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ORIGINAL PAPER

ESTONIAN LOGISTICS MARKET 2018 SURVEY: ANALYSIS AND FINDINGS

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ABSTRACT. Background: Estonian logistics market survey has been completed three times (during years 2007, 2012 and 2018), and this research reports development from the most recent survey concerning operating conditions and logistics costs as well as performance. Survey concerns manufacturing, trading and logistics service companies.
Methods: Research data was gathered through an online survey executed during summer and early autumn of 2018. The survey received a total of 122 responses from manufacturing, trade and logistics service provision. Results of the study are compared to earlier years, and with the same approach completed Finnish logistics market survey.
Results: Survey responses showed that Estonian logistics market has been experiencing overheating and the costs of logistics activities are clearly increasing. Logistics service providers have experienced negative effects resulting thereof more than manufacturers or trading companies. Inventories and delivery times have increased, which has resulted in longer cash conversion cycles. Other than inventory and lead time related supply chain metrics have developed positively, indicating that the overall performance in Estonian logistics has remained high.
Conclusions: Increase of logistics costs and inventories remain as main future challenge for Estonian logistics. In other regards, development has been good, and quality of e.g. logistics services and customs have increased and is at high level.

Key words: logistics costs, logistics market, logistics performance, Estonia.

INTRODUCTION

Connectivity and cost of connections are critical for national economies and companies [United Nations, 2019]. For long time it has been so that not companies, but entire supply chains and networks compete with each other [Oliver, Webber, 1982; Houlihan 1985; Rice, Hoppe, 2001]. Same applies to regions and countries: Advantages are built from bunch of issues and within interaction of public-private sector. For example, in logistics it is based on interaction between private sector actors, infrastructure, superstructure, connections, legislation, demand and availability as well as quality of services. Therefore, logistics competitiveness needs to be examined from multiple angles and stakeholders. Direct logistics costs from revenues could be high in manufacturing companies, but the quality and overall performance of logistics could be so high that costs could be tolerated, and region being competitive [World Bank, 2020]. As an example could be used one of the leading countries in Logistics Performance Index (LPI), Germany [World Bank, 2020]. In addition, Sweden, Singapore, Luxemburg, Belgium and Netherlands are typically performing well within LPI, but all from own strengths, but with sure weaknesses (such as high costs). Therefore, we need to know and examine at country level factors and indicators behind logistics competitiveness.

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Nowadays, logistics cost estimates mostly at national level are based on surveys among private sector companies, and estimates are given as a share from company revenues [Rantasila 2014, Kiisler et al. 2017; Schwemmer, 2017]. Typically, these surveys follow the example of Heskett et al. [1973] by dividing logistics costs into sub-components like transportation costs, inventory holding / carrying costs, warehousing costs, IT and administration. For example, in Finland at national level logistics costs are followed with a biannual survey, and it is based on high amount of responses [in year 2018 amount of responses in survey were 2001, see Solakivi et al., 2018a]. However, logistics costs could also be evaluated based on macro-economic measures, and as a share of GDP [see for example Ward et al., 2019, Solakivi et al. 2018b]. Logistics cost examinations could also concern some smaller group of companies in order to understand the differences within same branch and sized actors [Shvartsburg et al., 2017]. Similar national account, and even combining private company profit and loss statement based approach, was used in national level logistics cost estimations within past [Rodrigues et al., 2005, Mckinnon, 1988].

Our purpose of this article is to give an overview of logistics market in Estonia based on recent logistics survey, simultaneously introducing some main results of this survey. Estonia is small North European country, which is among the most open countries in trade within the entire world [share of exports 73% and imports 69% from GDP in 2019; OECD, 2019]. Logistics plays a key role in this country as it has traditionally been transit transport focused, and these services have been key in balancing current and trade account deficits [Kiisler et al., 2017]. This gives high relevance and need for the survey results. The survey was carried out among Estonian manufacturing, trading and logistics companies in May-October 2018. Tallinn University of Technology (Tallinn, Estonia) and University of Turku, School of Economics (Turku, Finland) arranged and implemented the survey process. Research problem in this most recent survey could be stated through following questions: “What is the current level of logistics cost in Estonia and how it has developed from earlier surveys?”, and “What factors have accounted for logistics costs change and how competitive are Estonian supply chains?”.

This research is structured as follows: Research methodology together with survey respondent data is introduced in Section 2. Estonian logistics market and its operating conditions are analyzed in Section 3 through survey responses. Logistics costs and supply chain performance metrics and their development in Estonian companies are analyzed in Section 4. Research is concluded in Section 5, where also further research avenues are being proposed.

RESEARCH METHODOLOGY

This survey has been the third among the series of comprehensive surveys made about Estonian logistics market. The previous surveys have been completed in 2007 [see Ojala et.al. 2007] and in 2012.

The methodology of the survey is similar to biannual Finland State of Logistics, which was last arranged in 2018 [Solakivi et al., 2018a]. The survey is based on an Internet questionnaire, where a personalized link to participate was sent by email to sample companies and asking them to take part in the survey. There were three versions of questionnaires in use, focusing accordingly on manufacturing, trade and logistics service companies.

The sample consisted of 2500 Estonian manufacturing, trading and logistics companies. This sample was built up of companies belonging into TOP 100 and Turnover TOP 500 of 2012-2017 rankings of the local business newspaper "Äripäev", members of Estonian Chamber of Trade and Industry, and the members of local professional associations.

At total 122 representative responses were received, so the return rate was 4.9%. From responses 45% represented manufacturing, 26% trading (wholesale and retail) and 29% logistics services providers (see Tables 1-2).

Table 1. ESOL 2018 survey respondents base by number of employees

No of employees	Sector of economy			
	Manufacturing	Trade	LSP -s	Total
1-9	7.3%	34.4%	25.7%	19.7%
10-49	38.2%	40.6%	51.4%	42.6%
50-249	43.6%	18.8%	20.0%	30.3%
500-999	7.3%	3.1%	2.9%	4.9%
1000-1999	3.6%	3.1%	0.0%	2.5%
	100.0%	*100.0%*	*100.0%*	*100.0%*

Table 2. ESOL 2018 survey respondents base by annual turnover

Annual turnover	Sector of economy			
	Manufacturing	Trade	LSP -s	Total
0-2 MEUR	21.8%	34.4%	25.7%	26.2%
2,1-5 MEUR	20.0%	9.4%	34.3%	21.3%
5,1-10 MEUR	23.6%	21.9%	17.1%	21.3%
10,1-25 MEUR	16.4%	12.5%	8.6%	13.1%
25,1-50 MEUR	7.3%	6.3%	5.7%	6.6%
50,1-100 MEUR	7.3%	9.4%	8.6%	8.2%
100,1-500 MEUR	1.8%	6.3%	0.0%	2.5%
500-1 000 MEUR	1.8%	0.0%	0.0%	0.8%
	100.0%	*100.0%*	*100.0%*	*100.0%*

The main themes researched in the survey were the following:

- Operating conditions in the field of logistics within Estonia,
- Impact of logistics and SCM on the competitiveness and operations of local companies,
- Logistics costs and key performance indicators,
- Main disturbing factors for the supply chains,
- The extent of logistics outsourcing,
- The use of ICT in logistics/SCM operations
- The needs for further competence development in the field of logistics and SCM.

Only part of this survey themes (operating conditions, logistics costs and key performance indicators) have been tackled in this paper.

OPERATING CONDITIONS IN ESTONIAN MARKET

World Bank [2018] produces a biannual Logistics Performance Index – report, where countries are measured on six dimensions of logistics performance. The data for the report is collected from international freight forwarders and other logistics professionals outside the estimated country. In this research, the respondents in Estonia were asked to estimate the logistics performance using similar dimensions on a scale of 1-5, with 1 indicating "very poor" and 5 indicating "very good". The respondents were also provided the option of "no response".

On the average, Estonian firms assess the performance of local logistics market with 3.5 points out of five (see Figure 1). In comparison with previous similar survey from 2012, this

rating has slightly improved (was 3.4 in 2012). The highest ratings were given to the quality of logistics services and effectiveness of customs, 3.7 points for both. The competitiveness of transport prices and shipments tracking possibilities got the lowest ratings (3.3%).

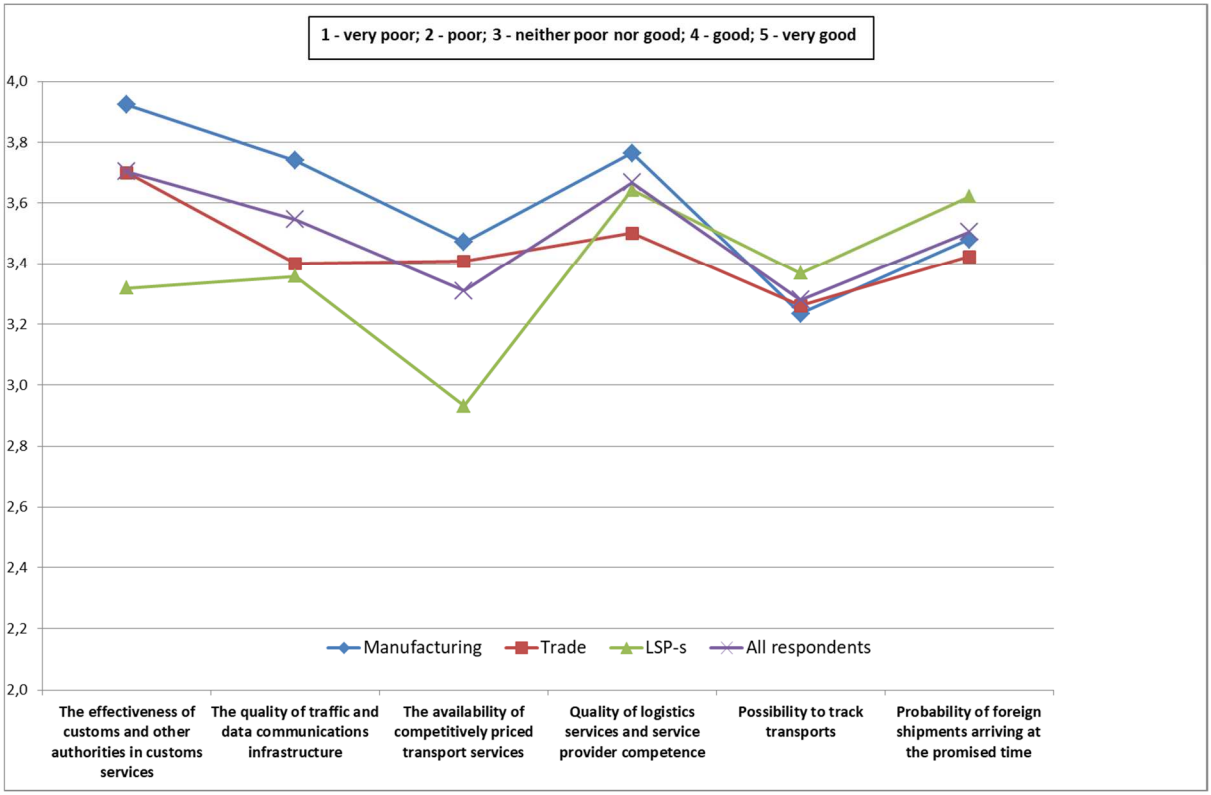

Fig. 1. Respondent estimations for the functioning of logistics in Estonia, 2018

The rankings are quite different by respondents' industries and also in comparison with the results of previous, year 2012 survey. Compared to survey made in 2012, the shippers overall estimation about Estonian logistics market performance have increased on average 0.2 points (from 3.4 to 3.6 in manufacturing and from 3.2 to 3.5 in trading sector), while LSPs estimations have fallen on average 0.35 points (from 3.7 to 3.4). While in 2012 LSP sector gave the higher ratings for Estonian logistics environment performance, in 2018 their ratings were the lowest ones.

This change has been mainly caused by the fall of LSPs average estimation for availability of competitive transport prices from 4.05 to 2.93 points and estimation for quality of transport and data communication infrastructure from 3.91 to 3.36 points.

There are significant differences between shippers and logistics services providers opinions in availability of competitively priced transport services (3.4 versus 2.9; 38% of LSPs answered either 1 or 2, 14% 3 and the remaining 48% 4 or 5.). In addition, many other survey questions show, that LSPs estimate their operating conditions and performance much lower than shippers. Probably the main reason for this is the sharp increase of the fuel excise taxes enforced in Estonia during the period of 2016-2018. Since 2010 to 2015, the diesel excise in Estonia was 39.3 eurocents per diesel liter. In 2016, this was raised by 14% and in 2017 by 10% more, resulting in 49.3 eurocents per diesel liter or 26% increase since 2015 [Ahermaa et al,. 2019]. The excise for gasoline during this period increased even more (33%), from 42.3 eurocents per liter in 2015 to 56.3 eurocents in 2018.

High fuel prices resulting thereof limit the international competitiveness of Estonian (road) transport companies and strong competition in customer markets makes it difficult to transfer these high fuel prices into service prices. Also the shortage of drivers is increasing labor cost in addition to overall salary level increases in Estonia. This is also visible in the road transport statistics. According to Statistics Estonia [2020] the total and international road transport turnovers (tonkms) of Estonian road transportation companies have both declined 28% during period of 2015-2018. The cargo amounts (in tons) transported in international road traffic by Estonian companies have fallen even 48% during this period. It should be reminded that in this period road transportation in Estonia did not experience any big changes, and overall volumes were rather stable (in transported tons volumes were slightly higher in 2018, but in tonkms they were in turn down somewhat). However, the market share of Estonian companies in road transport has considerably decreased as a result.

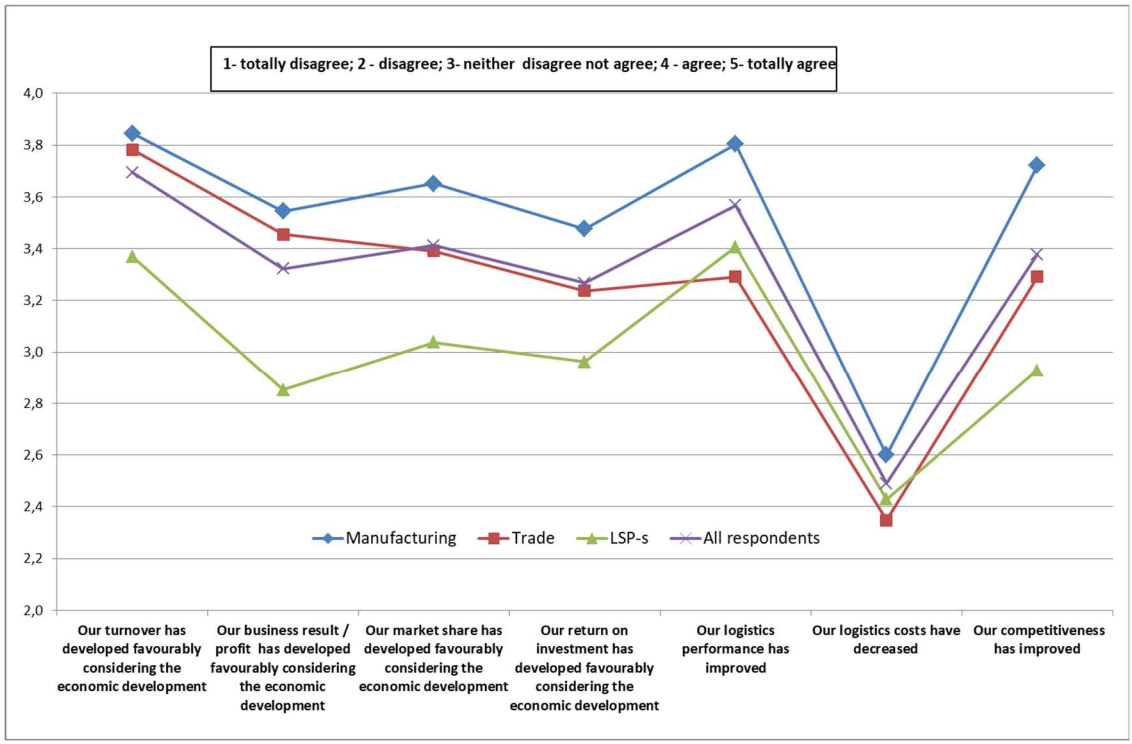

Fig. 2. Average estimations of responded companies for the developments of key performance figures during the two last years, 2018

Respondents were asked to agree or disagree with 5-point scale concerning some statements about the development of key performance indicators during the last two years (Figure 2). Overall respondents gave highest agreement rates to the following statements: "our turnover has developed favorably" and "our logistics performance has improved". Far the lowest agreement rate was with the statement: "our logistics costs have decreased". Only 17% of all answered companies were able to decrease their logistics costs during the 2016-2018. The logistics costs increased instead by 58% of all respondents and stayed stable for the rest of 25%. By the sectors, the logistics costs of 49% responded manufacturers, 70% trading companies and 64% LSPs increased during 2016-2018.

The statement about logistics costs decrease was among the manufacturers and traders single one, where the percentage of disagreeing respondents (choosing answer options 1 and 2 in Figure 2) exceeded percentage of agreeing ones (answer options 4

and 5). In logistics sector, also the statement, "Our business result / profit has developed favorably", got more disagreements than agreements (37% versus 26%). In addition, statement, "Our return on investment has developed favorably", got equal division of agreements / disagreements from LSPs (22% versus 22%). LSPs feedback to statement, "Our competitiveness has improved", divided rather equally between negative, neutral and positive opinions (32% disagreed, 32% neutral and 36% agreed).

Summing up, the manufacturing sector was clearly most and logistics sector strongly less satisfied with their business results during last two years.

LOGISTICS COSTS AND PERFORMANCE INDICATORS

The Manufacturing and trading companies were asked to estimate their logistics costs as a share of turnover in 2017. Following Solakivi et al. [2018b] they were also asked to estimate five separate logistics cost components: transportation, warehousing, inventory carrying, administration and other logistics costs. Figure 3 presents the average logistics costs of responded Estonian manufacturing and trading companies from 2017, 2011 and 2005 (latter are based on previous surveys from 2012 and 2007; cost comparison always to realized year). For comparison, the Finnish companies' similar data from similar periods originating from similar surveys has shown [Solakivi et. al. 2018].

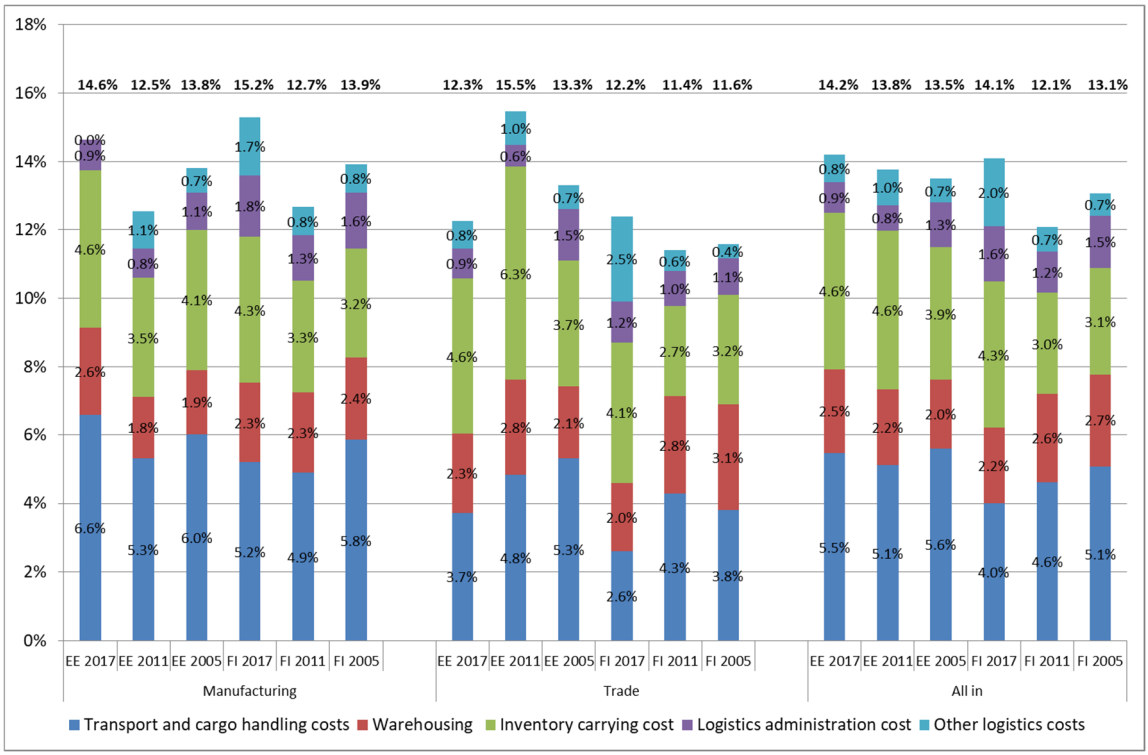

Fig. 3. Logistics cost of Estonian and Finnish manufacturing and trading companies expressed as % of turnover, 2017, 2011 and 2005

The average logistics cost of Estonian manufacturing and trading companies in 2017 were 14.2% of turnover, (14.6% in manufacturing and 12.3% in trade). These costs are at the same magnitude of Finnish enterprises (14.1%, 15.2% and 12.2% accordingly). On the average, transport costs of Estonian shippers are 5.5% of turnover (or ca 40% of total logistics costs) and inventory carrying costs 4.6% (or one third of total

logistics costs). By the logistics costs structure Finnish shippers differ with lower transportation costs (on average 4.0% versus 5.5% of turnover). At the same time Finnish shipper's administration and other logistics costs are significantly higher (1.6% versus 0.8% and 2.0% versus 0.8%). The differences could be caused from the differences of logistics costs accounting practices (or sales terms) in Estonian and Finnish firms (e.g., almost all responded manufacturers declared that their other logistics costs are 0%). The second reason could be the wider use of ICT in logistics and supply chain management in Finnish companies, often such ICT solutions costs are accounted under logistics administration and other logistics costs.

The comparison of logistics costs of Estonian firms in 2017 with these ones in 2011 is quite complicated, because of differences in average size of trading companies replied in 2017 and 2011 surveys (expressed in annual turnover). In previous year 2012 survey, rather significant share of responded trading companies were micro-companies, with annual turnover up to 2 million euros, in much bigger share than in preceding and following surveys (71% of traders in 2012 answered versus 39% in 2007 and 34% in 2018). There is a direct relationship between company size expressed in financial turnover and logistics cost level expressed as percentage of financial turnover. For larger companies the economies of scale effect applies resulting in smaller percentage of total logistics costs of turnover. For example, this relationship was very clearly seen in year 2007 survey results, where the average logistics cost shares of answered micro size (annual turnover up to 2 MEUR) and large size (above 50 MEUR) differed more than twice (16.1% of micro companies versus 7.0% of large ones; Kiisler 2008). Therefore, the average logistics costs of Estonian trading companies participating in year 2012 survey were to some extent upward and not objectively comparable with results of surveys from 2017 and 2007. However, also other issues have been analyzed to potentially have caused this increase in costs within 2012 survey, like political instability and natural disasters [Kiisler et al., 2017].

Among Estonian manufacturers there is no such respondents average size variations through surveys launched. The average logistics costs of Estonian manufacturers, expressed as % of turnover has increased from 12.5% to 14.6% during 2011-2017 (growth 16.8%). Also the logistics costs of Finnish companies within the same period have increased in relative terms with nearly same amount (16.5%), from 12.7% to 15.2%. Proceeding from this data could be argued, that average logistics costs of Estonian shippers (as percentage of turnover) have increased 17%.

Table 3. Logistics indicators of Estonian manufacturing and trading companies – operational performance 2017, 2011 and 2005

Indicator	Manufacturing			Trade		
	2017	2011	2005	2017	2011	2005
Percentage of customer orders delivered correctly in relation to time, place, documentation, amount, and quality, %	94.8	89.2	80.5	95.7	86.3	85.6
Average order fulfilment cycle time (order date to delivery date), days	37.9	32.3	21.5	8.7	7.1	5.6
Percentage of correct deliveries received (correct delivery time, place, documentation, amount and quality), %	91.4	84.2	NA	84.3	85.6	NA
Supplier average delivery time (order date to delivery date), days	30.8	25.3	NA	21.8	19.1	NA
Average number of material suppliers used during the last 12 months, suppliers	59.5	43.8	NA	35.8	37.4	NA

Table 4. Logistics indicators of Estonian manufacturing and trading companies – working capital management 2017, 2011 and 2005

Indicator	Manufacturing			Trade		
	2017	2011	2005	2017	2011	2005
Average number of days of sales outstanding (DSO, i.e. average number of days between customer order delivery to receipt of customer payment), days	37.6	29.2	30.2	17.6	30.8	23.7
Average end-product inventory days of supply, days	26.6	16.6	13.9	60.2	45.4	42.1
Average number of days of payables outstanding (DPO, i.e. average number of days between supplier order receipt to order payment), days	42.3	28.8	32.7	29.0	31.2	36.5
Average cash conversion cycle (CCC), days	21.9	17.0	11.4	48.8	45.0	29.3

Tables 3 and 4 present the logistics indicators of Estonian manufacturing and trading companies in 2017, 2011, and 2007, investigated respectively in year 2018, 2012 and 2007 surveys. The investigated indicators are basing on the SCOR (supply chain operations reference model) metrics.

Based on time series showed in Tables 3 and 4, the following developments can be outlined:

- The percentages of perfect orders have been significantly improved both in manufacturing and trading sectors.
- The average order fulfillment cycles have grown both for manufacturers and traders, probably in connection with optimization of logistics / shipping costs.
- Compared with traders, manufacturers have significantly improved the percentage of correct deliveries received.
- The end product inventories have grown considerably. Since 2011, manufacturer inventory days of supply have been grown 60% and in trading correspondingly by 33%.
- The average delivery times of suppliers have increased both in manufacturing and trading sector, probably due to supplier base internationalization and logistics costs optimization.
- The average number of material suppliers has slightly decreased in trading sector since 2011 (-4%), but surprisingly there is strong growth in manufacturing sector (36%).
- The indicator describing the efficiency of using live capital in supply chain is "Cash to cash cycle" or "Cash conversion cycle" (CCC). This is the net time interval between a firm's cash expenditures for purchases and its final recovery of cash receipts from product sales [Yasdanfar and Öhman 2013] or "the average days required to turn a dollar invested in raw material into dollar collected from a customer" [Stewart, 1995]. CCC can be calculated by adding days of inventory to days of accounts receivable and subtracting days of accounts payable [Farris & Hutchison, 2003]. Calculated on the basis of Table 4 data, the average CCC of Estonian manufacturers was 11 days in 2005, 17 days in 2011 and 22 days in 2017. The corresponding figures of Estonian traders were 29, 45 and 49 days. First of all, the increase of CCC has caused by increase of firms inventories. At the same time, in comparison with the results of year 2011 survey, Estonian companies have achieved in 2017 that their average terms of payment to their clients are shorter than their own terms of payments to their own suppliers. In 2017, this average difference between the days of sales outstanding (DSO) and days of payables outstanding (DPO) was 5 days in manufacturing (37.9 versus 42.3 days) and even 11 days in trading sector (17.6 versus 29.0 days). In 2011, DSO and DPO were roughly equal.

CONCLUSIONS

Based on completed logistics survey, Estonian manufacturing, trading and logistics firms on the average assess the level of operating conditions of logistics within Estonia with 3.5 points in 5-point scale (where 3 points means "neither poor nor good" and 4 points "good"). This is slightly better estimation than by previous similar survey from 2012 (3.4). However, during this period 2012-2018, the assessments of responded shippers and logistics services providers have considerably changed in different directions. While in 2012 Estonian LSPs gave the highest ratings for local logistics environment performance, in 2018 their ratings were the lowest one, strongly fallen especially in the field of availability of competitively priced transport services. Also in 2018, LSPs estimated their business results during the last two years less satisfying than manufacturers or traders. The main reason behind this development must have been the rough gradual increase of fuel excise taxes by Estonian government (coupled together with tight labour market) during 2016-2018 (including 26% growth of diesel and 33% growth of gasoline excises). This has resulted in the increasing costs and falling competitiveness of Estonian road haulage companies, both internationally and locally. On the average, the logistics costs of Estonian manufacturing and trading companies were 14.2% of their net turnover in 2017. On the average, transportation costs make ca. 40% of total logistics costs and inventory carrying costs ca 1/3 of total costs. In comparison with similar data from 2011, logistics costs of Estonian shippers, expressed as percentage of their net turnover, have increased on the average 16.8 %. Similar growth in logistics costs could be found from other studies too, like those of Finland [Solakivi et al., 2018a], Russia and Poland [Shvartsburg et al., 2017] and within smaller extent in USA [Ward et al., 2019]. As a small open economy with an opposite trend, the logistics costs of Switzerland have been on a steady decline (see for example Solakivi et al. 2018), which might make an interesting reference to the Estonian economy. This new survey also showed that average inventories of Estonian manufacturing and trading companies have significantly increased (60% and 33% respectively). Average order fulfillment cycles and suppliers delivery times have increased everywhere, probably originating from goals of optimization delivery costs.

Overall, as Estonia has an open economy, the results of Estonian logistics survey results comply with the general logistics trends during last years identified in many regions (rapid increase of logistics costs, increasing inventories etc). The results of last Estonian logistics surveys also show, how easily and extensively governmental fiscal measures through changing excise tax rates for fuels can influence the competitiveness and economical activities of road transport sector operating in small country, in competitive international environment.

As a further research, it would be interesting to repeat this same survey for Estonian companies in 2020 or later years. Business environment has further changed as growth has slowed in Northern European economies, and we have numerous factors, which might have considerably changed logistics performance (like very low interest rates and pandemic situation of Covid-19). It is extremely interesting to follow, how companies are tackling this current difficult situation, when they a priori have increasing inventories at hand, and demand conditions are suddenly deteriorating.

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PRZEGLĄD ESTOŃSKIEGO RYNKU LOGISTYCZNEGO 2018: ANALIZA I WNIOSKI

STRESZCZENIE. **Wstęp:** analiza estońskiego rynku logistycznego była realizowana trzy razy (w latach 2007, 2012 oraz 2018). Poniższa praca prezentuje najświeższe wyniki dotyczące warunków operacyjnych oraz kosztów logistycznych. Badanie obejmuje przedsiębiorstwa z branży przetwórczej, handlowej i logistycznej.
Metody: Dane wejściowe zostały zebrane poprzez ankiety przeprowadzone on-line w okresie lato - wczesna jesień 2018. Uzyskana 122 odpowiedzi od przedsiębiorstw z branży przetwórczej, handlowej oraz logistycznej. Uzyskane wyniki zostały porównane z wcześniej uzyskanymi wynikami z poprzednich lat, przy zastosowaniu tej samej metodologii.
Wyniki: Wyniki wskazują, że estoński rynek logistyczny wykazuje objawy przegrzania oraz wyraźny wzrost kosztów operacji logistycznych. Dostawcy usług logistycznych doświadczają wyraźniejszych negatywnych efektów w porównaniu z przedsiębiorstwami produkcyjnymi. Zaobserwowano wzrost zapasów oraz okresów dostaw, co skutkuje dłuższymi cyklami obiegu pieniężnego.
Wnioski: Wzrost kosztów logistycznych pozostaje wyzwaniem przyszłości dla estońskich logistyków. Jednak rozwój i jakość usług logistycznych wzrasta i jest na wysokim poziomie.

Słowa kluczowe: koszty logistyczne, rynek logistyczny, działalność logistyczna, Estonia

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