

Introduction to the research of uncertainty in logistics management

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Abstract. The article aims to present the assumptions and results of the first part of the initial research of logistic management in conditions of uncertainty. As a result of the research, research gaps were identified which determine further directions of research in the problem above. The presented research results were analyzed using the statistical method of Spearman and Guilford, which allowed verifying the assumptions and determining the working version of the hypothesis and the partial purpose of further research. The evaluation of the survey results confirmed the need for conducting in-depth research in recognition of uncertainty conditions at the strategic management level.

1. Introduction

The critical challenge for many companies is to achieve the most effective adjustment of their volatility to the variability of the environment, to "eliminate the unacceptable level of variation in volatility", which then becomes a real problem for the company. However, one can not overlook the fact that there is a general pressure to improve all processes (including logistic) continuously. However, in every process (as well as in the management of it) events occur marked by randomness. This is mainly because economic instability, which enterprises face, is not characterized by a simple causal relationship and can not be directly identified with the phenomenon of volatility.

When making logistic decisions, managers must always consider issues of existing uncertainty and possible risk. Therefore, in terms of uncertainty, decision-making models of a deterministic nature (where the result verifies the correctness of the decision) or probabilistic (in which, apart from the result, the risk level is also taken into account) is often used. The essential feature characterizing uncertainty is the inability to predict the effects and consequences of events. Therefore, there is certainty about the occurrence of an event, but the set of effects is characterized by a limited possibility of forecasting and estimating possible consequences. This means that from the efficiency of logistics processes, it is impossible to determine the degree of their efficiency. Considering this category from mainstream economics (and management), uncertainty should be considered a situation that is in its essence an insoluble decision problem. One in which different decisions will have different possible consequences. This means that even if a certain event and the probability distribution of a given state of affairs has been known, it can result in many different values.

The problem raised in the article is a contribution to researching the field of uncertainty management in the company from the perspective of logistics management. The article aims to present the assumptions of the study of uncertainty in logistics management from the perspective of the company. The article has a research and demonstration nature, based on the results of the preliminary study and constitutes a voice in the ongoing discussion.

2. Determining the state of knowledge in the problem

The approach to understanding and defining logistic management is common and widely described in the available literature. Only the internet shows about 19,000 results corresponding to the logistic management tag. From the discourse pursued in the article, the approach to understanding uncertainty, and the occurrence of conditions of uncertainty is much more critical. As A.W.Willett [1] wrote at the beginning of the 20th century: "the risk is an objectified uncertainty as to the occurrence of an undesirable event. This risk depends on uncertainty and not on the degree of probability "[1].

It is worth noting that the definition of uncertainty also depends on the area of science and knowledge in which different authors move. However, it is noticeable that the uncertainty is related to risk and its scientific aspect (i.e., measurable but unpredictable effects) and the personal aspect (understood as a relation to risk) [2]. Notably, the risk concept also includes the expected high volatility [3].

There is always the possibility of an event occurring, but it may not be possible to assess the degree of probability. It can be concluded that the occurrence of various unpredictable factors, coming from various sources, and only partially measurable, forms the so-called conditions of inactivity. Uncertainty concerns changes and events are challenging to estimate. However, there are approaches to measuring uncertainty. One of the most popular approaches to measuring uncertainty is to say that uncertainty can be measured using statistical methods (if it is considered sufficient) – what again is the starting point for the considerations in the article, although the uncertainty in its pure form is here not accepted because the uncertainty that can not be measured is the uncertainty "in the strict sense"[4]. At the same time, it is not possible to predict the effects of actions in the long term, especially in the field of business conditions, technological progress, competition development, etc. [5], which results in the extreme claim that uncertainty cannot be measured in any way - there is no possibility to use any measurement tool [6].

The divergence in the approach to the possibility of measuring uncertainty in the light of management raises the question of whether there is a possibility of alleviating the level of uncertainty. The answer should be affirmative because the anticipation of the future should take into account at least the partially quantifiable variability. Thus, the volatility of the degree of uncertainty depends on the pace of identification of factors that should be taken into account in the forward-looking analysis [7]. Nevertheless, for the article, it can be assumed that uncertainty occurs when apart from unpredictable factors (usually the more significant part of the set) there are factors that are quantifiable. Not only the set of factors is essential, but also a set of effects that can create many options that make up the portfolio of results [8]. This suggests that there is the possibility of not only examining the level of uncertainty but also its impact on logistics management, which is the basis for the formulation of research tools in this regard.

3. Methodology and main assumptions of the first stage of the preliminary research

In January 2019, the methodology for qualitative research using the focus method was developed (FGI), aimed at finding answers to the following questions:

1. Do logisticians in the enterprise consider uncertainty in the management process?
2. Who takes responsibility for logistic management in conditions of uncertainty?
3. Should the impact of uncertainty conditions be measured on logistics management and how?

The answers to such questions were to facilitate the decision regarding the need to research logistic management in conditions of uncertainty, to build the concept of the pilot and proper research, including the model of logistic management in conditions of uncertainty and the possibility of measuring the impact of uncertainty on the management process.

The described stage is an original study that allows determining the main assumptions and premises for further research. Two focus sessions were conducted, attended by 19 representatives of enterprises employed at various organizational levels. So-called target selection was used (in the focus study the targeted sample is determined by the selection criteria), whose necessary qualifying criterion was to have in the employment and organizational structure the person (s) directly responsible for logistics management (e.g. logistics managers).

The participants of the research were presented with problems, and an external moderator, which ensures objectivity in formulating further conclusions, conducted the research.

In the analysis of the responses of the focus group participants, the methods of statistical analysis in the scope of question 2 and 3 were used, which aimed to give value to the answers enabling the determination of the highest value constituting the highest rank. The first question was developed only in terms of quantitative responses (not using statistical analysis).

The study uses the Spearman rank correlation coefficient. It has been defined as the Pearson correlation coefficient calculated for the variable ranks [9] (the rank is the number that corresponds to the place in the order of each feature).

When interpreting the results, the classification was based on J. Gilville, where:

- $|r|=0$ - lack of correlation
- $0,0<|r|\leq 0,1$ - slender correlation
- $0,1<|r|\leq 0,3$ - weak correlation
- $0,3<|r|\leq 0,5$ - average correlation
- $0,5<|r|\leq 0,7$ - high correlation
- $0,7<|r|\leq 0,9$ - very high correlation
- $0,9<|r|<1,0$ - almost full correlation
- $|r|=1$ - full correlation

4. Research results

- 1) In the scope of question 1. - Do logisticians in the enterprise consider uncertainty in the management process?
- 2)

Table 1. Percentage of responses to question 1 set by study participants

Established answers	Number of answers	Percentage
Factors shaping uncertainty are not taken into account. Management concerns the only risk.	4	21,05%
Uncertainty is taken into account, but only in terms of leveling the effects of its occurrence.	4	21,05%
Uncertainty in logistics management is taken into account. However, selected management methods are not used	9	47,37%
Yes, uncertainty is considered as a set of variable factors, including uncertainty using forecasting	2	10,53%

Source: Own study based on the focus research (FGI)

It should be indicated that the answers presented in the table come directly from the participants of the study. As can be seen, in the majority (47.37%) of enterprises - and in particular those responsible for logistics management - take into account the conditions of uncertainty in logistics management. However, uncertainty factors are included only in an intuitive way - depending on the competences (and qualifications) of logistics managers. There is no indication of the use of management tools about the occurrence of uncertainty conditions. Only two of the surveyed managers confirmed the development of their management tools taking into account the possibility of uncertainty conditions as well as their

application at the stage of forecasting the quality of the management process and estimating the effects of uncertainty.

- 3) In the scope of question 2. - Who takes responsibility for logistic management in conditions of uncertainty?

Table 2. The strength of correlation in question 2

Answers in the field of taking responsibility - the decision-making level	Correlation coefficient	Strength of correlation
Each level of management	0,5012	high
Strategic management level	0,571	high
The tactical level of management	0,2568	weak
Operational management level	0,3382	average

Source: Own study based on the focus research (FGI)

According to the correlation analysis, the answer with the highest impact (the strategic level of management) means that decisions regarding the uncertainty should be made at the strategic management level. Interestingly, a similarly high correlation coefficient received an answer stating that logistics management in the conditions of uncertainty requires management decisions at every level.

- 4) In the scope of question 3. - Should the impact of uncertainty conditions be measured on logistic management and how?

The difficulty in analyzing the participants' answers to such a question is dictated by earlier responses that speak about the lack of management tools in terms of uncertainty in logistics management. For this reason, it is concluded that among the surveyed companies, the tools for measuring possible conditions of uncertainty are also not used. Nevertheless, with the help of deduction, the participants of the study gave general answers shaping the cognitive value towards the need to measure the influence of uncertainty factors on logistic management in the way as in Table 3.

Table 3. Strength of correlation in the scope of question 3

Established answers	Correlation coefficient	Strength of correlation
measurement is not possible	0,0206	slender
measurement is possible using the available statistics and management tools	0,2568	weak
measurement is possible using a "sewn-in" tool - e.g., a measurement survey, checklist	0,6354	high

Source: Own study based on the focus research (FGI)

Answers whose correlation with question 3 is described as weak does not mean that this answer can not be answered in reality. It only means a reduced probability of the possibility of such a solution. However, it should be considered that measurement is possible, and the strength of the impact of uncertainty on logistic management is quantifiable at least partially - which confirms the assumptions of the study that some of the factors that shape uncertainty are subject to the possibility of partial estimation.

5. Discussion and Conclusions

The research being carried out is the first part of the preliminary study, allowing to put a working hypothesis in the following wording:

The uncertainty conditions belong to the set of inherent factors of the logistic management strategy and have an impact on its effectiveness.

The preliminary results of this part of the study are not sufficient to confirm the working hypothesis. However, in its scope, you can verify the assumptions of the study (questions posed in the focus session). As the study showed, the factors shaping the uncertainty identified by enterprises result instead of the perception of the phenomenon of uncertainty as to the basis for risk management. Hence the partial, though the strong, the tendency of managers to claim that management uncertainty is at least partially taken into account. This is a confirmation of this part of the working hypothesis that the conditions of inactivity have an impact on management, and a way to measure this influence should be developed.

The results of the survey also point to the fact that uncertainty is perceived by managers as a phenomenon requiring far-reaching actions in the field of its management. For this reason, decisions regarding the management of uncertainty in logistics should be made at the strategic level. This means that despite the universality of the uncertainty related to management at all levels, the conditions of uncertainty should, however, be part of the management strategy. Conditions of uncertainty should, therefore, be included in the process of strategic planning and implementation of long-term goals. The above conclusions partially confirm the hypothesis regarding the location of responsibility for managing uncertainty conditions among top management.

Most reservations at this stage of the study and at the same time, the most difficulties in interpretation leave the aspect of measuring the impact strength. At such an early stage of the study, when the qualitative research process failed to construct a measurement tool subjected to possible evaluation by the participants of the study, it is not possible to adequately assess the level of impact of uncertainty conditions on logistics management. Nevertheless, it is worth noting that the correlation of the answer with the question shows that among managers there is a need to find a way (including tools) to measure the impact of uncertainty factors on the way, efficiency and effectiveness of logistics management.

The preliminary study carried out at the same time allows us to determine the partial purpose of further research, which is to determine the typology of uncertainty about sources of variable factors and to determine how to react to the occurrence of uncertainty. The above discussion allows us to conclude a general nature, that the cognitive and scientific space in the field of logistics management in the conditions of uncertainty carries many challenges and is still open.

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