A comparative study of market potential for logistics outsourcing in Estonia and Finland

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Abstract

Purpose – This research analyzes the development of logistics outsourcing market in two countries, Estonia and Finland, with different paths as members of the single European market. The purpose of this paper is to examine whether the two markets have become more similar or whether their logistics costs and logistics markets have developed differently over time.

Design/methodology/approach – The development of the logistics market is addressed through two survey-based variables. Logistics costs are used to measure the size of the logistics market, whereas logistics outsourcing is analyzed to measure the development phase as well as the market potential for logistics service provision.

Findings – Estonian logistics outsourcing market was found to be underdeveloped and small compared to the Finnish market. At the same time, the logistics costs of Finnish companies are high and rising, whereas the costs of Estonian firms are declining.

Research limitations/implications – The results imply that the level of outsourcing might explain the visibility of logistics costs, which should be taken into account when making estimates on logistics costs both at the firm as well as on country level.

Social implications – Logistics sector is an important source of national competitiveness and employment. This research identifies subareas for the two countries on how to develop competitiveness through the logistics market.

Originality/value – This research provides a unique method to estimate the size of logistics outsourcing market in these two countries. It also represents as one of the rare works to provide multiyear comparison between countries in logistics costs.

Keywords Logistics outsourcing, Market size, Logistics expenditure, Costs, Survey methodology, Quantitative

Paper type Research paper

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1. Introduction

Logistics may be considered a major cost both on a company level as well as when national economies are concerned. Depending on the scope and method of analysis, logistics is considered to account for around 10% of gross domestic product (GDP) on a national level (Rodrigue *et al.*, 2005; Rantasila, 2013; Kearney, 2017). There are naturally country level differences in the cost impact of logistics, depending on the structure of the economy, geography, etc. On a firm level, logistics costs are estimated to be on a range of 6 (Solakivi *et al.*, 2018b) to as much as 25% of turnover (Rantasila, 2013) depending on country, industry, etc. In any case, logistics can be considered a substantial cost as well as a major business area. Most studies on the size of the market are prepared by consultancies as market reports based on existing financial reporting data (KPMG, 2016).

However, financial reporting data covers only part of the expenditure, given that a large proportion of logistics activities are still handled in-house (Langley and CapGemini, 2016) and are not allocated to logistics in the financial reporting. As such, this kind of analysis undermines the true market potential of the logistics market in excluding the in-house share of logistics expenditure.

One of the challenges associated with logistics in general and logistics costs in particular is that even though the general term is rather well defined, its measurement is rather complex as it contains cross functional and cross firm elements whose boundaries are not well defined. Unlike many other business costs, the costs of logistics cannot be extracted from financial reports and therefore remain without a clear estimate. Back in the 1980s, Childerley (1980) and McKinnon (1988) attempted to do so, or at least to estimate the amount of logistics expenditure in the UK and faced the same problem: The official statistics were too general to grasp the essentials.

This in mind, it is a bit surprising that research on the topic has been rather limited. There are, however, a couple of research streams that attempt to bring light to the measurement of logistics expenditure, as well as the market potential associated with it. In the USA, estimates on national logistics expenditure are presented annually (Kearney, 2020), whereas, for example, in Finland logistics costs are measured biannually (Solakivi *et al.*, 2018a, 2018b). What is lacking almost entirely are the international, cross country comparisons using similar methodology for comparability. Some of the previous cross country comparisons include, for example, Hansen *et al.* (2014) and Solakivi *et al.* (2018a), but they too combine data sets obtained with different methodologies and different classifications.

One of the challenges in the usage of varying classifications is clearly that the boundaries of the associated costs may also vary, making the estimates at least to some extent biased. Another factor, not necessarily considered is the maturity of the logistics market (Hofer *et al.*, 2015), which may influence the visibility of different costs. As many of the costs associated with logistics are not easily obtained from financial reports, the companies may underestimate their true level, especially when they are handled in-house. This is clearly not the case with outsourced services that are invoiced by an outside service provider. For this reason, Solakivi *et al.* (2018a) suggest estimating the size of the logistics market by also using data concerning outsourcing to include both the outsourced and in-house logistics.

In international comparisons, the operating conditions, market regulation, etc., may also be an influential factor in explaining international differences. Therefore, in international comparisons these differences should also be considered. Classical trade theory suggests that free mobility of factors of production would equalize the relative and absolute prices of productive services. However, as there are multiple limitations on the free mobility of factors of production, usually it is the commodities, not the factors that move across the borders.

Free commodity movement on the other hand is assumed to only partially equalize factor prices (Samuelson, 1948). This has also been one of the rationales of free trade areas such as the European Union (EU). Deriving from this the interpretation is that in case the countries operate under similar conditions and regulation, the countries should converge in time in relation to their price and cost levels (Krugman, 1980). Surprisingly, this phenomenon and especially the impact of single European market has been discussed rather superficially in logistics and supply chain literature. Almost 30 years ago Browne (1993) and Bayliss and Millington (1995) discussed the evolution of logistics systems under single European market, concluding that most likely the impact will be the increase in transport costs and a decline in warehousing and inventory carrying. Further, Bayliss and Millington (1995) expect the increase of transport costs to be tackled with increased subcontracting and outsourcing.

This paper has multiple goals. First of all, it approaches the size of the national logistics market in two countries, Estonia and Finland with a unified methodology following the previous example of Solakivi *et al.* (2018b) by using survey-based estimates on logistics costs. To account for both in-house and market-based shares of the market, it also uses survey-based data on the level of logistics outsourcing in the respective countries. Further, the logistics costs, outsourcing and the size of the logistics market are estimated in an interesting intertemporal setup, as the data covers three points of time between 2005 and 2017. Finland has been a member of the EU since 1995, whereas Estonia joined the EU in 2004. The timeframe provides an interesting setup for analyzing whether the price and cost levels have converged under the single European market, as suggested by Krugman (1980). As it comes to logistics outsourcing, we aim to analyze, how developed logistics outsourcing in Finland and Estonia are. Previously, Hofer *et al.* (2015) have discussed the maturity of the national outsourcing market, without providing a more detailed definition or model. Hsiao *et al.* (2008) on the other hand suggest a four-level model for firm level logistics outsourcing, defining that the two lowest levels of outsourcing focus on so-called execution activities, whereas the two highest levels extend outsourcing to planning and control activities. Following these logics we assume that the more widely these planning and controlling activities such as administration-related activities are outsourced on a national level, the further the development phase of the logistics outsourcing market.

The paper aims to answer multiple questions. First of all, it provides answer to the question of what are the levels of logistics costs in Estonia and Finland and how they have developed since 2005. It also answers questions on how the logistics market has developed in the respective countries and what is the market potential in the logistics markets. Finally, as said, it also provides insight on whether the countries have converged or not, during their joint time as members of the EU.

The paper is structured as follows. Section 2 discusses the theoretical background of the paper, introducing the key literature on logistics market, logistics costs and logistics outsourcing. Section 3 introduces the research methodology and data collection. Section 4 presents the results of the analysis. Finally, Section 5 discusses the results in more detail and draws conclusions on them with future research directions considered.

2. Literature review

2.1 Logistics costs and size of the logistics market

The size of the market is usually defined based on the volume of transactions (Rosen, 1981). One of the challenges with this approach is that part of the market remains hidden and is handled off the market owing to various reasons. One of the main reasons generally and also in the logistics market is that the actions are handled in-house owing to transactions costs

(Williamson, 2008). The in-house nature of some of the operations is a source of systematic undervaluation of the logistics market potential. In addition to the fact that some of the logistics functions are not traded in the market, another challenge in defining the size of the market is that the available industry statistics are not supporting the estimation. Logistics functions tend to spread to a diverse range of activities, many of them not associated with logistics in official statistics, further complicating the analysis (McKinnon, 1988).

For this reason, previous research has attempted to grasp the essential with a variety of different approaches, with most of them combining multiple methods and data sources. One of the earlier one has been Bowersox *et al.* (2003) who attempted to make an estimate on global logistics expenditure as a share of GDP by using neural networks. Stölzle *et al.* (2013) and Havenga (2015) supplement national accounting and industry statistics with survey-based data on firm level logistics costs, whereas Schwemmer (2017) extrapolates industry level transport and industry statistics to create a national level estimate. One of the more recent attempts is Solakivi *et al.* (2018b) who suggest combining survey-based estimates on logistics costs and outsourcing with national level industry statistics.

Based on the previous literature, it seems obvious that most of the estimates on logistics market size are to some extent based on logistics costs. Typically, they are approached either from the perspective of an individual firm or from the macro-perspective as a share of GDP. Examples of the former include Baykasoglu and Kaplanoglu (2008), Engblom *et al.* (2012); and Hansen *et al.* (2014), whereas the latter has been used by Bowersox *et al.* (2003), Elger *et al.* (2008); Havenga (2010); and Wilson (2015). Some of the literature combines the two (Havenga, 2015), or expands firm-level costs to national-level estimates (Solakivi *et al.*, 2017).

Many of the previous authors adopt the typology of the "Delaney model" (Delaney and Wilson, 2003) of logistics costs, including transportation, inventory, warehousing and administrative cost as individual cost components. Even though this typology is often associated with Delaney and Wilson, its origins can be traced back to Heskett *et al.* (1973), who used similar division with a minor difference of defining the administration costs more narrowly to just include order processing costs.

The "Delaney model" of logistics costs has been widely used for their measurement, on both the firm and the national level. Kearney and the European Logistics Association (2009) applied a similar typology in their survey of logistics costs in large European firms. Similar typology with minor modifications has also been used elsewhere by, for example, Engblom *et al.* (2012), Hansen *et al.* (2014); and Solakivi *et al.* (2018a, 2018b). In some of the cases, the changes have been larger to emphasize national characteristics. Highlighting the high dependency of the South African economy on transportation, Havenga and Simpson (2014) included fuel inflation as a separate cost category. For some, the typology has had to be narrowed down to guarantee the availability and quality of the data. For example, Choi and Lee (2009) limited their data collection and analysis to just three cost components, transportation, storage and management.

2.2 Logistics outsourcing

Although the phenomenon of outsourcing is not new (Greif, 1993), outsourcing in general and logistics outsourcing in particular has been on the research agenda mainly for the past 20–30 years. The original motive for outsourcing is usually considered through economic lens of transaction cost economics where outsourcing is considered a viable option in case the cost of outsourced service together with transaction costs is below the cost of in-house operations (Williamson, 2008). Another theoretical perspective often considered is the resource-based view (Silverman, 1999), where outsourcing is seen as a mean of obtaining

additional resources from the market rather than expanding the scale and scope of the company.

One of the first one to discuss outsourcing from the logistics perspective was Aertsen (1993) who approach the phenomenon of outsourcing physical distribution. D'Aveni and Ravenscraft (1994) and Gilley and Rasheed (2000) turned the attention towards the motives of logistics outsourcing, combining their perspective on the general emphasis towards core competences of the firm, arguing that for many firms, logistics fell outside of the core competences, therefore being a natural candidate to ne outsourced for performance gains.

The literature on outsourcing in general as well as on logistics outsourcing particularly has developed in waves or eras as titled by Leuschner *et al.* (2014). The first era of logistics outsourcing literature focuses on the question of the extent of outsourcing with varying geographical and industrial scopes. One of the first articles on the topic were from Bardi and Tracey (1991) and La Londe and Maltz (1992) who estimated the extent of outsourcing of transportation and warehousing in the USA. As other examples of different geographical scopes, Bhatnagar *et al.* (1999) analyzed the extent of outsourcing in Singapore, Bolumole (2001) in UK, Wilding and Juriado (2004) in Europe, Hong *et al.* (2004) in China and Arroyo *et al.* (2006) in Mexico.

The second era of outsourcing literature turned its attention towards the outcomes of outsourcing decisions. Firm performance, from various perspectives, was associated as an outcome for outsourcing decisions. Wallenburg (2009) and Brewer *et al.* (2013) concluded that to obtain positive outcomes on performance, the focus, directed by the motives of outsourcing, is crucial. Further, both came to the conclusion that cost-driven outsourcing is dominant when performance is considered. This research stream has continued to flourish, for example, Modaress *et al.* (2016), Nyameboame and Haddud (2017); and Akter *et al.* (2019) have since received similar results in different contexts. Akter *et al.* (2019) study among other things the impact of 3PL logistics outsourcing on performance, reporting that over 75% have experienced positive and just 13% of firms negative impacts on logistics costs. Similar results have been obtained in different company context also by Modaress *et al.* (2016), who surveyed petroleum companies in the Persian Gulf region, concluding that approximately 22% of respondents estimated hidden costs associated with logistics outsourcing. Nyameboame and Haddud (2017) surveyed the motives for logistics outsourcing of oil and gas companies in Ghana, coming up with the result that the main motive for outsourcing was the goal of (logistics) cost reduction. However, Wallenburg (2009) also acknowledged that more strategic motives in addition to costs might be beneficial in the long term. As examples of these, Prajapati *et al.* (2020) suggested that cost reduction (or saving) is one of the most important reasons to implement outsourcing by getting access to the latest technologies, machinery, expertise and almost no fixed cost. The connection between performance and outsourcing has also been analyzed from other perspectives. Kotabe and Mol (2009) identified a curvilinear relationship between the level of outsourcing and firm performance, suggesting that there would be an optimal level of outsourcing and distractions from it would be costly.

The third era of outsourcing research is characterized by greater internationalization in the study of logistics outsourcing phenomena, suggesting more advanced applications (Tan *et al.*, 2014). Even as these eras of outsourcing literature could be identified, new research still keeps piling up. A couple of years ago Akbari (2018) conducted a structured literature review concluding that the volume of logistics outsourcing articles remains high. At the same time, outsourcing research is expanded to new fields like humanitarian logistics

(Gossler *et al.*, 2020) and green logistics (Jazairy, 2020). Premkumar *et al.* (2020) suggest that future work on logistics outsourcing is likely to turn the attention to the difficult question of last mile.

3. Data and methodology

To estimate the current outsourcing market and market potential in Estonia and Finland, we follow the example of Solakivi *et al.* (2018b) and combine a variety of data sources from the both countries. As suggested by Solakivi *et al.* (2018b), we obtain data of firm level logistics costs and outsourcing through survey methodology. The data was collected through web-based surveys both in Estonia and Finland in three different time periods, in 2006, 2012–2013 and 2018. Table 1 presents the basic information of the survey datasets. Overall, it would seem that the response rates of the surveys are satisfactory, considering the sample sizes. For example Wagner and Kemmerling (2010) consider it natural that the response rates decline together with the sample size. At the same time, the larger sample size increase the total number of respondents as well as compared to the entire population and therefore the coverage of the survey, even considering the lower response rate. Further, the response rates of the surveys used here are rather similar to the surveys listed by Wagner and Kemmerling, excluding the Estonian survey in 2012, where the response rate remained as low as 1.9%.The reason for this was that in 2012 different contact database was used. In 2006 and 2018, the Estonian survey was organized in co-operation with an industry association, whereas in 2012–2013 a commercial database was used. It would seem that this resulted in less visibility towards the respondents and therefore also lower response rate.

In their paper, Wagner and Kemmerling (2010) list four techniques on how to address possible non-response bias. First they suggest following the example of Armstrong and Overton (1977) to extrapolate, in other words to consider late respondents to be most similar to non-respondents. The late and early respondents were compared and no significant differences could be found.

The second and third techniques listed by Wagner and Kemmerling (2010) are to compare the respondents to population and non-respondents on characteristics known *a priori*. Therefore, the survey sample is compared to the industry demographics in Appendix. As can be seen, the samples in both countries contain responses from the entire variety of industries and correspond rather well with the industry structure of the respective countries. In the Estonian sample, the most prominent industries are wood and wood products (21%), other manufacturing (17%) and basic metals and metal products (12%) that are also the largest industries by the number of companies in the Estonian economy. In the Finnish sample, the most prominent industries are machinery and equipment (18%) and basic metals and metal products (15%), with a slight overweight on firms in machinery and equipment. These however are both part of the so-called "technology industries" that share many same characteristics and therefore this can be assumed to have a minor influence on the results. As can be seen, the sample in both countries is to some extent biased towards larger companies. In both countries, the share of micro-sized companies is close to 90%,

Table 1. Data collection

	Finland			Estonia		
Survey year	Sent to	Respondents	Response rate (%)	Sent to	Respondents	Response rate (%)
2005	16,231	2,255	13.90	2,960	186	6.30
2012	38,834	2,732	7.00	5,000	97	1.9
2017	27,598	2,001	7.20	2,520	151	6.00

whereas this share is only 51% in the Estonian and 80% in the Finnish survey sample. As the results of this research are weighted by the turnover of the companies, the effect of this bias is minimized. We did not, however, sample non-respondents.

To obtain the logistics cost data, the respondents were asked to estimate the share of five cost components (transportation, warehousing, inventory carrying, logistics administration and other logistics costs) as a percentage of turnover, as previously suggested by Stewart (1995).

For the national level data, various data sources from both countries were used. For the Finnish data, the turnovers of the respondent firms were obtained either from the Orbis database (Bureau van Dijk, 2006–2018) or alternatively from a Finnish Voitto+ database. The turnovers of the individual industries, as well as the GDP of Finland, were obtained from Statistics Finland (2006) (2006–2018) Enterprise and National Accounts statistics. The turnover of international subsidiaries was obtained from the Bank of Finland.

For Estonia, the turnovers of the respondent firms were obtained from Estonian e-Business Register database. The turnovers of the individual industries as well as the GDP of Estonia were obtained from Statistics Estonia (2006–2018) Enterprise and National Accounts statistics. The turnover of international subsidiaries of Estonian firms was obtained from Eurostat ("Outward FATS, main variables" and "Foreign control of enterprises by economic activity and a selection of controlling countries" statistics).

Figure 1 presents the analysis process. The logic of the analysis is to aggregate the firm level logistics costs into an estimate of national level logistics expenditure. As logistics expenditure consists of both market-based and in-house operations, we use firm level survey data on logistics outsourcing to estimate how much of the logistics expenditure is purchased from the market and how much of it is produced in-house. The starting point is the data on logistics costs obtained from the surveys, which consist of five components, transportation, warehousing, inventory carrying, logistics administration and other logistics costs. The data is weighted twice (first with the turnover of the individual firms that responded in the

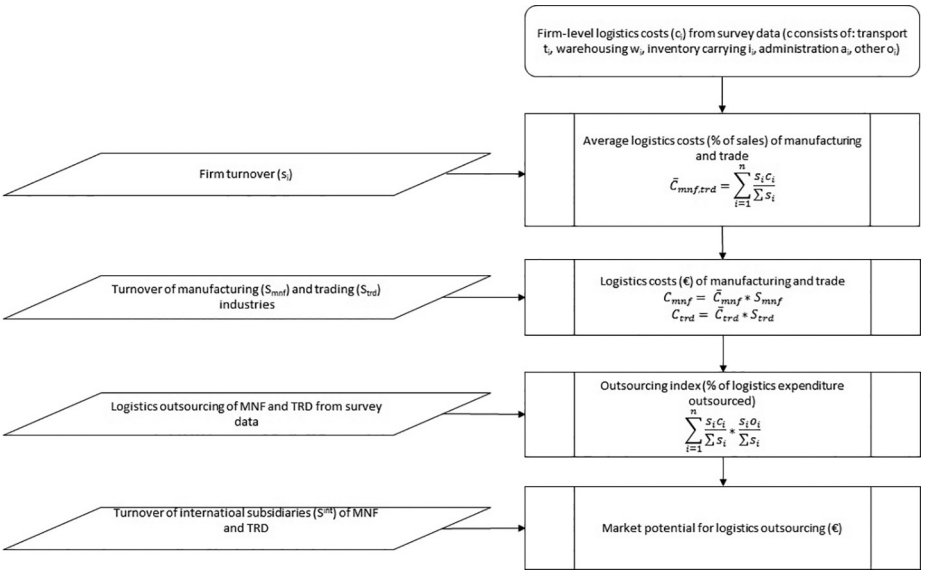

Figure 1.
The analysis process

surveys, second with the turnover of the individual industries) to calculate the weighted average logistics costs of manufacturing and trading industries for both countries. With the weighted average logistics costs and the turnovers of the individual industries we also calculate the monetary value of the logistics market (including both the in-house and outsourced costs) of Estonia and Finland.

To estimate the current market size and the outsourcing potential in Finland and Estonia, we use the survey data on outsourcing combined with the logistics costs data. We follow the example of Solakivi *et al.* (2018a, 2018b) and allocate the outsourced logistics functions into different logistics costs as listed in Table 2.

The extent of logistics outsourcing was measured by asking the survey respondents to estimate on a five-point Likert scale how widely their firm had outsourced different logistics activities (1 = no outsourcing, 2 = 1–25%, 3 = 26–50%, 4 = 51–75%, 5 = 76–100%). The included logistics activities were chosen following Langley *et al.* (2005) and remained the same on each three data collection periods to maintain consistency. To estimate the extent of outsourcing, we calculate an "Outsourcing Index" that refers to the share of logistics expenditure that is currently outsourced. The remaining part of logistics expenditure is still produced in-house. It is a sum of weighted averages of logistics cost components, where the weights are the outsourced shares of logistics functions that are associated to different logistics cost components as listed in Table 2. As the survey data on outsourcing was obtained using a five-point Likert scale with 25 percentage intervals, we assumed symmetric distribution within each category and converted the categories into single values by using the mean value of the category (e.g. the category 1–25% received value 13%). The calculation method is presented in equation (1) as follows:

$$Outsourcing\ index: \sum_{i=1}^{n} \frac{s_i c_i}{\sum s_i} * \frac{s_i o_i}{\sum s_i} \quad (1)$$

where i refers to the respondent firm, s to its turnover, c to the estimated logistics-cost component and o to the estimated level of outsourcing.

4. Results

Figure 2 presents the turnover weighted averages of logistics costs in Estonia and Finland in 2005–2017. As can be seen, the costs in the two analyzed countries differ both on the level and the development. The total logistics costs of the Estonian companies seem to be as much

Table 2. Allocation of outsourced logistics activities to cost categories

Logistics cost category	Outsourced logistics activity
Transportation costs	Domestic transportation
	International transportation
Warehousing costs	Warehousing
Inventory carrying costs	
Logistics administration costs	Freight forwarding
	Order processing
	Invoicing
	Logistics IT systems
Other logistics costs	Reverse logistics
	Value added logistics services

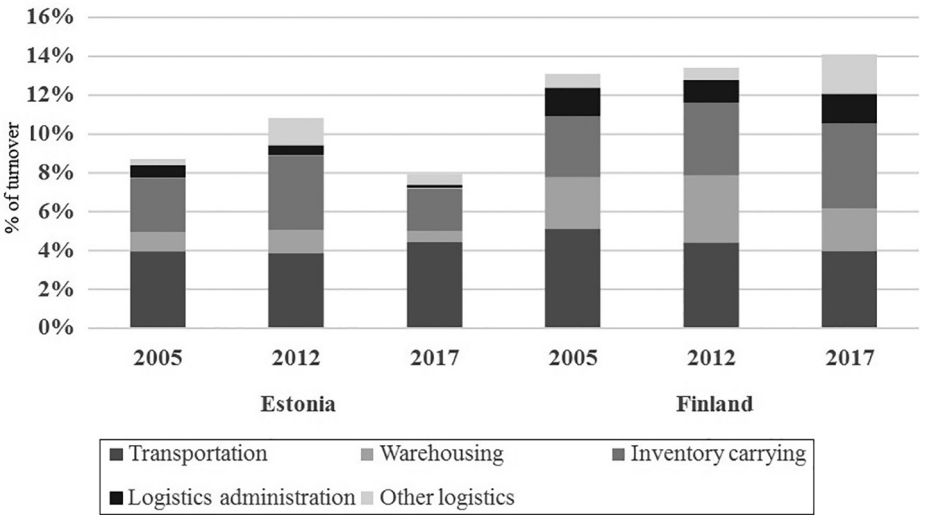

Figure 2. Logistics costs as share of turnover in Estonia and Finland in 2005, 2012 and 2017

as 6 percentage points lower than of the Finnish companies. Further, it would seem that the transportation costs are on a rather similar level in both countries, at around 4% of sales. This means that the cost difference is explained by other cost components. Especially, the warehousing costs seem to be considerably lower in Estonia than in Finland. The same is also true with the logistics administration costs and other logistics costs. The other difference is that in Estonia the logistics costs peaked in 2013 and declined towards 2018, whereas the logistics costs of Finnish companies have steadily been increasing. Even though the transportation costs of the Finnish companies have been in decline, the other cost components, especially the inventory carrying costs and other logistics costs have increased in such a scale that the overall cost level has increased.

Figure 3 presents the share of outsourced logistics divided into logistics costs categories as well as the outsourcing index of the Estonian and Finnish economies. As with the logistics costs, both the levels and development trends in Estonia and Finland once again are different. In Finland, the levels of outsourcing have remained practically on the same level for the entire period. Transportation was already widely (close to 80%) outsourced in 2005 and it has remained on the same level since. There has also been only limited increase

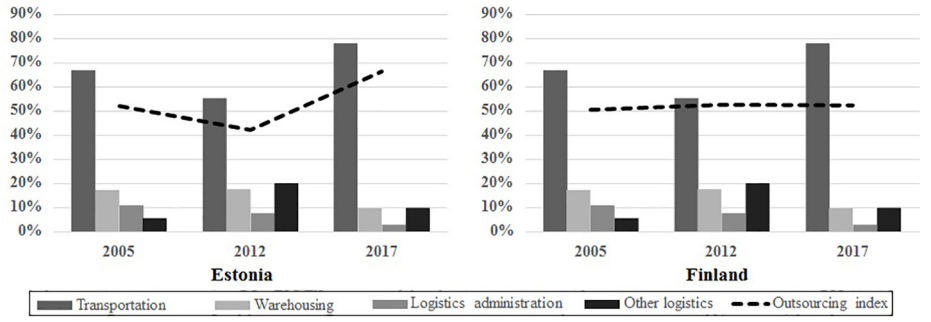

Figure 3. Outsourcing index and outsourcing of logistics by different logistics costs categories in Estonia and Finland in 2005, 2012 and 2017

in the outsourcing of logistics administration and other logistics. Outsourcing of warehousing activities, however, has to some extent increased in Finland. As a result, also the outsourcing index, the share of outsourced logistics in relation to total logistics has remained at around 50% of total, which would imply that in Finland around half of the market potential is unused.

With Estonia, the results are a bit different. In 2005, less than 70% of transportation on the Estonian firms was outsourced, which has increased to close to 80% in 2017. The other components, however, remain mostly in-house, with just about 10% of warehousing and other logistics outsourced in 2017 and the respective share of logistics administration being even lower than that. At the same time, the outsourcing index of Estonia has increased from around 50% to around 65% of all logistics, implying that in Estonia the unused market potential for logistics outsourcing is currently around 35% of the market.

Figure 4 illustrates the existing market potential for logistics outsourcing in Estonia and Finland. Currently in Finland, the market potential for logistics outsourcing is around €9bn. Of the individual activities, warehousing has the highest market potential, as around €3.1bn worth of warehousing activities is still handled in-house. The second highest potential (€2.2bn) of outsourcing is on logistics administration. Also in other logistics activities (€2bn) and transportation (€1.7bn) the market potential is still substantial.

In Estonia, however, the largest market potential (€400m) is still in transportation, whereas other logistics (€191m) and warehousing (€185m) are estimated to have lower outsourcing potential. Surprisingly, logistics administration is estimated to have a combined market potential of less than €60m.

5. Discussion and conclusions

This paper analyzes the logistics costs and outsourcing of logistics in a longitudinal setup in two neighboring countries, Estonia and Finland. In the beginning of the observation period, 2005, the two countries had very different starting points as according to the World Bank (2020) the PPP adjusted GDP per capita of Estonia ($16,624) was around 51% of Finland corresponding number ($32,051). The two countries had some similarities though, as Estonia had just in 2004 joined the EU, meaning that the common market would apply for both of them. Further, Estonia joined the euro zone in 2011. This as such would raise expectations that the two countries would become similar with time. Considering the

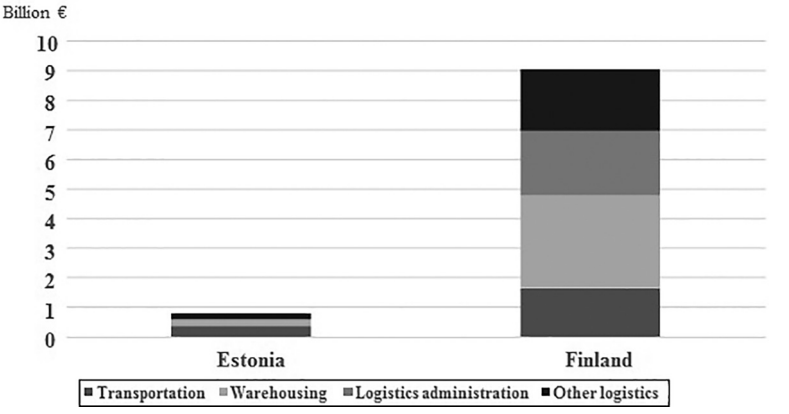

Figure 4.
Market potential for logistics outsourcing in Estonia and Finland

macroeconomic variables, this has taken place, as the Estonian PPP corrected GDP per capita ($33,820 in 2017) had increased to around 71% of Finland ($47,481 in 2017).

According to the results, however, the two countries remain different both in the level and development trend of logistics costs. The logistics costs of Estonian firms have remained lower than the costs of the Finnish firms throughout the observation period. At the same time they have declined from 2005 to 2017. During the observation period, the costs of the Finnish firms have increased and are currently over 6 percentage points higher compared to the Estonian firms. The causes for this difference are speculative. A common explanation for differences in logistics costs is associated with the industrial structure of the economy. For example, Solakivi *et al.* (2018a, 2018b) have explained the high logistics costs of the Finnish economy compared to Switzerland with a larger share of low value – high volume manufacturing. Havenga (2015) offers similar explanation for South Africa. However, in both cases the major contributor were the relatively high transportation costs, whereas the difference between Finland and Estonia occurs in warehousing costs, logistics administration and other logistics costs.

This result may have an explanation in international economics. As suggested by Krugman (1980), the domestic markets may play a role in remaining country level differences in logistics costs. In practice, the country with the larger domestic market will sustain higher labor costs compared to the country with smaller domestic market and therefore larger exposure to international competition. The labor statistics would seem to support this, as there are still significant differences in labor costs of the two countries. According to Eurostat (2020), in 2017 the average hourly labor cost (€11.7) in Estonia was only 36% of the labor cost in Finland (€32.7). Concerning logistics, this would impact especially labor intensive warehousing and the cost of administrative staff. Even as transportation, especially road transport, is rather labor intensive, its nature is mobile and cross-border, creating a joint market more easily than stationary warehousing of administration. This would also correspond well with the classical trade theory (Samuelson, 1948). It would seem that also in logistics the equalization of factor prices depends on how mobile the factors of production are. Transportation as a mobile service would seem to converge rather quickly, whereas the less mobile warehousing, administration, etc., take longer time to adjust.

Also, the before mentioned logistics activities are less outsourced in Estonia, than in Finland. Interestingly, most of the existing studies consider cost reduction as a main motivator for logistics outsourcing (Brewer *et al.*, 2013; Prajapati *et al.*, 2020) and that logistics outsourcing has mainly had positive effects on cost performance (Akter *et al.*, 2019).

This finding raises another interesting question. Could it be that the lower logistics costs of Estonia might be partly explained by the fact that some of the costs are not considered as logistics costs but rather something else? This might be true especially with logistics administration and other logistics. Or, could it be that as warehousing, logistics administration etc. is mainly handled in-house, the true costs of these operations are not as visible as they would be in case they would be outsourced, resulting in underestimation of the true costs? The fact that transportation is widely outsourced among Estonian firms, combined with the result that the transportation costs of Estonian firms are higher than of the Finnish firms supports this view. Especially with in-house warehousing, the cost might be difficult to separate from overall real estate costs.

However, this challenge should be similar in Finland as well, which would imply that there is something fundamentally different in the Estonian real estate market, causing better availability of reasonably priced premises. Together with these it should be stressed that Estonian market is much smaller than Finnish – recent examination of road transportation

contracts concluded that competition in Estonia is not as high as it could or should be (ITF, 2020). In addition, Estonia has a hinterland connection to Europe whereas Finnish logistics is always connected first to sea ports (and Estonia has acted as a popular transit route for Finnish trucks with semi-trailers; Hilmola, 2014). This latter factor could possibly enable lower inventories and therefore less need for warehousing for the Estonian supply chains compared to the Finnish.

Finally, the differences in the total level of outsourcing and in the outsourcing of individual logistics activities provide useful tools to estimate and to speculate the market potential of logistics outsourcing in the analyzed countries. For Estonia, the market potential for the logistics service provision is estimated to be close to billion euros, which could be considered substantial, especially taking into account the size of the economy (GDP) which is around €30bn. Further, as discussed, it might be that the current market is underdeveloped in a way that underestimates the true size of market, especially concerning logistics administration and value added services. If the market would be similar to the Finnish, this would mean that there would be substantial market potential especially in those services.

Our results contribute in several ways. The first contribution is related to the effects of the single European market. It would seem that regardless of the operating under similar market conditions in the single European market, the differences between the two observed countries, Estonia and Finland have rather been increasing rather than becoming similar. As classical trade theory suggests (Samuelson, 1948) it would seem that the pace how fast the factor prices equalize depend on the mobility of factors of production. In logistics this would seem to mean that the cost of transport equalizes more quickly than the less mobile services. This can be considered to be an interesting and important finding concerning the strategic decision making of internationally operating firms. At the same time, this contributes to the discussion on the evolution of logistics systems under a single market area that Browne (1993) and Bayliss and Millington (1995) started almost 30 years ago. Naturally this discussion, together with the findings of this paper can be expanded to other internal markets as well.

From the policy perspective, this raises an interesting question for further research regarding national policies. Has there been something fundamentally different in the use of different policy instruments to explain the differences in the development of logistics costs?

The second contribution is related to the level of costs and the size of the national logistics (outsourcing) market. As underlined in previous literature (McKinnon, 1988; Solakivi *et al.*, 2018a, 2018b), the estimates on the size of the logistics market are often vague. This research applies an improved and more solid methodology to estimate the size and the market potential in the analyzed countries, providing valuable information to the actors in the market. For the logistics service providers in the two examined countries, the results of this research provide a concrete estimate on where the future demand increases are likely to take place.

Finally, the paper raises an important question concerning the methodological development of measuring the logistics costs and size of the logistics market. The results of this research imply that there could be a connection between the measured level of logistics costs and the extent of outsourcing of logistics functions. It might be that because the outsourcing costs are more visible to the companies and therefore more likely to be accounted than the ones that are handled in-house. If this is the case, it might be that the national estimates of logistics costs might be more of a measure of maturity of logistics market rather than a measure of logistics costs. This provides another path for further research.

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Further reading

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Appendix

	Estonia		Finland	
	Economy (2018) (%)	Survey (%)	Economy (2018) (%)	Survey (%)
Manufacturing				
Food products	10	10	10	11
Textiles	12	7	9	4
Leather and related products	1	4	1	1
Wood and wood products	16	21	10	8
Paper and paper products	1	1	1	2
Printing and reproduction of recorded media	5	1	5	3
Coke and refined petroleum products	0	1	0	2
Chemicals and chemical products	2	1	2	8
Rubber and plastic products	3	7	3	3
Non-metallic mineral products	4	2	4	2
Basic metals and fabricated metal products	21	12	26	15
Machinery and equipment n.e.c.	3	9	8	18
Electrical equipment	4	5	6	7
Motor vehicles, trailers and semi-trailers	2	3	4	2
Other manufacturing	17	16	12	13
Trade				
Trade of motor vehicles and motorcycles	21	6	24	11
Wholesale trade	42	61	32	41
Retail trade	37	33	44	48
Firm size				
Large	0	6	1	5
Medium-sized	2	17	2	4
Small	8	27	9	10
Micro	90	51	88	80

Table A1.

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