“An analytical study on logistics outsourcing impact on logistical service quality in supply chains (case study: industrial enterprises of Sumy region)”

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AN ANALYTICAL STUDY ON LOGISTICS OUTSOURCING IMPACT ON LOGISTICAL SERVICE QUALITY IN SUPPLY CHAINS (CASE STUDY: INDUSTRIAL ENTERPRISES OF SUMY REGION)

Abstract

The aim of this paper is to analyze and evaluate the impact of logistical outsourcing on the overall quality of the level of the logistical service of enterprises-producers in supply chains. In this study, special attention is paid to the estimation of indicators of logistics service as by their own forces and due to outsourcing and assessing the elasticity of these indicators, for an example, in Sumy Engineering Works Ltd.

As a result of the study, in case of their own delivery, logistics service level is higher than in case of logistics outsourcing. It may be related to the fact that in the first case, at the industrial enterprises, there is higher level of control over the process and the capacity for flexible and rapid response to various demands of consumers, which is very important for competitiveness. It was determined how the value of each individual index varies with the change in the supply control volume.

Keywords logistics, logistical service, logistical outsourcing, service quality

JEL Classification L89, M21, M31

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INTRODUCTION

The modern economy is characterized by permanent changes in the state of external micro and macroenvironment, acceleration of the pace of technological progress (PTP); reduction in product life cycle; increasing the competition between domestic and foreign producers; changes in consumer tastes and preferences. World experience shows that such conditions are for competitive enterprises, which provide higher level of service in delivering products. But the quality of logistics services in the distribution system helps enterprises to increase the chances of successful long-term development of the market, enhance their own image as a reliable partner and thereby consolidate and develop competitive position.

At the same time there is a tendency to be concentrated on the main types of activities of enterprises and more and more often the question of transferring the certain functions to outsourcing arises.

According to mentioned above, subject matter of this study is:

- analysis of the values of logistic service in conditions of delivering by its own forces and outsourcers supply chain in dynamics by years;

- calculation of the value of correlation between the level of logistics services and the number of orders that were delivered by their own forces and logistics service level and the number of orders that were delivered by the logistics operator;

- determination of the overall performance flexibility in logistics services in supply chain dynamics for recent years;

- analysis of the degree of influence on the logistics service products in the supply chain and to identify indicators that require high level control of the company during transferring the amount of supply outsourcer.

The aim of studying is the determination of the vector and logistics outsourcer degree of impact on the overall quality of logistics services producers in the supply chain. To achieve the goal, we propose to solve the following problems:

- to analyze the values of logistic service in conditions of delivering by its own forces and outsourcers supply chain in dynamics by years;

- to calculate the value of correlation between the level of logistics services and the number of orders that were delivered by their own forces and logistics service level and the number of orders that were delivered by the logistics operator;

- to determine the overall performance flexibility in logistics services in supply chain dynamics for recent years;

- to analyze the degree of impact on the logistics service products in the supply chain and to identify indicators that require high level control of the company during transferring the amount of supply outsourcer.

1. LITERATURE REVIEW

When analyzing the market of outsourcing, it can be said that it is rapidly developing in the world and in Ukraine. There is a growing number of companies that provide outsourcing services and the number of companies that attract outsourcers. (Danyliuk et.al. 2017).

Logistics processes and logistics service, in particular, are not an exception. But, at the same time there is always an open question: how will the quality of the logistics service change during outsourcing logistics transmission? And how to find a way of expenses optimization at enterprises?

There are many studies that help to get closer to the answer on these questions, but they are very individual for different countries and different types of activities. For example, Denisa Hrušecká, Lucie Macurová, Eva Juřičková, Leona Kozáková (2015) conducted a study of Czech manufacturing companies, and determined that the statistical testing showed just an average between the areas of logistics outsourcing and the main reasons for outsourcing logistic activities. Therefore, it is not possible to say strictly that some logistic activities should be outsourced and the other ones not. It depends on many other factors.

But it remains unclear which set of indicators should be used and how the quality of the logistics service will change. Mariusz Szuster suggests in his work that in many cases, manufacturers purchased transport services only and did not consider outsourcing a wider range of logistical functions (Szuster, 2010). That is why he considers this question from the side of transport logistics.

Oleg Olefirenko (2016) proposed scientific and methodic bases of expenses optimization for innovatively active industrial enterprises production

sales in Ukraine, which may be the ground of the similar research on logistics field.

These studies are not the only ones and they do not give a full answer to the main question. So we propose our own version of revealing the level of impact of logistics outsourcing on the quality of logistics services using the example of Sumy Engineering Works Ltd.

2. RESEARCH METHODOLOGY

2.1. Hypothesis

The hypothesis of research was the assumption that the level of logistics services in the supply chain was lower than outsourced logistics services, if compared with the situation when the logistics services were provided by its own manufacturer.

Sub-hypotheses

1. There is a high correlation between the level of logistics services and the number of orders that were delivered by their own forces, and logistics service level and the number of orders that were delivered by logistics operator in the supply chain;

2. There is a high level of the control of the manufacturer of the following parameters: resolution of complaints and bug fixes, efficiency of communication and availability of information on request.

3. In case of transferring supplying to logistic operator, the manufacturer reduces his control over average lead time, modifying current delivery time in supply chain.

4. The flexibility of index of the logistical service is significantly higher in conditions of supplies (less than 50%).

The hypothesis of the study was the assumption that a decisive role in achieving the efficient use of all incomes of logistical service in the industrial sector is subject of logistical service suppliers. The foundations of the study's methodology were the economic phenomena and processes of mentioned issue. In view of this goal, the authors applied various methods and techniques on the theoretical level, e.g., average values, correlation analysis, table, index etc. as traditional mathematical, statistical and economic methods. Also analysis and comparison as the empirical level and a systematic approach are used to analyze the data in the article.

2.2. Research variables

The valuation of logistics services in the supply chain industry was made in the study by using four groups of indicators discussed in details in previous works (Gaidabrus, 2013, 2015), the quality and the execution time, flexibility of service and information provision. Each of these groups contains elements of logistics services, which are selected depending on the specifics of the company.

The abovementioned elements are proposed to be estimated using quantitative and qualitative indicators. Data for calculation of quantitative indicators are contained in the internal statements, which include specially shaped figures and general statistics that can be used to carry out an objective assessment of logistics services.

We mean the complex of services as logistics service supply chain. It accompanies marketing, commercial, logistics and sales activities in moving products to the final consumer in accordance with the strategy of the entity most appropriate in terms of cost.

The overall rating of indicators of the enterprise, analytics counterparties about the terms for the prices of logistics services, market research are related to the common documents containing information on the effectiveness of logistics services.

The conclusions of experts in logistics and specialists of the analyzed company, which were involved to analyze logistics services in the enterprise, can be a source of quality indicators.

It is important to consider that only customers can evaluate the service level objectively, so we must maintain contacts with them using all possible channels.

These channels include a direct survey by questionnaire, targeted phone calls, other methods of receiving complaints and suggestions, and by gathering information through analysis of dynamics of economic activity.

Apart from the validity of indicators, experts determine the gain and reducing the action of each of the indicators, that is caused by synergy effect which will be discussed below.

The weighted average value of indicators in different conditions of delivery, i.e., for each performance evaluation, is the only logistics service index (E_i) as follows:

$$E_i = \frac{E_{o.f.i} \cdot N_{o.f.i}}{N} + \frac{E_{l.o.i} \cdot N_{l.o.i}}{N}, \quad (1)$$

where $N_{o.f.i}$ – the number of orders in the accounting period is brought by own forces of producer; $N_{l.o.i}$ – the number of orders in the accounting period delivered by logistics operator; $E_{o.f.i}$ – the total values of the indicator of logistic service in conditions of delivery by its own forces; $E_{l.o.i}$ – the total values of the logistic service in conditions of delivery by logistics operator; N – the total number of ordered products within the accounting period, units.

The total value of indicators in conditions of delivery of its own products ($E_{o.f.}$) and logistics operator ($E_{l.o}$) is calculated as the product of corresponding component and its importance:

$$E_{o.f.} = \sum_{i=1}^{n} E_{o.f.i} \cdot W_{o.f.i}, \quad (2)$$

$$E_{l.o.} = \sum_{i=1}^{n} E_{l.o.i} \cdot W_{l.o.i}, \quad (3)$$

where $W_{o.f.i}$ and $W_{l.o.i}$ – the weight of i-element of the logistics service at delivery by its own forces of producer and logistics operator, respectively.

The idea of a synergistic effect is a foundation for the basis of calculation of integral index of logistics services. Synergy is an advantage, which cannot be repeated by any competitor. Correctly using the benefits of synergy can increase economic enterprise profit in the supply chain. It is expressed in a complex impact on all items of service to the general impression of user and differs from simply adding the values of each element separately (adapted from (Novosad et.al. (2009))):

$$S_e = f(E_1,...,E_n) \quad (4)$$

where S_e – the effect from the impact of elements of logistics services; $f(E_1,...,E_n)$ – applying the effects of the influents the elements to logistics services; $E_1,...,E_n$ – the elements of logistics services.

However, a synergistic effect may have directly opposite results (Bozhkova, 2011):

- be negative ($f(E_1,...,E_n) < E$, where E – the total effect) in case of weakening (neutralizing) the impact of various factors;
- be positive ($f(E_1,...,E_n) > E$ if they gain swashbuckling action depending on the combination of elements for strengthening the impact of various factors.

A result of analysis of works by A. Hadzhynsky (2007), E. Krykavsky (2009), V. Mykolaichuk V. Kuznetsov (1999) shows an exponential dependence service costs and, consequently, the level of customer satisfaction and logistics services provided by the enterprise from about 70%. It means that interaction between two or more components of the logistics service gives a result greater than what could be obtained under the conditions of impact of each of these factors separately.

On the basis of proposed approaches and division of the scale at intervals [7, 10, 15]: 0–0.33; 0.34–0.66; 0.67–1, a graph of the level of satisfaction of the execution order from LS enterprises was constructed where the point of intersection with the axis of logistics services is 67% (Figure 1). Built schedule looks like cubic parabola with equation $y=(x-67)^3$.

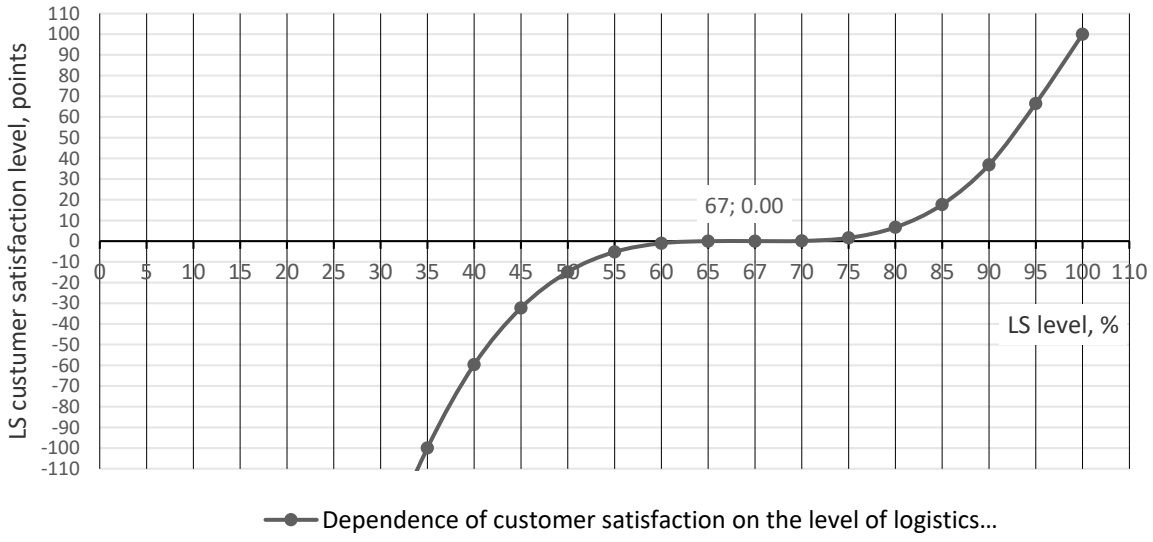

Figure 1. The dependence of the level of consumer to satisfaction execution of orders from logistics services company

Thus, the integral index is the sum of the partial integrated assessment of logistics services, the level of customer satisfaction elements of which is less than 67% (not inclusive) and partially integrated assessment of logistics services, the level of customer satisfaction elements of which is from 67% to 100% (Figure 2).

To analyze the degree of control of the manufacturer above the logistics service we offer to use the elasticity of logistic service on the volume of supplies to measure the degree of impact of changes in scope of supply, which is controlled by the manufacturer for the given level of logistics services. The given indicator is calculated as follows:

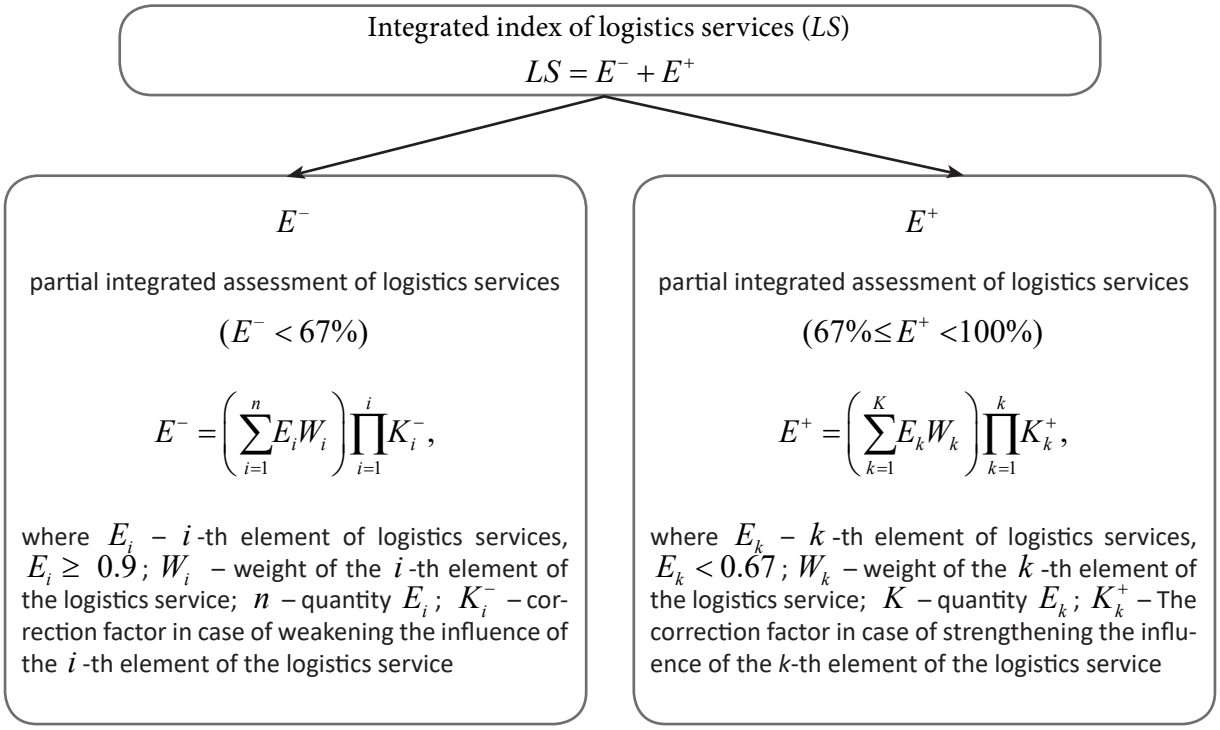

Figure 2. Calculation of the integral parameter of logistic service company

$$E_V^{LS} = \frac{\sum_{i=1}^{n} \frac{\Delta LS_i}{\Delta V_i}}{n-1}, \quad (5)$$

where E_V^{LS} – the elasticity of individual indicators of logistic service from the volume of supply; ΔLS_i – changing the values of the of logistic service in comparison with previous year; ΔV_i – changing in volume of deliveries in comparison with previous year; n – number of years in the period under study.

If the index is more than 1, it can be concluded that the logistics service is flexible, that is, small change in volume of deliveries carried out by the manufacturer causes significant changes in the quality of service in the supply chain. And, otherwise, if the index is from 0 to 1, the service is inflexible.

The inverse index is the degree of impact of an enterprise on logistics service:

$$E_V^{LS} = \frac{\sum_{i=1}^{n} \frac{\Delta V_i}{\Delta LS_i}}{n-1}, \quad (6)$$

Thus, depending on the resulting value of this indicator, all elements of logistics services are offered to be divided into three groups based on their values: high (5%), medium (5 to 20%) and the lowest (20%) level of control. The indicators, which were in the low control segment, have the highest priority in terms of attention from the manufacturing enterprise towards the support and implementation of appropriate measures. The indicators from the middle segment of control are the next. Thus, the elements of logistics services are different by high stability; they are located in the respective segment.

2.3. Assessment of weights of the selected criteria

To determine the importance of indicators for assessing logistics service, we offer to apply the method of expert evaluations. To determine the necessary number of experts, we use such methods: formal, whereby the number of experts determined using special formulae, and informal, where the number of experts is an arbitrary number usually ranges from 10 to 20 people (Gaidabrus, 2013).

Experts' group is formed by competent persons in logistic service and present interests of various interested groups. Particularly, it may include managers and leading specialists at the enterprise, for which analysis is conducted, and counter-agent, who take part in logistic service and involved experts concerning work conditions in the analyzed market.

Weighting of each factor is calculated by the following formula (Novosad et.al., 2009):

$$W_{A^3} = W_{\hat{I}^3} \frac{\sum_{j=1}^{m} W_{ij}}{\sum_{i=1}^{n} (\sum_{j=1}^{m} W_{ij})}, \quad (7)$$

where m – quantity of experts; n – quantity of estimated factors, which are observed; W_{ij} – rank, got by i-th estimated factor, set by j-th expert.

The sum of weight is equal to 1.

After that, one should find experts' thoughts conformity while evaluating logistic service quality factors. We propose to use Kendall's concordance coefficient (agreement) W (K_{conc}) and Pearson's criterion (X^2).

Concordance coefficient is calculated by the following formula (Novosad et.al., 2009):

$$\hat{E}_{conc.} = \frac{12\sum_{j=1}^{n} d_j^2}{m^2(n^3-n) - m\sum_{i=1}^{m} T_i}, \quad (8)$$

$$d_j = S_j - \frac{\sum_{j=1}^{n} S_j}{n}, \quad (9)$$

$$S_j = \sum_{i=1}^{m} R_{ij}, \quad (10)$$

$$T_i = \sum_{i=1}^{L} (t_e^3 - t_e), \quad (11)$$

where K_{conc} – coefficient concordance; d_j – deviation amount of estimates from the average amount; S_j – sum of the ranks; L – scope; l – quantity of connected (similar) ranks; t_l – quantity of connected ranks in each group).

Concordance coefficient is changed within $0 \leq K_{conc} \leq 1$. The bigger concordance coefficient is the higher level of experts' thoughts agreement. With full agreement of experts' thoughts $K_{conc} = 1$, and with full disagreement $K_{conc} = 0$. Its low value may be received either without all experts' thoughts generalization, or with opposite thoughts between experts' subgroups, although the group has high agreement level.

Statistic significance of the concordance coefficient is checked by Pearson's criterion (X^2) (Nikolaychuk & Kuznetsov, 1999):

$$X_p^2 = \frac{\text{Ł} \sum_{j=1}^{n} d_j^2}{m \cdot n \cdot (n+1) - \frac{1}{n-1} \sum_{i=1}^{m} T_i}. \quad (12)$$

Calculated value (X_p^2) is balanced with table value (X_m^2) for n-1 freedom stages and trustful probability (p = 0.95 or p = 0.99). If $X_p^2 > X_m^2$, the concordance coefficient is essential, if $X_p^2 < X_m^2$, it is necessary to increase experts' number in the group.

In order to estimate character so flow, middle and high weighting factors concerning logistical service quality, it is necessary to determine maximum (max) and minimal (min) value for matrix analysis. Intermediate values (k_1, k_2) are calculated by the formula:

$$k_1 = \min + \frac{1}{3} \cdot (\max - \min), \rightarrow$$
$$\rightarrow \quad k_2 = \min + \frac{2}{3} \cdot (\max - \min). \quad (13)$$

Factors, appearing in the box "competitive advantage – high weighting" are the strongest in the producer's hands. And another most important but weak is "competitive advantage – high weighting". These factors need fast improvement, because they are very important for consumer. Factors in the box "competitive advantage – low weighting" is the secondary strong sides of the enterprise. They are not important for consumer, that's why it is necessary to support and persuade consumer that they are important and in other case one has to decrease level of resource provision for the support.

3. THE MAIN RESULTS OF THE STUDY

Sumy Engineering Works Ltd. is a private industrial-engineering enterprise. The main core is the development, design, manufacturing, testing and implementation of the pumping equipment. It is a high-tech certificated enterprise, which was working well at many facilities of countries near and far abroad during 10 years.

Indicators of logistic service are calculated separately for delivery of their own products and outsourcing of logistics services. The main results of the calculations are presented in Table 1.

The graph (Figure 3) demonstrates that the company Sumy Engineering Works Ltd. has gradually reduced the volume of supply by their own forces since 2012 in favor of delivery outsourcer, which caused reduction of logistics services. It is confirmed by the calculated correlation coefficient (r) between the level of logistics services and the number of orders that were delivered by themselves (r = 0.9686) and the level of logistic service and the number of orders, which were delivered by logistics operator (r = –0.9686). Values of the coefficients are close to 1, indicating a high strength link between the analyzed indicators.

So, according to the calculations, we can make a conclusion that in case of their own delivery, logistics service level is higher (–0.899) than in case of logistics outsourcing (–0.63). It may be related to the fact that in the first case, at the company, there is higher level of control over the process and the capacity for flexible and rapid response to various demands of consumers, which is very important for competitiveness.

According to the analysis of elasticity of indicators of logistics services depending on the volume of

Table 1. Indexes of logistic service of Sumy Engineering Works Ltd. in 2012–2016

Index of LS		2012			2013			2014			2015			2016		
		value index for the conditions of delivery:		Total value of the index	value index for the conditions of delivery:		Total value of the index	value index for the conditions of delivery:		Total value of the index	value index for the conditions of delivery:		Total value of the index	value index for the conditions of delivery:		Total value of the index
		on their own	logistics provider		on their own	logistics provider		on their own	logistics provider		on their own	logistics provider		on their own	logistics provider	
quality of the order	Accuracy in carrying out orders	0.98	0.86	0.92	0.96	0.86	0.91	0.96	0.84	0.90	0.99	0.86	0.93	0.95	0.93	0.93
	absence of damage during transportation	0.92	0.60	0.76	0.91	0.60	0.75	0.91	0.58	0.74	0.94	0.60	0.77	0.87	0.90	0.89
time of the order	Average delivery time	0.96	0.80	0.88	0.95	0.80	0.88	0.95	0.78	0.86	0.97	0.80	0.88	0.91	0.95	0.94
	variability of delivery time	0.98	0.99	0.98	0.96	0.99	0.98	0.96	0.96	0.96	0.98	0.99	0.98	0.89	0.95	0.94
	Convenience of warehouse location	1.00	1.00	1.00	0.99	1.00	0.99	0.99	0.98	0.98	1.01	1.00	1.00	1.00	1.00	1.00
Flexible service	Maintenance of unusual requests	0.86	0.39	0.63	0.85	0.39	0.62	0.88	0.36	0.62	0.87	0.39	0.63	0.47	0.18	0.24
	Availability of minimum volume of orders	1.00	1.00	1.00	0.99	1.00	0.99	1.01	0.98	1.00	1.01	1.00	1.00	1.00	1.00	1.00
	Availability of additional services	0.95	0.32	0.64	0.94	0.32	0.63	0.96	0.30	0.63	0.96	0.32	0.64	0.90	0.50	0.59
	Possibility of an accelerated delivery of goods	0.96	0.88	0.92	0.95	0.88	0.91	0.97	0.85	0.91	0.97	0.88	0.92	0.60	0.64	0.63
Information support	Availability of accurate and timely information about orders	0.78	0.33	0.55	0.77	0.33	0.55	0.79	0.30	0.55	0.80	0.33	0.56	0.83	0.19	0.32
	Addressing complaints or bug fixes	0.86	0.65	0.76	0.85	0.65	0.75	0.87	0.63	0.75	0288	0.65	0.77	0.90	0.45	0.55
	Effectiveness of communications	0.90	0.65	0.78	0.88	0.66	0.77	0.91	0.63	0.77	0.91	0.66	0.78	0.78	0.38	0.47
	Competence of staff	0.99	0.97	0.98	0.97	0.97	0.97	1.00	0.95	0.97	1.00	0.97	0.99	0.89	0.90	0.90
Integral value of the index		0.93	0.73	0.93	0.92	0.76	0.88	0.94	0.70	0.79	0.94	0.69	0.77	0.90	0.63	0.68

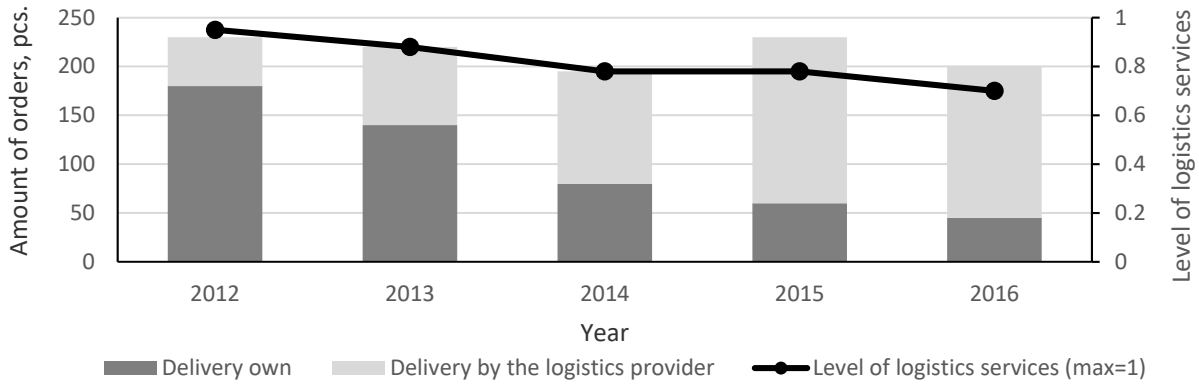

Figure 3. The volume of contracts of Sumy Engineering Works Ltd. in 2012–2016

Table 2. Flexibility of indicators of logistics services Sumy Engineering Works Ltd.

Year		2012	2013	2014	2015	2016	Total flexibility of logistics services
The volume of deliveries performed by the manufacturer, %		80	64	39	27	21	
Flexibility index of logistics services (relative to the previous year)	Accuracy in carrying out orders	0.26	0.2	0.15	0.07	0.71	0.28
	Absence of damage during transportation	0.4	0.54	0.44	0.57	3.63	1.12
	Average delivery time	0.36	0.23	0.2	0.01	1.72	0.50
	Variability of delivery time	0.09	0.07	0.04	0.23	0.9	0.27
	Convenience of warehouse location	0.07	0.04	0.04	0.15	0.05	0.07
	Maintenance of unusual requests	0.3	0.51	0.49	1.63	0.74	0.73
	Availability of minimum order quantity	0.06	0.04	0.01	0.09	0.05	0.05
	Availability of additional services	0.77	0.67	0.64	0.54	1.67	0.86
	Possibility of an accelerated delivery of goods	0.21	0.12	0.11	0.06	4.9	1.08
	Availability of accurate and timely information about orders	0.58	0.49	0.48	0.29	2.33	0.83
	Addressing complaints and bug fixes	0.79	0.25	0.22	0.1	2.98	0.87
	Effectiveness of communications	0.78	0.39	0.25	0.1	4.71	1.25
	Competence of staff	0.3	0.17	0	0.07	1.44	0.40

supply on their own (Table 2), the most sensitive components are defined:

- the effectiveness of communication;
- the possibility of rapid delivery of goods;
- no damage during transportation;
- availability of reliable and timely information about demand;
- resolution of complaints and bug fixes.

The obtained data make it possible to determine the degree of impact on values of logistic service delivery under the different conditions. Considering that the company may have its fleet or use the services of logistics operators, rates on which it can impact can change. By using index, one can see the percentage change in value of an individual parameter logistic service by changing the control entity 1% of supply. The low value of the index indicates a high degree of control over

Table 3. Degree of impact of the enterprise on logistics service

Level control	Index logistic service	Degree of impact on individual indicators LS, %	The overall degree of impact on the level of logistics services, %
high	Availability of additional services	1.38	23.22
	Maintenance of unusual requests	1.5	
	Availability of accurate and timely information about orders	2.01	
	Absence of damage during transportation	3.21	
	Effectiveness of communications	4.4	
	Addressing complaints and bug fixes	4.81	
average	Accuracy in carrying out orders	7.02	
	Possibility of an accelerated delivery of goods	8.5	
	Variability of delivery time	10.75	
	Ease warehouse location	19.58	
low	Minimum order size	46.55	
	Average delivery time	51.52	
	Competence of staff	140.64	

his company. And vice versa, the higher the rate, the less it is subject to control by the manufacturer.

So we propose to allocate all of the elements of logistics services into three groups based on their values: high (5%), medium (5 to 20%) and the lowest (20%) level of control.

So Table 3 illustrates that in the case of outsourcing of logistics services, manufacturer completely loses its control over a group of indicators of staff competence, the average delivery time and availability minimum order size, because there is a high impact on these figures enterprises outsourcer.

However, despite this, the share control of the following parameters is high:

- the presence of extra services and service unusual requests is largely dependent on the willingness of the manufacturer to offer and provide an additional package of services that can precede or accompany the delivery of the goods or satisfy specific needs of customers;
- availability of accurate and timely information on demand due to the fact that the manufacturing company has the opportunity to provide the ability to track the order status during delivery or in the process of solving problems;
- no damage during transportation is provided for producers to organize suitable type of packaging that reduces the amount of damage during transportation;
- effectiveness of communication and availability of information about orders depends on the capabilities of the logistics operator to perform data transfer to the producer in case of status updates product and its willingness to meet;
- resolving of complaints and bug fixes – producer is more interested in solving the conflict, as its share in this process is overwhelming.

CONCLUSION

In conclusion, it is worth saying that we confirmed our hypothesis that the assumption that the level of logistics services in the supply chain was lower than outsourced logistics services, if compare with the situation when the logistics services were provided by its own manufacturer. It may be related to the fact that in the first case, at the company, there is a higher level of control over the process and the capacity for flexible and rapid response to various demands of consumers, which is very important for competitiveness.

As for sub-hypothyroidism, they are all confirmed:

- an example of Sumy Engineering Works Ltd. showed that gradual reduction supplies its own benefit delivery outsourcer caused reduction of logistics services. It is confirmed by the calculated correlation coefficient (r) between the level of logistics services and the number of orders that were delivered by themselves ($r = 0.9686$) and the level of logistic service and the number of orders, which were delivered by logistics operator ($r = -0.9686$). Values of the coefficients are close to 1, indicating a high strength link between analyzed indicators.
- outsourcing of logistics services manufacturer completely loses its control over a group of indicators of staff competence, the average delivery time and availability minimum order size, because there is a high impact on these figures enterprises outsourcer;
- there is a high level of the control of the manufacturer of the following parameters: availability of additional services, maintenance unusual requests, availability of accurate and timely information about orders, absence damage during transportation, effectiveness of communications, addressing complaints and bug fixes.

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