



# Measurement of the Logistic Customer Service Level in Commercial Cargo Motor Transport Companies

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**Abstract**—The term of logistic customer service is defined as the abilities or skills to meet the customer's requirements and expectations, chiefly in terms of the time and place of deliveries, while using all available forms of logistic activity, including transport, storage, and the management of inventories, information and packages. As each of the logistic activities has an effect on the customer receiving right product or service, in its proper condition, in the correct time and space, and at reasonable costs, so seeking the proper service comes down to managing logistic activities in such a manner, as to achieve the essential level of customer satisfaction at the lowest possible costs.

The identified elements of logistic customer service in an organization are placed on a specific level, as assessed from the perspective of the purchasers' expectations. Among various methods for measuring customer service level, or quality, which are described in the literature on the subject, the SERVQUAL is recognized as one of the most effective. The SERVQUAL method relies on measuring the differences that exist between the quality, as perceived by a customer, and the quality demanded by that customer from a specific service. In order to determine the difference, both the customer's expectations for the service level, and their fulfilment by a specific organization need to be examined at the same time.

The elements of logistic customer service of the Silesian Province's (region in southern Poland) commercial cargo motor transport enterprises under study are placed on a measurable level, as evaluated from the perspective of the recipients of offered transport services. The measurement of the logistic customer service level, as found in the entities examined, was made using the SERVQUAL method. The survey questionnaire used in the study was constructed based on 22 logistic customer service determinants. Questionnaire forms were filled by 294 customers of 147 Silesian Province's commercial cargo motor transport enterprises examined, i.e. two customers of each enterprise.

The article presents theoretical basis for the measurement of the logistic customer service level by the SERVQUAL method, description of acquiring the research material, analysis of examination results and conclusions.

**Key words**— cargo motor transport company, level of logistic customer service, logistic customer service, SERVQUAL.

## I. INTRODUCTION

The notion of customer service in logistics [1], [2], [3] is one of the least clearly interpreted terms in the enterprise management theory; hence, when seeking its basic definition, many authors, including J. C. Anderson and J. A. Narus [4], F. J. Beier and K. Rutkowski [5], M. Christopher and H. Peck [6], S.E. Fawcett and M.B. Cooper [7], D. Kempny [8], H. Isermann [9], encounter a number of controversial ambiguities.

D. Kempny [10] formulates the term of logistic customer service as the abilities or skills to meet the customer's requirements and expectations, chiefly in terms of the time and place of deliveries, while using all available forms of logistic activity, including transport, storage, and the management of inventories, information and packages. The author refers the concept to the very purpose and objectives of logistics and logistic management, which are most briefly expressed the definition of "seven Rs". As each of the logistic activities has an effect on the customer receiving right product or service, in its proper condition, in the correct time and space, and at reasonable costs, so seeking the proper service comes down to managing logistic activities in such a manner, as to achieve the essential level of customer satisfaction at the lowest possible costs [5], [11], [12]. At the same time, this particular framework of analysis of the logistic service issues seems to be the most

appropriate from the perspective of the subject matter of this discussion [13]. The adopted mode of understanding the phenomenon allows further construction of the analytic scheme and formulation of the preliminary research methodology.

The identified elements of logistic customer service in an organization are placed on a specific level, as assessed from the perspective of the purchasers' expectations. The customer service level is defined by W. Szczepankiewicz [14] and W. Wilmanska-Sosnowska [15] as a „set of activities aimed at fulfilling the customers' expectations related to the physical availability of the product, the conditions and convenience of purchase and the customer's satisfaction from the contact with a specific distribution link". In the opinion of S. Abt and H. Wozniak [16], the service level as the aim of functioning of a logistic system applies as a „quality scale for goods distribution services rendered by an organization". A similar interpretation of this concept is postulated by J. Dlugosz [17] by defining the customer service level by the quality of the service.

Among various methods for measuring customer service level, or quality, which are described in the literature on the subject, the SERVQUAL is recognized as one of the most effective. This method was developed by A. Parasurman, V. A. Zeithaml and L. L. Berry [18], [19], [20] in the years 1983-1985, and applied for the first time in 1988, primarily in the examination of the quality of services.

The SERVQUAL method relies on measuring the differences that exist between the quality, as perceived by a customer, and the quality demanded by that customer from a specific service [21], [22], [23]. In order to determine the difference, both the customer's expectations for the service level, and their fulfilment by a specific organization need to be examined at the same time.

## II. ACQUIRING THE RESEARCH MATERIAL

The elements of logistic customer service of the Silesian Province's (region in southern Poland) commercial cargo motor transport enterprises under study are placed on a measurable level, as evaluated from the perspective of the recipients of offered transport services. The measurement of the logistic customer service level, as found in the entities examined, was made using the SERVQUAL method.

The SERVQUAL method measures the differences that exist between the quality as perceived by the customer and the quality expected by that customer from a given service. In order to determine the difference, both the customer's expectations regarding the level of a service, and the provision of that service for a specific organization need to be examined simultaneously [18], [19], [20].

The survey questionnaire used in the study was constructed based on 22 logistic customer service determinants. The questionnaire form was composed of two sections: the first section illustrated the expectations of service recipients toward the logistic service, while the second section included items intended for the scoring of services rendered by a given service provider. Using the seven-point Likert scale, customers were asked to assign weights to respective statements: 1 meant that the respondent totally disagreed with a given item, while 7 – that he or she totally agreed with it.

Questionnaire forms were filled by 294 customers of 147 Silesian Province's commercial cargo motor transport enterprises examined, i.e. two customers of each enterprise. Questionnaire forms were handed over directly to 38 respondents indicated as the customers of 19 enterprises, while with the remaining customers of 128 entities examined, telephone surveys were carried out.

In the majority of cases, questionnaire forms were delivered to respondents by traditional mail – 650 forms, 19 forms were handed over to respondents in person, while 330 forms were sent out by electronic mail. A very low return rate of filled questionnaire forms was obtained for the latter means of distribution: 34 entrepreneurs returned filled form by electronic mail, of which, upon preliminary screening, 7 forms were rejected due to the incompleteness or unreliability of provided information (the questionnaire form return rate at a level of 8.18%). By traditional mail, 136 forms were returned, of which, upon preliminary screening for the incompleteness or unreliability of provided information, 31 forms were rejected (the questionnaire form return rate at a level of 16.15 %). The highest return rate of filled questionnaire forms was obtained for their distribution effected personally: 17 entrepreneurs correctly filled their forms (the return rate at a level of 89.47 %). Altogether, of the 999 distributed questionnaire forms, 149 complete forms suitable for subsequent examination were received, which makes up a total questionnaire form return rate of 14.91%.

To establish the minimum test sample size,  $n$ , assuming that the general population has a size of  $N = 14\ 500$ , with the assumed significance level of  $\alpha = 5\%$ , the statistic value, as read out from the

normal distribution tables, of  $u_{\alpha} = 1.96$ , and the desired estimation accuracy of  $d = 10\% = 0.1$ , the following formula was used [24]:

$$n = \frac{u_{\alpha}^2 N}{u_{\alpha}^2 + 4(N - 1)d^2}, \quad (1)$$

where:

$n$  – minimum test sample size,

$N$  – general population size,

$d$  – estimation accuracy,

$\alpha$  – significance level,

$u_{\alpha}$  – statistic value, as read out from the normal distribution tables.

By making calculation using the above formula, the minimum test sample size was obtained, which, with the preset parameters, amounted to 95 test subjects. This results confirm that 147 correctly filled questionnaire forms makes the adequate representation of the population tested.

### III. ANALYSIS OF EXAMINATION RESULTS

The information obtained from the customers of the examined commercial cargo motor transport enterprises in the Silesian Province through the analysis of the first section of filled questionnaire forms has reflected the customers' expectations with respect to the elements of logistic service offered them. The data obtained from the customers through the analysis of the second section of filled questionnaire forms reflected the customers' experiences with respect to the elements of logistic service offered them by the business entities under examination.

After measuring the differences existing between the quality of individual elements of logistic service as perceived by the customers of the Silesian Province's commercial cargo motor transport enterprises examined, and the quality expected by the customers from the service, the obtained results were plotted in a diagram, as shown in Fig. 1. So, the diagram presented in Fig. 1 indicates the average level of all the 22 logistic customer service determinants, being the difference between the level of fulfilment of the customer expectations and the perception of a given service by the customers, as broken down into the levels of that service in micro-, small-size, medium size and large enterprises.

The interpretation of the obtained measurement results was based on the formulas [18], [19], [20]:

$OJU = PJU$  – the customer expectations are satisfied, and the quality is satisfactory;

$OJU < PJU$  – the customer expectations have been exceeded, and the quality is astonishing;

$OJU > PJU$  – the customer expectations have not been met, and the quality is unsatisfactory,

where:

$OJU$  – customer expectations towards logistic service,

$PJU$  – perception of logistic service by the customer.

According to the formula shown above, large business entities' customers described their expectations as met regarding 7 logistic service attributes, namely: the short time of responding to inquiries, the availability and comprehensiveness of services, proper terminal protection, the scope of equipment and informatization of infrastructure, and the credibility of logistic advisory. The customer expectations regarding the offered logistic service level were exceeded in 5 categories: the infrastructure and the fleet meeting the environmental requirements, fleet age, service monitoring and round-the-clock service. The remaining 10 customer logistic service elements did not meet the customers' expectations, of which the lowest level was exhibited by: the completeness of services and the promptness of their provision.

The expectations of medium-size enterprises' customers towards logistic service coincided with the perception of the service in 5 its elements, i.e. the availability of services, proper terminal protection, the scope of infrastructural equipment, the fleet meeting the environmental requirements and the credibility of logistic advisory. The logistic service level desired by medium-size enterprises' customers was slightly exceeded in 4 its attributes: the location of infrastructure, service

monitoring, round-the-clock service, and the competencies and experience of logistic advisory. The remaining 13 customer logistic service elements did not meet the customers' expectations, of which the lowest level was exhibited by: the technological advancement of the fleet, the promptness of service provision and the completeness of services.

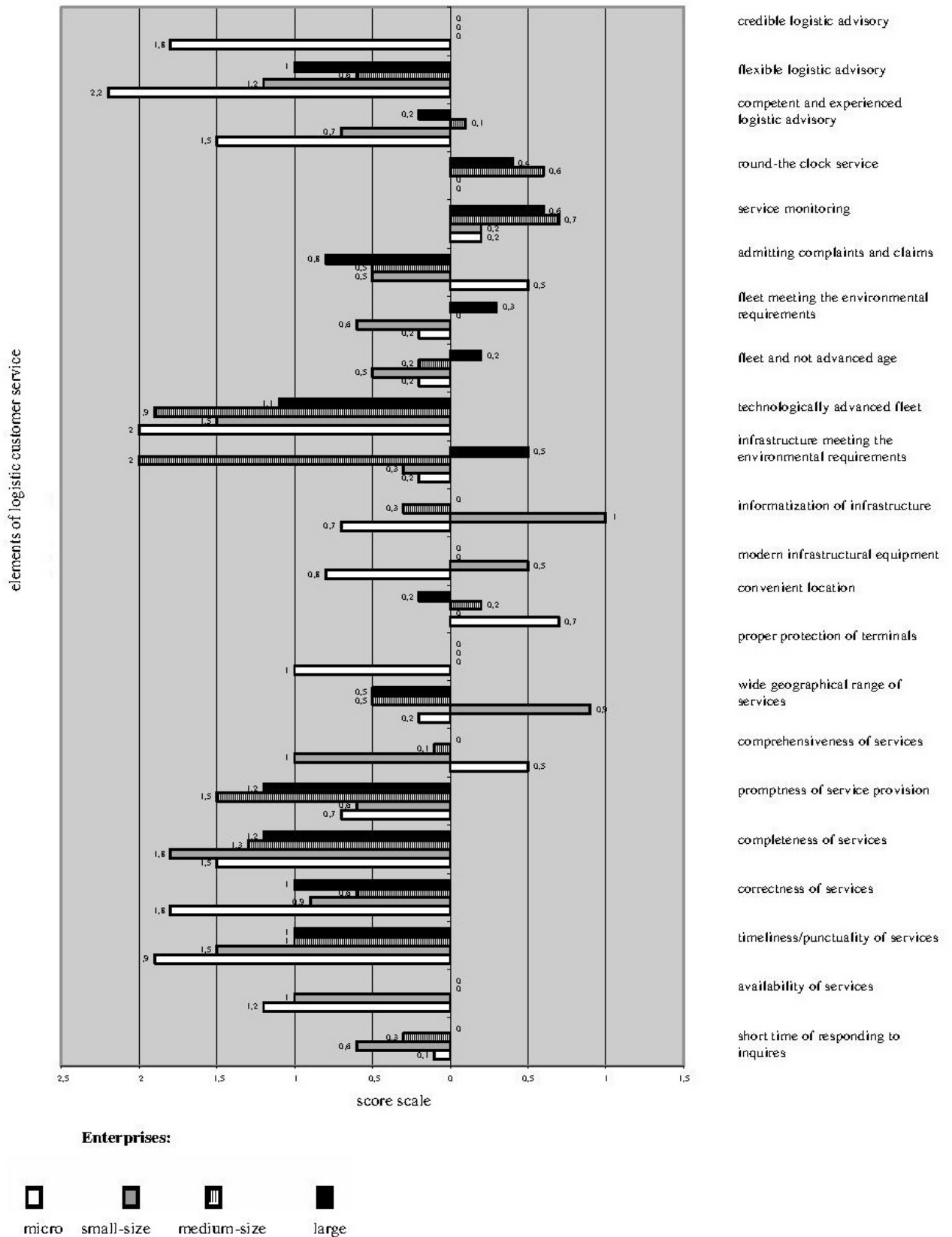


Figure 1: Level of the elements of the logistic customer service of the Silesian Province commercial cargo motor transport enterprises'.

A similar to the above customer logistic service level was shown by small-size enterprises. The customers of small-size enterprises recognized their expectations as met regarding 4 logistic service attributes, namely: proper terminal protection, the location of infrastructure, round-the-clock service, and the credibility of logistic advisory. The customer expectations regarding the offered logistic service level were exceeded in 3 categories: the geographic range of services, the scope of infrastructural equipment, and service monitoring. As many as 15 customer logistic service elements did not fulfilled their expectations, of which the flexibility of logistic advisory and the quality of offered services, mainly their completeness, timeliness/punctuality, availability and correctness, were assessed poorest.

The lowest customer service level in the transport enterprise sample examined was represented by micro-entities. Only 1 logistic service element showed satisfactory quality, that is met the customer expectations – that was round-the-clock service offered by the micro-entities. The logistic service level desired by medium-size enterprises' customers was slightly exceeded in 4 its attributes: the comprehensiveness of services, the location of infrastructure, the admittance of complaints and claims and service monitoring. The most customer logistic service elements, i.e. as many as 17, did not meet the service recipients' expectations, of which the lowest level was exhibited by: the flexibility and credibility of logistic advisory and the quality of services, chiefly their timeliness/punctuality, correctness and completeness.

To sum up, the shaped levels of logistic customer service offered by the transport enterprises examined did not fulfil the expectations of the service recipients, showing in total the following negative numerical values: the level of logistic customer service of micro-entities was  $-0.73$  points; the level of logistic customer service of small-size entities was  $-0.46$  points; the level of logistic customer service of medium-size entities was  $-0.42$  points; and level of logistic customer service of large entities was  $-0.28$  points. The determined levels of logistic service of Silesian Province commercial cargo motor transport enterprises' customers, by entity size, are presented in Fig. 2.

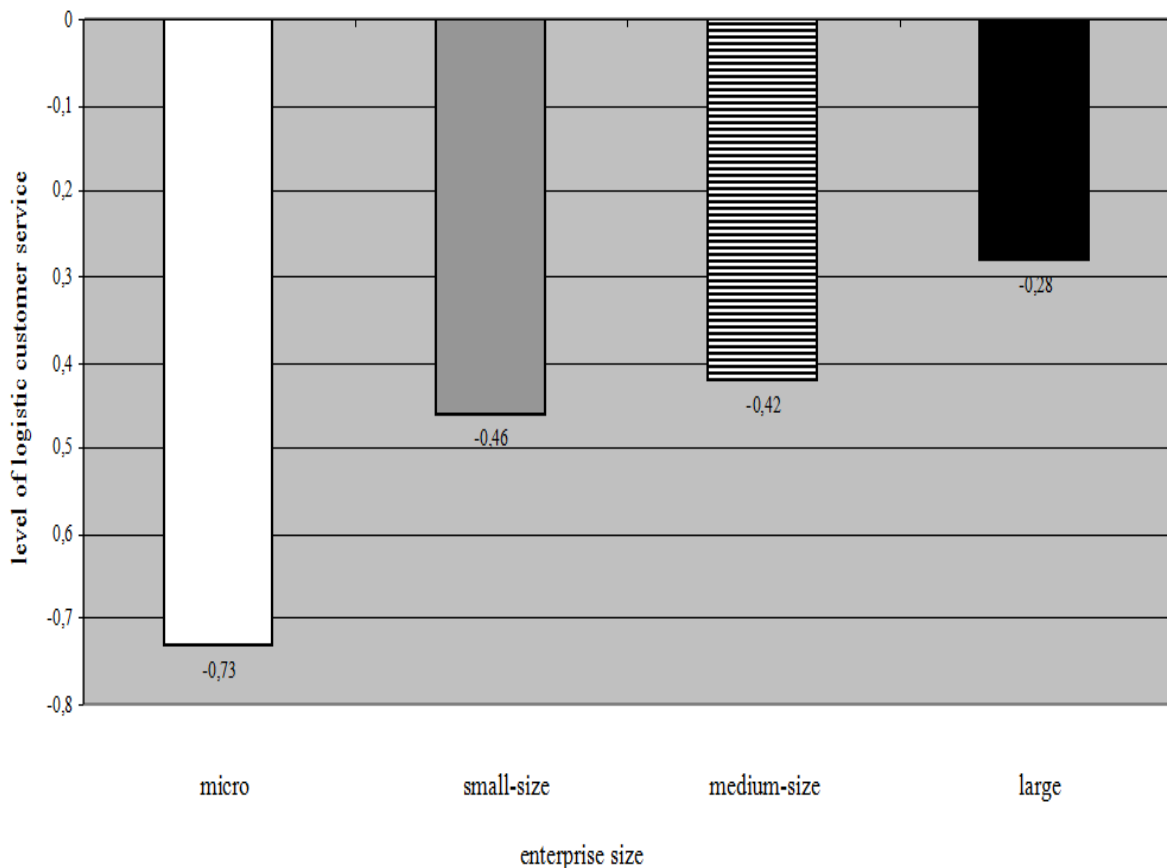


Figure 2: Level of the logistic customer service of the Silesian Province commercial cargo motor transport enterprises', by enterprise size.

The diagram illustrated in Fig. 2 shows that the highest quality of logistic customer service is offered by the largest enterprises, while the lowest quality – by micro-entities. The medium level of logistic service offered to transport enterprises' service recipients is represented by both small-size and medium-size enterprises, which meet their customers' expectations to a similar degree.

The above quantitative analysis indicates that the gap between the customer expectations regarding logistic service and the perception of this service, as offered by the Silesian Province's commercial cargo motor transport enterprises under examination, is at a level of about  $-0.47$ , which makes a general SERVQUAL result for the subjects under examination. The obtained logistic customer service level value shows that the customer expectations regarding this level have not been fulfilled.

#### IV. CONCLUSIONS

The negative value of the total logistic service of the examined transport enterprises' customers is made up of the predominant number of the service elements that have not met the service recipients' expectations. Of all the 22 attributes of transport enterprise customer logistic service, as many as 18 did not fulfill the customer expectations. The poorest rating, i.e.  $-1.62$  points, was given by service recipients to the technological advancement of the fleet. Not much higher customer ratings were obtained by: the comprehensiveness of services:  $-1.45$  points, the flexibility of logistic advisory:  $-1.25$  points, and the correctness of services:  $-1.07$  points. The remaining logistic service elements, which were negatively assessed by service recipients, were placed at a level not lower than  $-1$  point. Leaving logistic service at a too low level may result in a loss of customers. All service efforts of the examined transport enterprises should, therefore, be aimed at enhancing the service level desired by the customers within 18 crucial elements, while striving for maintaining the lowest possible logistic costs of the service. So, when building the optimal service level, consideration should be given both to the interrelations between the logistic costs and the logistic service level, and the effect of a higher service level on the sales volume and the proceeds of the enterprise.

Of the 22 attributes of transport enterprise customer logistic service, the customer-desired logistic service level was slightly exceeded in 3 service attributes: service monitoring, assessed at 0.42 points; round-the-clock service, assessed at 0.25 points; and the location of infrastructure, assessed at 0.17 points. The too high quality of the above logistic customer service elements is justified up to the level defined by the point of intersection of the curves for the sales increment and the costs of achieving the high service level determining the sales. Establishing logistic service at a very high level may lead to a dramatic increase in costs; therefore, maintaining the level of the 3 above-mentioned attributes of transport enterprise customer logistic service should be thoroughly considered by the Management of the entities concerned.

The most advantageous for both entrepreneurs and customers appears to remain the position of the informatization of infrastructure, being assessed by customers at a level of 0. This means that the expectations of customers in this regard coincided with their experiences, so the quality of this element is satisfactory.

At the same time, worthy of quoting are the responses of the representatives of the examined Silesian Province cargo motor transport enterprises to the question about the use of the SERVQUAL method in carrying out measurements of the logistic service level with participation of the polled entities' customers. The surveys of the logistic service level among the customers using the SERVQUAL method were regularly conducted only in 2 enterprises (1.35%) and, occasionally, also in 2 business entities (1.35%). As many as 143 enterprises (97.3%) never used the indicated method.

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