

UDC:

Received:

Accepted:

Corresponding author:

656:519.25

Original scientific paper

September 15, 2022

January 27, 2023

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## STATISTICAL ANALYSIS OF THE SURVEY “DEVELOPMENT OF SUSTAINABLE TRANSPORTATION AND LOGISTICS SERVICE SYSTEMS BASED ON SUPPLY CHAIN”

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**Abstract:** *Almost all theoretical and practical achievements in the field of economic science, as well as the development of information technology and management, nowadays direct the efforts of market participants to achieve the best possible business results.*

*In general, these efforts are in line with the development tendencies of modern economic thought and adequate forms of business that strive for greater profit.*

*For highly sophisticated economic systems, it is important to implement the objectively best and proven, in theory and practice, high-quality business processes. In addition, a well-designed and thought-out management is necessary, an approach that is a prerequisite for conducting a consistent economic policy, which creates the conditions for economical and profitable use of all factors of production and services.*

*Modern management functions on the assumption that an economically sustainable environment, in which market participants operate, does not disturb the comprehensive*

*transformation of business and enables the application of more modern technologies, as well as the use of adequate economic models and methods. Such an economic environment should create a business climate that stimulates the use of technical-technological and business advantages, as well as good positioning on the market.*

*Surveying customers, suppliers, experts or consultants is a good tool for checking the adequacy of the company's strategy and, as a feedback loop, provides the company's management with information that it can use as a corrective to set business goals.*

*The results of the statistical analysis in this scientific paper regarding the development of sustainable transport and logistics service systems represent support for the scientific team that is preparing a monograph in this area of the field, and also an instrument for evaluating the hypotheses.*

**Key words:** *survey, statistical analysis, buyers, suppliers, expected mean value standard deviation, transport and logistics systems, satisfaction customers, management, hypothesis.*

## INTRODUCTION

Empirical research has proven that the survey method is a good tool for providing quality data that is interesting for adopting guidelines regarding the development of the company, as well as improving mutual connections between market participants, which encourage their functionality and thus profitability.

In the specific case, the subject survey by measuring user satisfaction can also be used as a tool for comparing performance at different levels and for different types of organizations, products and services. In this sense, conducting surveys with common or standard questions and methods in different organizations can also enable development-oriented organizations to compare themselves, in order to adjust actions and improve their performance.

The conducted survey and the results resulting from it, in addition to the above, aim to enable the valorization or rejection of the hypotheses that were used in the scientific research project on the topic in question.

Detecting and determining the average expected marks in the survey by the surveyed persons, as well as the deviation (standard deviation) from that average, will determine the degree of their satisfaction, which they show during the introduction and implementation of development trends in business systems and which bring with them positive business economic effects as and quality in business (Šegrt S., "Poslovna statistika", 2021).

The real positive effects of development can be seen precisely at the level of performance of transformed and modernized business systems (especially with sophisticated digitized systems of the category of transport and logistics systems), which open up the possibility of creating greater utility for both the supplier and the user of goods and services.

Taking into account the above, I believe that the results of the conducted survey will serve the purpose, and that the assessment given by the respondents will in any case

serve as an important element during research related to the overview of key aspects and indicators based on the trends of “Development of sustainable transport and logistics service systems at the level of supply chains”. At the same time, it can serve the wider academic community as well as all interested individuals dealing with logistics and transport-logistics systems.

## 1. GENERAL FACTS ABOUT THE CONDUCTED SURVEY

The survey that was conducted in the period from 21.05. until 25.06. In 2022, in order to evaluate the factors and look at the key aspects and indicators based on the trends “Development of sustainable transport and logistics service systems at the level of supply chains”, it was carried out according to the principle of a random sample with 29 respondents. Each of the respondents was asked 24 questions.

Out of a total of 29 persons surveyed, 6 persons were from the category of service providers, while 23 respondents were from the category of clients-customers.

The questions were asked through the Survey-Questionnaire form (Table number 1.).  
(Table number 1.)

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### SURVEY-QUESTIONNAIRE

regarding the overview of key aspects and indicators based on trends  
“Developments of sustainable transport and logistics service systems at the level  
of supply chains”

**ANSWERS ARE PROVIDED BY BOTH BUYERS AND SERVICE PROVIDERS**  
(answers should be circled, written or checked in boxes: grade 1-lowest and 5-highest)

A row. Number	Questions-activities	Answers
1.	The transport and logistics development strategy is based on market demand forecasts	1□ 2□ 3□ 4□ 5□
2.	The strategy of development of transport and logistics is based on technical and technological trends	1□ 2□ 3□ 4□ 5□
3.	Information about offers is essential for the business success of the supplier of transport and logistics services	1□ 2□ 3□ 4□ 5□
4.	The development of the transportation of goods depends on the development trends of the supply chains	1□ 2□ 3□ 4□ 5□
5.	The development of passenger traffic depends on the trends in the development of transport and logistics systems	1□ 2□ 3□ 4□ 5□
6.	The performance of transport and logistics systems has a dominant influence on the client/customer (for selection).	1□ 2□ 3□ 4□ 5□
7.	As a rule, customers choose transport and logistics systems that provide integrated services	1□ 2□ 3□ 4□ 5□

8.	As a rule, the organization of transport and logistics systems should be set at the network level	1□ 2□ 3□ 4□ 5□
9.	Infrastructure is important for the success of transport and logistics service systems	1□ 2□ 3□ 4□ 5□
10.	Green logistics implies the co-location of distribution centers in accordance with aggregate needs	1□ 2□ 3□ 4□ 5□
11.	Reversible logistics represents a significant market need for waste disposal and recycling	1□ 2□ 3□ 4□ 5□
12.	The digitized part of the e-supply system should be harmonized with the analog part (basic transport of passengers and goods)	1□ 2□ 3□ 4□ 5□
13.	Special attention is paid to the "last mile" of delivering goods to the final customer-consumer	1□ 2□ 3□ 4□ 5□
14.	Intermodal transport has an advantage over transport of the same type in the supply of cargo	1□ 2□ 3□ 4□ 5□
15.	Intermodal transport has no priority in passenger traffic (yes, bimodal: passenger vehicle-plane)	1□ 2□ 3□ 4□ 5□
16.	Improving the system of insurance against the risk of transport and travel can be crucial for the choice of arrangements	1□ 2□ 3□ 4□ 5□
17.	Forecasts of service needs are based on the performance of transport and logistics companies	1□ 2□ 3□ 4□ 5□
18.	Service quality is crucial for trust and repeat choice of the same transport and supply service provider	1□ 2□ 3□ 4□ 5□
19.	Reliable insurance of the service company and the specific arrangement provides guarantees for the performance of the service	1□ 2□ 3□ 4□ 5□
20.	Marketing strategy plays the most important role in the promotion and contracting of tran.-log. service arrangements	1□ 2□ 3□ 4□ 5□
21.	The functionality of transport and logistics organizations is primarily reflected in the efficient provision of services	1□ 2□ 3□ 4□ 5□
22.	Clients/customers participate in improving existing or creating new services	1□ 2□ 3□ 4□ 5□
23.	Customer satisfaction, their affection and loyalty are indicators of value creation for both the customer and the contractor	1□ 2□ 3□ 4□ 5□
24.	The field of supply, transport and logistics is well covered by regularly applied standards	1□ 2□ 3□ 4□ 5□

**Information about the respondent (required to answer):**

**It is desirable to answer:**

The answer was given by (circle one answer):

Position in the company.....

1. Client-buyer

Company, institution, etc.....

2. Service provider Title.....

Place and date:.....

Gender.....

Age.....

## **Survey analysis**

The orderer of the survey defined the request to check the validity of the set hypotheses, ie. to confirm or reject them in accordance with the results of the survey, and to determine the average rating given by the respondents, as well as the deviation of individual ratings from their overall average (expected) rating.

Those who commissioned the survey set the following hypotheses:

### **Main hypotheses:**

GH1: The development of integrated supply systems has a dominant influence on the development of transport, logistics and service processes.

GH2: The development of integrated supply systems significantly affects the development of the organization of service transport and logistics networks.

Note: It is not logical for something to be developed without a vision of implementation, hence the hypothesis: "Technical-technological trends contribute to the development of transport-logistics systems and supply chains" does not stand because this is immanent in all branches of the economy (science and professions, at the level of theory and practice) and does not need to be proven separately.

### **Auxiliary hypotheses:**

H1: Trends in technical and technological development contribute to the development of transport and logistics service systems and supply chains.

H2: Client/customer requirements are of key importance for the development of transport-logistics service systems and supply chains.

H3: The general development of integrated supply systems does not have a dominant importance for the development of specialized (or dedicated) transport-logistics models.

### **More detailed (individual) results of statistical research from the Survey-Questionnaire**

Statistical analysis was done for each individual question, and at the end, a general (summary) assessment of the results of the survey was given, as well as an assessment of the proposed hypotheses (Šegrt S., "Kvantitativne metode i ekonomski modeli", 2021).

Within the Survey-Questionnaire (Attachment No. 1), the answers to the questions are given according to the scale of the offered answers, Table No. 2 (this table will not be repeated in the continuation of the presentation of the results, it is typical and applies to

every question and will be shown only through the first question ), while the results of the statistical analysis will be performed according to the parameters and data given in table number 3, which will be displayed in the same form but with different data for each question because the numbers of respondents and their answers are different.

Question number \_\_\_\_ (Ordinal number of questions from the Survey)

Table number 2: A scale with offered answers

1	Theoretically it is not sustainable
2	Practically it doesn't matter
3	It is not important or irrelevant
4	Important
5	Very important

Table number 3: Relevant data (based on survey-related questions) for analysis

$x_i$	$f_i$	$x^2$	$xf_i$	$f_ix^2$	Cumulative below	Cumulative above
1						
2						
3						
4						
5						
$\Sigma$	$\Sigma$	$\Sigma$	$\Sigma$	$\Sigma$		

Always the essay answers to the survey question will be converted to numerical values and then calculated:

The mean expected value of the parameters (answers to the question):

$$\bar{x} = \frac{\sum x_i f_i}{n}$$

$$\sigma^2 = \frac{\sum f_i x_i^2 - \frac{(\sum f_i x_i)^2}{N}}{N}$$

- Variance:

- Standard deviation:  $\sigma$

Other statistical indicators were calculated using standard functions in Excel.

Conclusion: will be given for each analyzed answer, with a clear comment and position of the researcher.

### Analysis of survey results:

**Question number 1:** The transport and logistics development strategy is based on market demand forecasts

If we convert the essay answers to the survey question into numerical values, we get the following:

1	Theoretically it is not sustainable					
2	Practically it doesn't matter					
3	It is not important or irrelevant					
4	Important					
5	Very important					
$x_i$	$f_i$	$x^2$	$x_i f_i$	$f_i x_i^2$	Cumulative below	Cumulative above
1	0	1	0	0	0	29
2	0	4	0	0	0	29
3	7	9	21	63	7	29
4	11	16	44	176	18	22
5	11	25	55	275	29	11
$\Sigma$	29	55	120	514		

The mean expected value of the parameter rating (answer to the question) in this case is:

$$\bar{x} = \frac{\sum x_i f_i}{n} = \frac{120}{29} = 4,14$$

While the variance:

$$\sigma^2 = \frac{\sum f_i x_i^2 - \frac{(\sum f_i x_i)^2}{N}}{N} = \frac{514 - \frac{(120)^2}{29}}{29} = \frac{514 - 496,5}{29} = \frac{17,5}{29} = 0,6$$

And Standard deviation  $\sigma = \sqrt{0,6} = 0,78$

Conclusion: Out of a total of 29 respondents, 22 of them or 75.8% answered that the strategy of development of transport and logistics based on forecasts of market demands is important or very important.

The average value of the individual answers is 4.14, which means that the majority of respondents answered that it is important or very important that the strategy of development of transport and logistics is based on forecasts of market demands, with the average deviation of each individual answer from the overall average score for this question (standard deviation) in the amount of 0.78 (Šegrt S., "Kvantitativne metode i ekonomski modeli", 2021).

**Question number 2:** The strategy of development of transport and logistics is based on technical and technological trends

If we convert the essay answers to the survey question into numerical values, we get the following:

$x_i$	$f_i$	$x^2$	$x_i f_i$	$f_i x_i^2$	Cumulative below	Cumulative above
1	0	1	0	0	0	29
2	0	4	0	0	0	29
3	3	9	9	27	3	29
4	14	16	56	224	17	26
5	12	25	60	300	29	12
$\Sigma$	29	55	125	551		

The mean expected value of the parameter rating (answer to the question) in this case is:

$$\bar{x} = \frac{\sum x_i f_i}{n} = \frac{125}{29} = 4,31$$

While the variance:

$$\sigma^2 = \frac{\sum f_i x_i^2 - \frac{(\sum f_i x_i)^2}{N}}{N} = \frac{551 - \frac{(125)^2}{29}}{29} = \frac{551 - 538,7}{29} = \frac{12,3}{29} = 0,42$$

and Standard deviation  $\sigma = \sqrt{0,42} = 0,65$

Conclusion: Out of a total of 29 respondents, 26 of them or 89.6% answered that a transport and logistics development strategy based on technical-technological trends is important or very important.

The average value of the individual answers is 4.31, which means that the majority of respondents answered that the strategy of development of transport and logistics based on technical-technological trends is important or very important, with the average deviation of each individual answer from the overall average score for this question (*standard deviation*) in the amount of 0.65.

**Question number 3:** Information about the offers is important for the business success of the transport logistics service provider

If we convert the essay answers to the survey question into numerical values, we get the following:



$x_i$	$f_i$	$x^2$	$x_i f_i$	$f_i x_i^2$	Cumulative below	Cumulative above
1	0	1	0	0	0	29
2	1	4	2	4	1	29
3	4	9	12	36	5	28
4	13	16	52	208	18	24
5	11	25	55	275	29	11
$\Sigma$	29	55	121	523		

The mean expected value of the parameter rating (answer to the question) in this case is:

$$\bar{x} = \frac{\sum x_i f_i}{n} = \frac{121}{29} = 4,17$$

While the variance:

$$\sigma^2 = \frac{\sum f_i x_i^2 - \frac{(\sum f_i x_i)^2}{N}}{N} = \frac{523 - \frac{(121)^2}{29}}{29} = \frac{523 - 504,8}{29} = \frac{16,5}{29} = 0,569$$

and Standard deviation  $\sigma = \sqrt{0,569} = 0,754$

Conclusion: Out of a total of 29 respondents, 24 of them or 82.7% answered that information about offers is important or very important for the business success of the supplier of transport and logistics services.

The average value of individual answers is 4.17, while the average deviation of each individual answer from the overall average score for this question (standard deviation) is 0.754

**Question number 4:** The development of the transportation of goods depends on the development trends of the supply chains

If we convert the essay answers to the survey question into numerical values, we get the following:

$x_i$	$f_i$	$x^2$	$x_i f_i$	$f_i x_i^2$	Cumulative below	Cumulative above
1	1	1	1	1	1	29
2	0	4	0	0	1	28
3	6	9	18	54	7	28
4	13	16	52	208	20	22
5	9	25	45	225	29	9
$\Sigma$	29	55	116	488		

The mean expected value of the parameter rating (answer to the question) in this case is:

$$\bar{x} = \frac{\sum x_i f_i}{n} = \frac{116}{29} = 4$$

While the variance:

$$\sigma^2 = \frac{\sum f_i x_i^2 - \frac{(\sum f_i x_i)^2}{N}}{N} = \frac{488 - \frac{(116)^2}{29}}{29} = \frac{488 - 464}{29} = \frac{24}{29} = 0,83$$

and Standard deviation  $\sigma = \sqrt{0,83} = 0,91$

Conclusion: Out of a total of 29 respondents, 22 of them or 75.9% answered positively that the development of goods transport depends on the development trends of supply chains.

The average value of the individual answers is 4.00, which means that the majority of respondents answered that the fact stated in the question is important or very important, with the average deviation of each individual answer from the overall average score for this question (standard deviation) in the amount of 0.91 .

**Question number 5:** The development of passenger traffic depends on the trends in the development of transport and logistics systems

If we convert the essay answers to the survey question into numerical values, we get the following:

$x_i$	$f_i$	$x^2$	$x_i f_i$	$f_i x_i^2$	Cumulative below	Cumulative above
1	1	1	1	1	1	29
2	1	4	2	4	2	28
3	10	9	30	90	12	27
4	11	16	44	176	23	17
5	6	25	30	150	29	6
$\Sigma$	29	55	107	421		

The mean expected value of the parameter rating (answer to the question) in this case is:

$$\bar{x} = \frac{\sum x_i f_i}{n} = \frac{107}{29} = 3,69$$

While the variance:

$$\sigma^2 = \frac{\sum f_i x_i^2 - \frac{(\sum f_i x_i)^2}{N}}{N} = \frac{421 - \frac{(107)^2}{29}}{29} = \frac{421 - 394,8}{29} = \frac{26,2}{29} = 0,9$$

and Standard deviation  $\sigma = \sqrt{0,9} = 0,95$

Conclusion: Out of a total of 29 respondents, 18 or 62% stated that it is important or very important that the development of passenger traffic depends on the trends in the development of transport and logistics systems.

The average value of the individual answers is 3.69, with the average deviation of each individual answer from the overall average score for this question (standard deviation) in the amount of 0.95.

Question number 6: The performance of transport and logistics systems has a dominant influence on the client/customer (for selection).

If we convert the essay answers to the survey question into numerical values, we get the following:

$x_i$	$f_i$	$x^2$	$x_i f_i$	$f_i x_i^2$	Cumulative below	Cumulative above
1	0	1	0	0	0	29
2	1	4	2	4	1	29
3	11	9	33	99	12	28
4	11	16	44	176	23	17
5	6	25	30	150	29	6
$\Sigma$	29	55	109	429		

The mean expected value of the parameter rating (answer to the question) in this case is:

$$\bar{x} = \frac{\Sigma x_i f_i}{n} = \frac{109}{29} = 3,76$$

While the variance:

$$\sigma^2 = \frac{\Sigma f_i x_i^2 - \frac{(\Sigma f_i x_i)^2}{N}}{N} = \frac{429 - \frac{(109)^2}{29}}{29} = \frac{429 - 409,7}{29} = \frac{19,3}{29} = 0,665$$

and Standard deviation  $\sigma = \sqrt{0,665} = 0,815$

Conclusion: Out of a total of 29 respondents, 17 of them or 58.6% answered that the Dominant influence on the client/customer (for selection) has the performance of transport and logistics systems is an important or very important fact.

The average value of the individual answers is 3.76, with the average deviation of each individual answer from the overall average score for this question (standard deviation) in the amount of 0.815.

**Question number 7:** As a rule, customers choose transport and logistics systems that provide integrated services

If we convert the essay answers to the survey question into numerical values, we get the following:

$x_i$	$f_i$	$x^2$	$x_i f_i$	$f_i x_i^2$	Cumulative below	Cumulative above
1	0	1	0	0	0	29
2	2	4	4	8	2	29
3	6	9	18	54	8	27
4	13	16	52	208	21	21
5	8	25	40	200	29	8
$\Sigma$	29	55	114	470		

The mean expected value of the parameter rating (answer to the question) in this case is:

$$\bar{x} = \frac{\Sigma x_i f_i}{n} = \frac{114}{29} = 3,93$$

While the variance:

$$\sigma^2 = \frac{\Sigma f_i x_i^2 - \frac{(\Sigma f_i x_i)^2}{N}}{N} = \frac{470 - \frac{(114)^2}{29}}{29} = \frac{470 - 448,1}{29} = \frac{21,9}{29} = 0,755$$

and Standard deviation  $\sigma = \sqrt{0,755} = 0,869$

Conclusion: Out of a total of 29 respondents, 25 of them or 86.2% answered that it is important or very important and true that customers usually choose transport and logistics systems that provide integrated services, with the average deviation of each individual answer from the overall average rating for this question (standard deviation) in the amount of 0.869.

**Question number 8.** As a rule, the organization of transport and logistics systems should be set at the network level

If we convert the essay answers to the survey question into numerical values, we get the following:

$x_i$	$f_i$	$x^2$	$x_i f_i$	$f_i x_i^2$	Cumulative below	Cumulative above
1	0	1	0	0	0	27
2	0	4	0	0	0	27
3	7	9	21	63	7	27
4	9	16	36	144	16	20
5	11	25	55	275	27	11
$\Sigma$	27	55	112	482		

The mean expected value of the parameter rating (answer to the question) in this case is:

$$\bar{x} = \frac{\sum x_i f_i}{n} = \frac{112}{27} = 4,15$$

While the variance:

$$\sigma^2 = \frac{\sum f_i x_i^2 - \frac{(\sum f_i x_i)^2}{N}}{N} = \frac{482 - \frac{(112)^2}{27}}{27} = \frac{482 - 464,6}{27} = \frac{17,4}{27} = 0,64$$

and Standard deviation  $\sigma = \sqrt{0,64} = 0,8$

Conclusion: Out of a total of 27 respondents, 20 or 74% answered that it is an important or very important fact that the Organization of Transport and Logistics Systems should, as a rule, be set up at the network level.

The average value of the individual answers is 4.15, which means that the majority of respondents gave a positive opinion on the question, with the average deviation of each individual answer from the overall average score for this question (standard deviation) in the amount of 0.8.

**Question number 9:** Infrastructure is important for the success of transport and logistics service systems

If we convert the essay answers to the survey question into numerical values, we get the following:

$x_i$	$f_i$	$x^2$	$x_i f_i$	$f_i x_i^2$	Cumulative below	Cumulative above
1	0	1	0	0	0	28
2	0	4	0	0	0	28
3	4	9	12	36	4	28
4	9	16	36	144	13	24
5	15	25	75	375	28	15
$\Sigma$	28	55	123	555		

The mean expected value of the parameter rating (answer to the question) in this case is:

$$\bar{x} = \frac{\sum x_i f_i}{n} = \frac{123}{28} = 4,39$$

While the variance:

$$\sigma^2 = \frac{\sum f_i x_i^2 - \frac{(\sum f_i x_i)^2}{N}}{N} = \frac{555 - \frac{(124)^2}{28}}{28} = \frac{555 - 540,3}{28} = \frac{14,7}{28} = 0,525$$

and Standard deviation  $\sigma = \sqrt{0,525} = 0,725$

Conclusion: Out of a total of 28 respondents, 24 or 82.7% answered that infrastructure is important for the success of transport and logistics service systems.

The average value of the individual answers is 4.27, which means that the majority of respondents answered that the fact stated in the question is important or very important, with the average deviation of each individual answer from the overall average score for this question (standard deviation) in the amount of 0.725.

**Question number 10:** Green logistics implies the co-location of distribution centers in accordance with aggregate needs

If we convert the essay answers to the survey question into numerical values, we get the following:

$x_i$	$f_i$	$x^2$	$x_i f_i$	$f_i x_i^2$	Cumulative below	Cumulative above
1	0	1	0	0	0	29
2	2	4	4	8	2	29
3	9	9	27	81	11	27
4	12	16	48	192	23	18
5	6	25	30	150	29	6
$\Sigma$	29	55	109	431		

The mean expected value of the parameter rating (answer to the question) in this case is:

$$\bar{x} = \frac{\sum x_i f_i}{n} = \frac{109}{29} = 3,76$$

While the variance:

$$\sigma^2 = \frac{\sum f_i x_i^2 - \frac{(\sum f_i x_i)^2}{N}}{N} = \frac{431 - \frac{(109)^2}{29}}{29} = \frac{431 - 409,7}{29} = \frac{21,3}{29} = 0,734$$

and Standard deviation  $\sigma = \sqrt{0,734} = 0,857$

Conclusion: Out of a total of 29 respondents, 18 of them or 62% answered affirmatively that green logistics implies the co-location of distribution centers in accordance with aggregate needs.

The average value of the individual answers is 3.76, which means that the majority of respondents answered that the fact stated in the question is important or very important, with the average deviation of each individual answer from the overall average score for this question (standard deviation) amounting to 0.857.

**Question number 11:** Reversible logistics represents a distinct need for the disposal market waste and recycling

If we convert the essay answers to the survey question into numerical values, we get the following:

$x_i$	$f_i$	$x^2$	$x_i f_i$	$f_i x_i^2$	Cumulative below	Cumulative above
1	0	1	0	0	0	28
2	0	4	0	0	0	28
3	10	9	30	90	10	28
4	11	16	44	176	21	18
5	7	25	35	175	28	7
$\Sigma$	28	55	109	441		

The mean expected value of the parameter rating (answer to the question) in this case is:

$$\bar{x} = \frac{\sum x_i f_i}{n} = \frac{109}{28} = 3,89$$

While the variance:

$$\sigma^2 = \frac{\sum f_i x_i^2 - \frac{(\sum f_i x_i)^2}{N}}{N} = \frac{441 - \frac{(109)^2}{28}}{28} = \frac{441 - 424,3}{28} = \frac{16,7}{28} = 0,596$$

and Standard deviation  $\sigma = \sqrt{0,596} = 0,772$

Conclusion: Out of a total of 28 respondents, 18 of them or 62% positively assessed the question that Reversible Logistics represents a pronounced need for the market related to waste disposal and recycling.

The average value of the individual responses is 3.89, which means that the majority of respondents answered that it is important or very important that Reversible Logistics represents a strong need for the market related to waste disposal and recycling, with the

average deviation of each individual response from the overall average score for this question (standard deviation) in the amount of 0.772.

**Question number 12:** The digitized part of the e-supply system should be harmonized with the analog part (basic transport of passengers and goods)

If we convert the essay answers to the survey question into numerical values, we get the following:

$x_i$	$f_i$	$x^2$	$x_i f_i$	$f_i x_i^2$	Cumulative below	Cumulative above
1	0	1	0	0	0	28
2	0	4	0	0	0	28
3	5	9	15	45	5	28
4	15	16	60	240	20	23
5	8	25	40	200	28	8
$\Sigma$	28	55	115	485		

The mean expected value of the parameter rating (answer to the question) in this case is:

$$\bar{x} = \frac{\sum x_i f_i}{n} = \frac{115}{28} = 4,1$$

While the variance:

$$\sigma^2 = \frac{\sum f_i x_i^2 - \frac{(\sum f_i x_i)^2}{N}}{N} = \frac{485 - \frac{(115)^2}{28}}{28} = \frac{485 - 472,3}{28} = \frac{12,7}{28} = 0,454$$

and Standard deviation  $\sigma = \sqrt{0,454} = 0,673$

Conclusion: Out of a total of 28 respondents, 23 or 79.3% answered affirmatively that the digitized part of the e-supply system should be harmonized with the analog one (basic transport of passengers and goods).

The average value of the individual answers is 4.1, which means that the majority of respondents answered that the fact stated in this question is important or very important, with the average deviation of each individual answer from the overall average score (standard deviation) amounting to 0.673.

**Question number 13:** Special attention is paid to the “last mile” of goods delivery to the final customer-consumer



If we convert the essay answers to the survey question into numerical values, we get the following:

$x_i$	$f_i$	$x^2$	$x_i f_i$	$f_i x_i^2$	Cumulative below	Cumulative above
1	0	1	0	0	0	28
2	3	4	6	12	3	28
3	4	9	12	36	7	25
4	14	16	56	224	21	21
5	7	25	35	175	28	7
$\Sigma$	28	55	109	447		

The mean expected value of the parameter rating (answer to the question) in this case is:

$$\bar{x} = \frac{\sum x_i f_i}{n} = \frac{109}{28} = 3,89$$

While the variance:

$$\sigma^2 = \frac{\sum f_i x_i^2 - \frac{(\sum f_i x_i)^2}{N}}{N} = \frac{447 - \frac{(109)^2}{28}}{28} = \frac{447 - 424,3}{28} = \frac{22,7}{28} = 0,81$$

and Standard deviation  $\sigma = \sqrt{0,81} = 0,9$

**Conclusion:** Out of a total of 28 respondents, 21 or 72.4% answered that Special attention should be give a gift to the “last mile” when delivering the goods to the final customer-consumer.

The average value of the individual answers is 3.89, which means that the majority of respondents answered that the facts mentioned in the question are important or very important, with an average deviation of each individual answer from the overall average score for this question (standard deviation) in the amount of 0.9 .

**Question number 14:** Intermodal transport has an advantage over transport of the same type in the supply of cargo

If we convert the essay answers to the survey question into numerical values, we get the following:

$x_i$	$f_i$	$x^2$	$x_i f_i$	$f_i x_i^2$	Cumulative below	Cumulative above
1	0	1	0	0	0	29
2	2	4	4	8	2	29
3	5	9	15	45	7	27

4	17	16	68	272	24	22
5	5	25	25	125	29	5
$\Sigma$	29	55	112	450		

The mean expected value of the parameter rating (answer to the question) in this case is:

$$\bar{x} = \frac{\sum x_i f_i}{n} = \frac{112}{29} = 4,2$$

While the variance:

$$\sigma^2 = \frac{\sum f_i x_i^2 - \frac{(\sum f_i x_i)^2}{N}}{N} = \frac{450 - \frac{(112)^2}{29}}{29} = \frac{450 - 432,5}{29} = \frac{17,5}{29} = 0,6$$

and Standard deviation  $\sigma = \sqrt{0,6} = 0,778$

Conclusion: Out of a total of 29 respondents, 22 or 75.8% answered positively that Intermodal transport has an advantage over transport of the same type in the supply of cargo.

The average value of the individual answers is 4.2, which means that the majority of respondents answered that the fact mentioned in the question is important or very important, with the average deviation of each individual answer from the overall average score (standard deviation) in the amount of 0.778.

**Question number 15:** Intermodalni transportnema prednost u putničkom saobraćaju (da, bimodalni: putničko vozilo-avion)

If we convert the essay answers to the survey question into numerical values, we get the following:

$x_i$	$f_i$	$x^2$	$x_i f_i$	$f_i x_i^2$	Cumulative below	Cumulative above
1	0	1	0	0	0	29
2	2	4	4	8	2	29
3	15	9	45	135	17	27
4	9	16	36	144	26	12
5	3	25	15	75	29	3
$\Sigma$	29	55	100	362		

The mean expected value of the parameter rating (answer to the question) in this case is:

$$\bar{x} = \frac{\sum x_i f_i}{n} = \frac{100}{29} = 3,45$$

While the variance:

$$\sigma^2 = \frac{\sum f_i x_i^2 - \frac{(\sum f_i x_i)^2}{N}}{N} = \frac{362 - \frac{(100)^2}{29}}{29} = \frac{362 - 344,8}{29} = \frac{17,2}{29} = 0,593$$

and Standard deviation  $\sigma = \sqrt{0,593} = 0,77$

Conclusion: Out of a total of 29 respondents, 12 of them or 41.3% answered that Intermodal transport has no advantage in passenger traffic (yes, bimodal: passenger vehicle-plane).

The average value of individual answers is 3.45. We come to the conclusion that the majority of respondents do not agree with the set hypothesis in this question, with the average deviation of each individual answer from the overall average score for this question (standard deviation) amounting to 0.77.

**Question number 16:** Improving the system of insurance against the risk of transport and travel can be crucial for the choice of arrangements

If we convert the essay answers to the survey question into numerical values, we get the following:

$x_i$	$f_i$	$x^2$	$x_i f_i$	$f_i x_i^2$	Cumulative below	Cumulative above
1	0	1	0	0	0	28
2	1	4	2	4	1	28
3	10	9	30	90	11	27
4	9	16	36	144	20	17
5	8	25	40	200	28	8
$\Sigma$	28	55	108	438		

The mean expected value of the parameter rating (answer to the question) in this case is:

$$\bar{x} = \frac{\sum x_i f_i}{n} = \frac{108}{28} = 3,86$$

While the variance:

$$\sigma^2 = \frac{\sum f_i x_i^2 - \frac{(\sum f_i x_i)^2}{N}}{N} = \frac{438 - \frac{(108)^2}{28}}{28} = \frac{438 - 402,2}{28} = \frac{35,8}{28} = 1,278$$

and Standard deviation  $\sigma = \sqrt{1,278} = 1,13$

Conclusion: Out of a total of 28 respondents, 22 or 75.8% responded positively to the fact given in the question that the Improvement of the insurance system against the risk of transport and travel can be decisive for the choice of arrangement.

The average value of the individual answers is 3.86, with the average deviation of each individual answer from the overall average score for this question (standard deviation) in the amount of 1.13.

**Question number 17:** Forecasts of service needs are based on the performance of transport and logistics companies

If we convert the essay answers to the survey question into numerical values, we get the following:

$x_i$	$f_i$	$x^2$	$x_i f_i$	$f_i x_i^2$	Cumulative below	Cumulative above
1	0	1	0	0	0	29
2	1	4	2	4	1	29
3	13	9	39	117	14	28
4	10	16	40	160	24	15
5	5	25	25	125	29	5
$\Sigma$	29	55	106	406		

The mean expected value of the parameter rating (answer to the question) in this case is:

$$\bar{x} = \frac{\sum x_i f_i}{n} = \frac{106}{29} = 3,66$$

While the variance:

$$\sigma^2 = \frac{\sum f_i x_i^2 - \frac{(\sum f_i x_i)^2}{N}}{N} = \frac{406 - \frac{(106)^2}{29}}{29} = \frac{406 - 387,4}{29} = \frac{18,6}{29} = 0,641$$

and Standard deviation  $\sigma = \sqrt{0,641} = 0,8$

Conclusion: Out of a total of 29 respondents, 15 of them or 51.7% answered positively that Forecasts of service needs are based on the performance of transport and logistics companies.

The average value of the individual answers is 3.66, which means that the majority of respondents answered that the statement mentioned in the question

is important or very important, with the average deviation of each individual answer from the overall average score for this question (standard deviation) in the amount of 0.8 .

**Question number 18:** Service quality is crucial for trust and repeat choice of the same transport and supply service provider

If we convert the essay answers to the survey question into numerical values, we get the following:

$x_i$	$f_i$	$x^2$	$x_i f_i$	$f_i x_i^2$	Cumulative below	Cumulative above
1	0	1	0	0	0	29
2	0	4	0	0	0	29
3	2	9	6	18	2	29
4	8	16	32	128	10	27
5	19	25	95	475	29	19
$\Sigma$	29	55	133	621		

The mean expected value of the parameter rating (answer to the question) in this case is:

$$\bar{x} = \frac{\sum x_i f_i}{n} = \frac{133}{29} = 4,59$$

While the variance:

$$\sigma^2 = \frac{\sum f_i x_i^2 - \frac{(\sum f_i x_i)^2}{N}}{N} = \frac{621 - \frac{(133)^2}{29}}{29} = \frac{621 - 610}{29} = \frac{11}{29} = 0,38$$

and Standard deviation  $\sigma = \sqrt{0,38} = 0,62$

Conclusion: Out of a total of 29 respondents, 27 or 93.1% responded positively to the thesis that Quality of service is crucial for trust and re-choice of the same transport and supply service provider.

The average value of the individual answers is 4.59, which means that the majority of respondents answered that an important or very important fact is stated through the question, with an average deviation of each individual answer from the overall average score for this question (standard deviation) in the amount of 0.62 .

**Question number 19:** Reliable insurance of the service company and the specific arrangement provides guarantees for the execution of the process

If we convert the essay answers to the survey question into numerical values, we get the following:

$x_i$	$f_i$	$x^2$	$x_i f_i$	$f_i x_i^2$	Cumulative below	Cumulative above
1	0	1	0	0	0	29
2	2	4	4	8	2	29
3	5	9	15	45	7	27
4	13	16	52	208	20	22
5	9	25	45	225	29	9
$\Sigma$	29	55	116	486		

The mean expected value of the parameter rating (answer to the question) in this case is:

$$\bar{x} = \frac{\sum x_i f_i}{n} = \frac{116}{29} = 4$$

While the variance:

$$\sigma^2 = \frac{\sum f_i x_i^2 - \frac{(\sum f_i x_i)^2}{N}}{N} = \frac{486 - \frac{(116)^2}{29}}{29} = \frac{486 - 464}{29} = \frac{22}{29} = 0,759$$

and Standard deviation  $\sigma = \sqrt{0,759} = 0,871$

Conclusion: Out of a total of 29 respondents, 22 or 75.8% answered positively that the Reliable Insurance of the service company and the specific arrangement provides guarantees for the execution of the process.

The average value of the individual answers is 4.00, which means that the majority of respondents answered that an important or very important fact is stated through the question, with an average deviation of each individual answer from the overall average score for this question (standard deviation) in the amount of 0.871.

**Question number 20:** Marketing strategy plays the most important role in the promotion and contracting of transport-logistics-service arrangements

If we convert the essay answers to the survey question into numerical values, we get the following:

$x_i$	$f_i$	$x^2$	$x_i f_i$	$f_i x_i^2$	Cumulative below	Cumulative above
1	0	1	0	0	0	29
2	0	4	0	0	0	29
3	7	9	21	63	7	29
4	13	16	52	208	20	22
5	9	25	45	225	29	9
$\Sigma$	29	55	118	496		

The mean expected value of the parameter rating (answer to the question) in this case is:

$$\bar{x} = \frac{\sum x_i f_i}{n} = \frac{118}{29} = 4,07$$

While the variance:

$$\sigma^2 = \frac{\sum f_i x_i^2 - \frac{(\sum f_i x_i)^2}{N}}{N} = \frac{496 - \frac{(118)^2}{29}}{29} = \frac{496 - 480,1}{29} = \frac{15,9}{29} = 0,548$$

and Standard deviation  $\sigma = \sqrt{0,548} = 0,74$

Conclusion: Out of a total of 29 respondents, 22 or 75.9% answered positively that Marketing strategy plays the most important role in the promotion and contracting of trans-log service arrangements.

The average value of the individual answers is 4.07, which means that the majority of the respondents answered that the statement stated in the question is important or very important, with an average deviation of each individual answer from the overall average score for this question (standard deviation) in the amount of 0 ,74.

**Question number 21:** The functionality of transport and logistics organizations is primarily reflected in the efficient provision of services

If we convert the essay answers to the survey question into numerical values, we get the following:

$x_i$	$f_i$	$x^2$	$x_i f_i$	$f_i x_i^2$	Cumulative below	Cumulative above
1	0	1	0	0	0	28
2	0	4	0	0	0	28
3	4	9	12	36	4	28
4	9	16	36	144	13	24
5	15	25	75	375	28	15
$\Sigma$	28	55	123	555		

The mean expected value of the parameter rating (answer to the question) in this case is:

$$\bar{x} = \frac{\sum x_i f_i}{n} = \frac{123}{28} = 4,39$$

While the variance:

$$\sigma^2 = \frac{\sum f_i x_i^2 - \frac{(\sum f_i x_i)^2}{N}}{N} = \frac{555 - \frac{(123)^2}{28}}{28} = \frac{555 - 540,3}{28} = \frac{14,7}{28} = 0,525$$

and Standard deviation  $\sigma = \sqrt{0,525} = 0,725$

Conclusion: Out of a total of 28 respondents, 24 or 85.7% responded positively to the statement that the functionality of transport and logistics organizations is primarily reflected in the efficient provision of services.

The average value of the individual answers is 4.39, which means that the majority of respondents answered that the statement given through this question is correct and important or very important, with the average deviation of each individual answer from the overall average score for this question (standard deviation) in the amount of 0.725.

**Question number 22** Clients/customers participate in improving existing or creating new services

If we convert the essay answers to the survey question into numerical values, we get the following:

$x_i$	$f_i$	$x^2$	$x_i f_i$	$f_i x_i^2$	Cumulative below	Cumulative above
1	0	1	0	0	0	29
2	1	4	2	4	1	29
3	6	9	18	54	7	28
4	14	16	56	224	21	22
5	8	25	40	200	29	8
$\Sigma$	29	55	116	482		

The mean expected value of the parameter rating (answer to the question) in this case is:

$$\bar{x} = \frac{\sum x_i f_i}{n} = \frac{116}{29} = 4,00$$

While the variance:

$$\sigma^2 = \frac{\sum f_i x_i^2 - \frac{(\sum f_i x_i)^2}{N}}{N} = \frac{482 - \frac{(116)^2}{29}}{29} = \frac{482 - 464}{29} = \frac{18}{29} = 0,621$$

and Standard deviation  $\sigma = \sqrt{0,621} = 0,788$

Conclusion: Out of a total of 29 respondents, 22 or 75.9% positively assessed the fact that Clients/customers should participate in improving existing or creating new services.

The average value of the individual answers is 4.00, which means that the majority of respondents answered that an important or very important fact is given through this



question, with the average deviation of each individual answer from the overall average score for this question (standard deviation) in the amount of 0.788.

**Question number 23:** Customer satisfaction, their affection and loyalty are indicators of value creation for both the customer and the supplier

If we convert the essay answers to the survey question into numerical values, we get the following:

$x_i$	$f_i$	$x^2$	$x_i f_i$	$f_i x_i^2$	Cumulative below	Cumulative above
1	0	1	0	0	0	29
2	0	4	0	0	0	29
3	3	9	9	27	3	29
4	10	16	40	160	13	26
5	16	25	80	400	29	16
$\Sigma$	29	55	129	587		

The mean expected value of the parameter rating (answer to the question) in this case is:

$$\bar{x} = \frac{\sum x_i f_i}{n} = \frac{129}{29} = 4,45$$

While the variance:

$$\sigma^2 = \frac{\sum f_i x_i^2 - \frac{(\sum f_i x_i)^2}{N}}{N} = \frac{587 - \frac{(129)^2}{29}}{29} = \frac{587 - 573,8}{29} = \frac{13,2}{29} = 0,455$$

and Standard deviation  $\sigma = \sqrt{0,455} = 0,675$

Conclusion: Out of a total of 29 respondents, 26 or 89.6% answered that customer satisfaction, their affection and loyalty are indicators of value creation for both the customer and the supplier.

The average value of the individual answers is 4.45, which means that for most respondents the fact given in the question is important and very important, with the average deviation of each individual answer from the overall average score for this question (standard deviation) in the amount of 0.675.

**Question number 24:** The field of supply, transport and logistics is well covered by regularly applied standards

If we convert the essay answers to the survey question into numerical values, we get the following:

$x_i$	$f_i$	$x^2$	$x_i f_i$	$f_i x_i^2$	Cumulative below	Cumulative above
1	0	1	0	0	0	29
2	0	4	0	0	0	29
3	8	9	24	72	8	29
4	15	16	60	240	23	21
5	6	25	30	150	29	6
$\Sigma$	29	55	114	462		

The mean expected value of the parameter rating (answer to the question) in this case is:

$$\bar{x} = \frac{\sum x_i f_i}{n} = \frac{114}{29} = 3,93$$

While the variance:

$$\sigma^2 = \frac{\sum f_i x_i^2 - \frac{(\sum f_i x_i)^2}{N}}{N} = \frac{462 - \frac{(114)^2}{29}}{29} = \frac{462 - 448,1}{29} = \frac{13,9}{29} = 0,479$$

and Standard deviation  $\sigma = \sqrt{0,479} = 0,692$

Conclusion: Out of a total of 29 respondents, 21 or 72.4% answered that the field of supply, transport and logistics should be well covered by regularly applied standards.

The average value of the individual answers is 3.93, which means that the majority of respondents answered that an important or very important fact was given through this question, with the average deviation of each individual answer from the overall average score for this question (standard deviation) amounting to 0.692.

Overall rating of the survey

If we convert the essay answers to the survey question into numerical values, we get the following:

$x_i$	$f_i$	$x^2$	$x_i f_i$	$f_i x_i^2$	Cumulative below	Cumulative above
1	2	1	2	2	2	688
2	19	4	38	76	21	686
3	164	9	492	1476	185	667
4	283	16	1132	4528	468	503
5	220	25	1100	5500	688	220
$\Sigma$	688	55	2764	11582		

The mean expected value of the parameter rating (answer to the question) in this case is:

$$\bar{x} = \frac{\sum x_i f_i}{n} = \frac{2764}{688} = 4,02$$

While the variance:

$$\sigma^2 = \frac{\sum f_i x_i^2 - \frac{(\sum f_i x_i)^2}{N}}{N} = \frac{11582 - \frac{(2764)^2}{688}}{688} = \frac{11582 - 11104,2}{688} = \frac{477,8}{688} = 0,69$$

and Standard deviation  $\sigma = \sqrt{0,69} = 0,83$

## CONCLUSION

Bearing in mind that the ratings from the two categories of respondents (service providers and clients-buyers) are approximately the same (the deviations are at the level of statistical error, about 3%), no analysis was performed per category of respondents, but a unified analysis was performed for all 29 respondents.

The overall average rating of the survey is 4.02 (important).

In total, 696 questions were asked in the survey (29 respondents times 24 questions), while the respondents gave a total of 688 answers, and no answer was given to 8 questions.

Of the total number of responses, 503 or 73.1% were graded 4 and 5 (important and very important), where the average value of individual answers is 4.02, while the deviation of the value of individual answers from the average grade is 0.83 (Šegrt S., "Poslovna statistika, 2021).

It is also noted that out of a total of 688 questions, only 2 questions were given a negative grade, while 19 questions were given a 2 grade.

I would like to mention that question number 15 was given the lowest score by the respondents. (3.45) Intermodal transport does not have an advantage in passenger traffic (yes, bimodal: passenger vehicle-plane) and the above should be taken into account, ie. Respondents believe that the assumption in the question is neither important nor irrelevant.

The final conclusion derived from the general assessment of the survey points to the position that the main and secondary hypotheses given through the questions in the survey can be accepted as correct.

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