issue at stake concern how to make informed planning decisions in a context of an uncertain development, methods such as risk analysis or scenario analysis, where different possible futures are explored, could also be useful.

6. Conclusions

To the extent that e-commerce is mentioned at all in Swedish local planning and policy documents, there is often a focus on mobility effects. Several examples were found of local planning documents expecting e-commerce to lead to individual mobility being substituted with freight distribution. This expectancy of substitution, which generally was put forward as an opportunity to deal with urban transport challenges, was contrasted to the review of the research literature. The research literature showed that, at least so far, there is no evidence of e-commerce reducing individual mobility while freight transport, especially distribution in urban areas, has increased as a result of e-commerce. The interviews, as well as the national planning documents, gave a more balanced view that was more in line with research literature, both concerning the short-term direct mobility effects and long-term accessibility effects of e-commerce.

To sum up, academic research, national planning documents and the interviewed planners are more or less in agreement that the short and long term effects of e-commerce are still very uncertain, but there is some degree of wishful thinking in the local planning documents.
The results of this study also show that planners are currently facing a number of challenges linked to increasing e-commerce, and one of the biggest challenges to current planning approaches to urban logistics, such as consolidation centres, is that faster home deliveries are currently considered a competitive strategy for many e-commerce actors. Also, new concepts, such as omni-channel retailing, mean that there is a need for new kinds of retail facilities and retail locations. An important task in planning is to address these needs, for example, by identifying suitable premises and locations for omni-channel retailing.

More research on e-commerce and planning is needed, and the results from this study might be useful for developing research designs allowing for more generalisable results. The results also point to the need for further studies on how to develop planning capacity to address the impacts of increasing e-commerce. An important aspect of increasing planning capacity is to make sure that available research knowledge on the impacts of e-commerce, both concerning short-term mobility effects and long-term accessibility effects, is disseminated to practitioners.

**Note**

1. The following variants of Swedish words were used: e-handel, näthandel, distanshandel, hemleverans, Internet, godstransporter, distributionstrafik.

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**Appendix 1. Local planning documents**

- City of Gothenburg (2009) Översiktsplan för Göteborg – Övergripande mål och strategier, strategiska frågor, inriktning för stadens utveckling. Stadsbyggnadskontoret
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