

Research and Evaluation of Factors and Sub-Factors that Affect on the Timeliness and Reliability of Deliveries and Their Importance for the Efficiency of the Logistic Processes

Kiril Anguelov
Faculty of French Electrical Engineering Education
Technical University of Sofia
Sofia, Bulgaria
e-mail ang@tu-sofia.bg

Rossitza Kenova
Faculty of management
Technical University of Sofia
Sofia, Bulgaria

Abstract— One of the most important factors, affecting on the entire efficiency of the logistic processes is the well-timed and safe delivery. On one hand, it should be done on time and on the other hand – its integrity shouldn't be broken anyway. Hence, for the purpose of the current paper, the authors research what's the impact of timeliness and reliability of the deliveries on the efficiency of the logistic processes. This research is based on the expert evaluation, given by precisely selected respondents, who present their opinion for the impact level of all the factors and sub-factors over the theme and object of the study. As a result of this empirical research, conducted with the help of a specially written inquiry card, the authors present the summarized data, which is also analyzed in graphic images. Then they make conclusions and proposals for improving of the weaker criteria, whilst keeping the satisfying levels of the stronger ones.

Keywords— logistics processes, reliability of delivery, competitiveness and efficiency of logistics, timeliness

I. INTRODUCTION

The success rate and high evaluation of every fulfilled delivery is measured by different criteria – price, delivery time, safety and reliability; insurance and provision of the shipment; and last, but not least – reaction during force majeure circumstances. Therefore, the interaction between shipper, logistic partner and recipient is of pretty high importance for reaching an optimal level of quality of the delivery service. On one hand, the current study aims to establish the relation between factors and sub-factors, affecting on the timeliness and reliability of deliveries, and on the other hand it aims to measure their level of importance.

The surveyed sample is presented by categorized respondents, representatives both of the business sphere and of the science one, who evaluate every criterion in the inquiry card, due to their expert level. Once the data is collected, it is processed with a special software and the results are presented in graphic and analytic way. Based on these results, the authors make some proposals, which target improvement of timeliness and reliability of the deliveries, as far as a whole enhance of the logistic processes efficiency. Views and practices on timeliness and reliability of the deliveries and their importance for the effectiveness of logistic processes.

The timeliness and reliability of the deliveries, along with its impact over all the logistic processes are explored by Demirova S. [1] and Rakovska M. [2] as a part of Logistic performance Index (LPI), which gives comparable assessment of the current condition of logistic sphere of every explored country. Regarding improvement of timeliness and reliability of shipments, Loukanov K. [3] finds and explores the aims, that lead to it and puts the priority on reducing the number of early and late deliveries.

There are two strategies that may be explored in the meaning of usually accepted and concrete delivery hour, which is also convenient for the clients – first is the strategy of “delivery window”, the second one is “just-in-time” strategy. The first one is studied by Bushuev M. A. and Guiffrida A.L. [4], who claim that the optimal planned “delivery window” leads to minimal risk of fees and penalties, due to late or early deliveries. The second one is explored by McMillan Ch. [5], once as a tool for minimizing of storage and warehouse costs, then as a part of the whole “just-in-time” delivery strategy, which is a fundament of the supply chain management [6]. The reorganization of logistic processes in accordance with the requirements of "Industry 4.0" is an object of the paper [7] of Demirova S. Meanwhile, Korpff A. and Saure P. [8] claim, that imputed fixed delivery costs impact negatively on the trade agreements, geographic neighbourhood and language commonalities. Another point of view over the factor “timeliness and reliability of deliveries” is presented by Wang H., Tan J., Guo S. and Wang S. [9]. They explore it in the meaning of insurance of fragile and precious goods, as far as receiving relevant compensation, if any loose or damage occurs during delivery. Moreover, the authors analyze the different insurance options – either to declare lower, actual or higher value of the shipped goods, which correlates to the amount of future compensation.

II. METHODOLOGY FOR THE SURVEY OF FACTORS AND SUB-FACTORS THAT AFFECT ON THE TIMELINESS AND RELIABILITY OF DELIVERIES AND THEIR IMPORTANCE FOR THE EFFICIENCY OF THE LOGISTIC PROCESSES

The results, presented in the article are part of an overall research of the factors and subfactors, which influence over the LPI of Bulgaria. In the current paper the authors' focus is mainly on the results, related to the timeliness and reliability of deliveries and their importance for the efficiency of the logistic processes

The methodology of the research may be described in the following stages: definition of the sample volume; definition of the respondent categories; preparation of inquiry card for data collecting; field work; processing, summarizing, presenting and analyzing of the gathered data; conclusions and proposals. The described in this paper survey is conducted for a period of two months in the form of direct interview with fifty respondents. The inquiry card consists of twelve questions, divided into two categories and the gathered data is processed by special software. For the aim of the research, the results are object of direct and crossed analysis, as long as they are used also as a fundament of conclusions and future surveys and elaborations.

In order to obtain maximum information and study of all possible influencing factors, the study analyzes the experts' opinion of all involved persons related to the logistics processes: general managers of industrial enterprises; logistic managers of industrial enterprises; general managers of forwarding companies with own transport; general managers of forwarding companies with hired transport; managers in forwarding companies with own transport; managers in forwarding companies with hired transport; representatives of non-government organizations (NGO), experts from Bulgarian logistic association (BLA); a scientist from the subject area; consultant.

Each of the respondent group indicates in relation to what activity was acquired their expert opinion on the degree of influence of factors and sub-factors. It is possible and permissible by the method of research to be an expert, when changing his working positions, he has gained experience in more than one quality.

The respondents rate their answers about each factor and subfactor importance, as they mark 1 (for the weakest importance) to 7 (for the strongest importance).

III. MAIN RESULTS

The analysis of the summarized results shows, that factor "Timeliness and reliability of the deliveries" is rated on second place (6.13), while the first place is for "Competence of the local logistic sector" (6.23). The third factor is "Quantity and quality of the human resources" (6.03), so these are the only factors, rated with average value above 6, which corresponds to "Very strong importance", according to the scale. The other factors are rated, as follows: Organization of the international deliveries" – 5.89, Tracking of the international deliveries" – 5.81, "Quality of the transport and communication infrastructure" – 5.70 and "Efficiency of the customs procedures"- with 5.30. It's a remarkable fact, that none of the factors is rated with average value below 5, which is indicator for a very precise definition of the factors and well formulated questions. (Fig. 1)

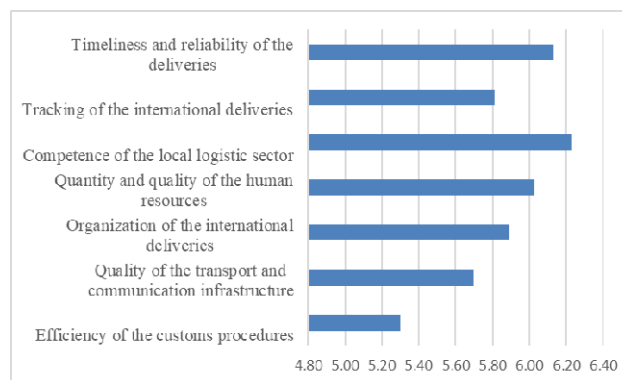


Fig. 1. Assessment of significance of the timeliness and reliability of the deliveries.

More than half of the respondents (53.33%) say, that the sub-factor "Certain deliveries at regular hour, which is client convenient" has very strong importance for the timeliness and reliability of deliveries. It's noticeable, that almost 2/3 of them are general managers or logistic managers in industrial enterprises. The answer "Extremely strong" is given by 37.78% of the respondents, while there are only 8.88% for "Strong". It's impressive, that there are no neutral or negative answers, which shows the great importance of this sub-factor for the timeliness and reliability of the deliveries. (Fig. 2)

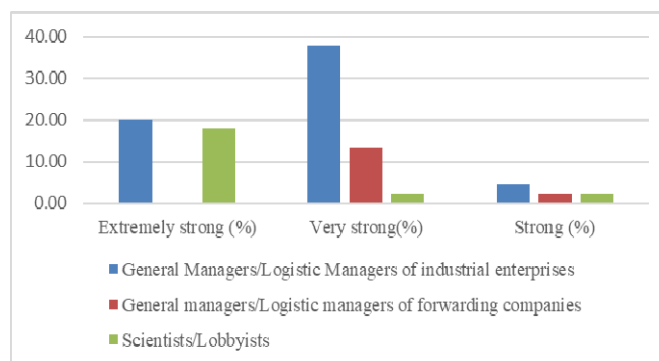


Fig. 2. Assessment of significance of the certain deliveries at regular hour, which is convenient for the client

The question about the significance of the delivery conditions, which match the type and quality of inventories is also answered only positively by the respondents. Almost 2/3 of them give answer "Extremely strong", while 35.56% think, that the importance of this sub-factor is "Very strong". The rest of the respondents (2.22%) answer with "Strong". The answers are distributed similarly to these of the previous question, but here the predominant category is "Extremely strong" and the share answer "Strong" is too small. (Fig.3)

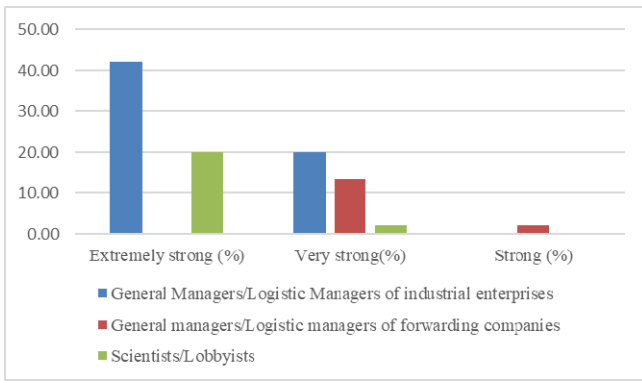


Fig. 3. Assessment of significance of the delivery conditions, which match the type and quality of inventories

The answers of the question about the significance of proper storage and protection of the delivery goods in order to prevent from deterioration the clients' expense for inventories correspond to one of the main logistic aims – to complete all the logistic processes with optimized expense. So, the shares of respondents, who give answer “Extremely strong” and “Very strong” are almost 90% - respectively 57.78% and 31.11%, dominated by general managers and logistic managers of industrial enterprises. The other answers belong only to general managers and logistic managers of forwarding companies are distributed between: “Strong” – 8.89% and “Neutral”- 2.22%. (Fig.4).

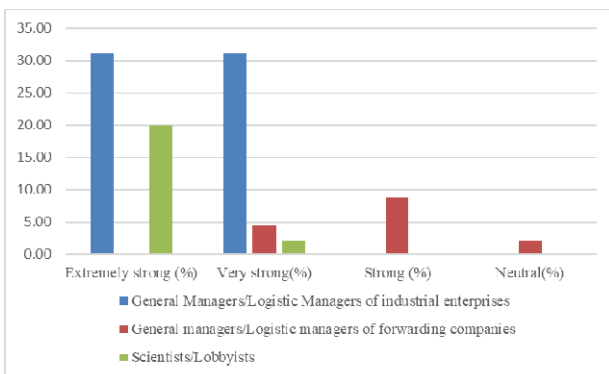


Fig. 4. Assessment of significance of proper storage and protection of the delivery goods in order to prevent from deterioration the clients'expense for inventories

The question, regarding the significance of proper storage and protection of the delivery goods in order to prevent from deterioration the clients' expense for manufacture is answered by the respondents in quite similar way (Fig.5). Most of them (57.78%) say, that this sub-factor is of Extremely strong importance for timeliness and reliability of the deliveries, while 31.11% think it is Very strong. The answers “Strong” and “Neutral” are represented respectively with 8.89% and 2.22%.

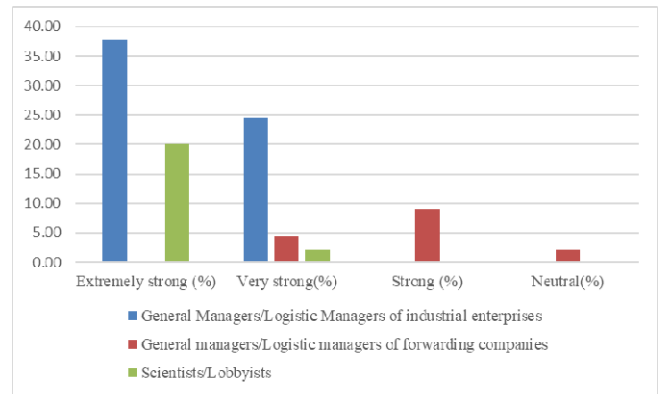


Fig. 5. Assessment of significance of proper storage and protection of the delivery goods in order to prevent from deterioration the clients'expense for manufacture

The distribution of the answers, regarding the significance of proper storage and protection of the delivery goods in order to prevent from deterioration the clients' expense for marketing is a little bit different from these of the two previous questions (Fig.6). As far, as they are dominated by answer “Extremely strong”, here most of the respondents (48.89%) think, that the significance of this sub-factor about timeliness and reliability of the deliveries is “Very strong”. The other answers are distributed, as follows: 33.33% for “Extremely strong”, 13.33% for “Strong” and 2.22% for both “Neutral” and “Weak”.

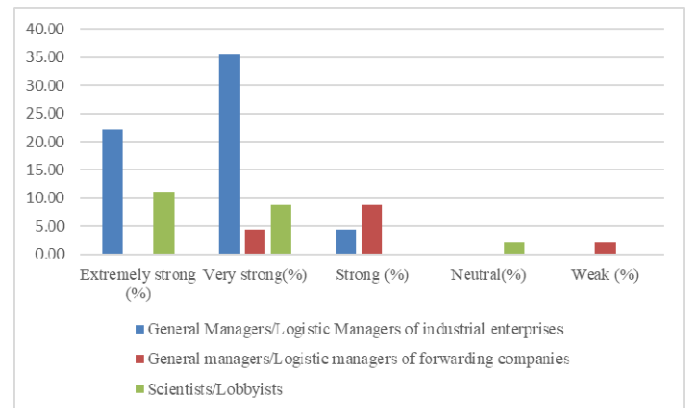


Fig. 6. Assessment of significance of proper storage and protection of the delivery goods in order to prevent from deterioration the clients'expense for marketing

The insurance of the delivery goods in case of damage or lose occurs, which is directly connected to receiving compensations (Fig. 7) is rated as a sub-factor of “Extremely strong” importance by more than half of the respondents (55.56%). The answer “Very strong” is with share of 37.78% and it should be emphasized, that this is the only category, which unites respondents from all groups – general and logistic managers of industrial or forwarding companies, scientist, lobbyist, experts from the non-government sector. The rest of the answers are distributed, as follows: 4.44% for “Strong” and 2.22% for “Very weak”.

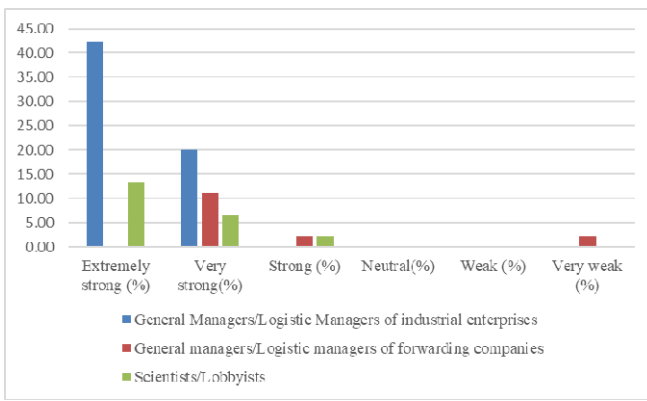


Fig. 7 Assessment of significance of insurance of fragile and precious delivery goods and compensations if damage or lose occurs

The assessment of significance of fixed delivery date at higher price for the timeliness and reliability of the deliveries is presented on Fig. 8. Here, more than half of the respondents (53.33%) give answer “Extremely strong”, while 26.67% answer with “Very strong”. It is interesting, that both of the categories are presented only by general/logistic managers of industrial enterprises and scientists/lobbyists, while all the general/logistic managers of forwarding companies answer with “Strong”. This category gathers 1/5 of the respondents answers and they are only from the positive categories – there is no neutral or negative answer.

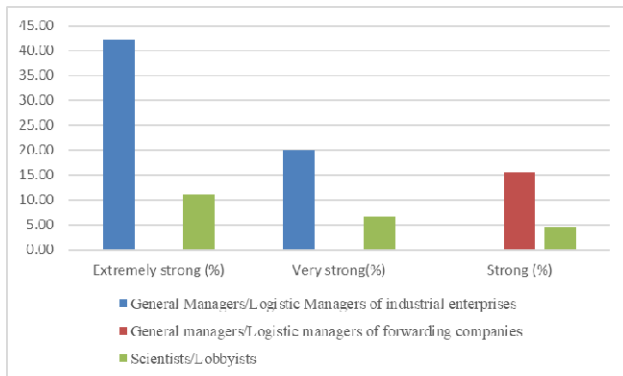


Fig. 8. Assessment of significance of fixed delivery date at higher price

Opposite of the previous question, there is a sub-factor, which concerns the assessment of significance of minimum delivery price, which may compromise the timeliness (Fig.9). Here, the leading role is played not by fixed delivery date, but by the price and there is no surprise, that a huge part of the respondents defines it as more important for the efficiency of the delivery processes. 44.44% answer with “Very strong”, while 37.78% point “Strong”. The answer “Extremely strong” is given by 8.89%, while the other respondents share their answers between “Neutral” – 6.67% and “Very weak” – 2.22%.

A comparison between the last two questions reveals, that fixed delivery date is more important for the efficiency of the logistic processes than the minimal delivery price, as it gathers only positive answers, most of which are of “Extremely strong” importance.

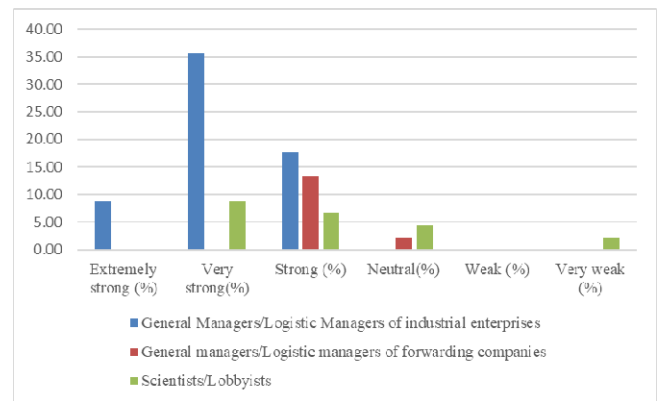


Fig. 9 Assessment of significance of minimum delivery price, which may compromise the timeliness

The assessment of significance of force majeure circumstances during delivery, along with the timely and adequate reaction if they occur (Fig. 10) is a sub-factor of “Very strong” importance for 57.78% of the respondents, while 33.33% give answer “Strong”. The rest of the respondents share their expert rate between “Extremely strong” – 6.67% and “Neutral” – 2.22%. It may be assumed, that this sub-factor is also one of high rated, as there is no negative answers and the share of the neutral ones is minimal. Although not a primary one, it is evaluated as very important for the timeliness and reliability of the deliveries and the efficiency of the logistic processes.

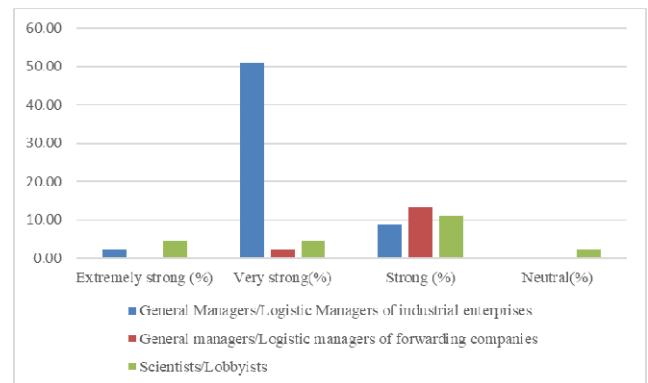


Fig. 10. Assessment of significance of force majeure circumstances during delivery

Based both on the whole and on the partial research, the authors make the following conclusions:

- The answers are distributed extremely according to the field of work of the respondents and the area of their expert opinion.
- There is no visible correlation between the distribution of the answers and the time, that the respondents have acquired their expert opinion.
- The questions related to direct influence of the sub-factors over the logistic processes gather more answers in the positive part of the scale.
- The secondary sub-factors related to specific logistic activities are positively evaluated mainly by the narrow specialists in these spheres.
- It's observed, that the expert opinion of managers, working in industrial enterprises or logistic companies doesn't always correspond to this of scientist, lobbyists and other internal or theoretical experts.

- The tendency, established in previous researches, of serious mismatch between theoretically grounded facts and their practical implementation is still kept in this research.

IV. CONCLUSIONS

Based on the conducted research, the authors present in the paper various results – both particular and generalized, that refer to the following factors and sub-factors: delivery timeliness at fixed hour; observation of delivery conditions, corresponding to the type and quality of the shipment; proper shipment storage, aiming to avoid worsening of inventory, producing and marketing costs; insurance of fragile and precious shipments and force majeure circumstances; fixed delivery date at higher price or minimal delivery cost on account of not fixed delivery time.

The ratings of the answers, given by the respondents in the current research are commented and analyzed for all of the groups with expert opinion – general managers, logistic managers, scientists, lobbyists, non-government experts. If there is a distinctive difference between the opinion of the groups, it is commented with its value. The conclusions may be used as solid fundament of a methodology for determination of the logistic capacity of industrial or trade enterprise.

Based on the cumulated results, we may induct the following tendencies: regarding the expert opinion about logistic questions - most of them are rated with answer “very high importance” or “medium high importance” in the meaning of their impact over efficiency of the logistic processes, while only few of them are rated with answer “high importance”. This may be interpreted as a sign both for well-structured and formulated questions and for high qualification of the respondents. Moreover, the detailed results may lead to future investigation and may be used for competitive analysis with other Balkan countries.

V. ACKNOWLEDGMENT

Publishing of this paper was financed by the Scientific and research sector of the Technical University of Sofia.

REFERENCES

- [1] Demirova S., Industrial Information Technology - A Revolutionary Factor In Logistics, Acta Technica Corviniensis - Bulletin of Engineering, Tome X, Fascicule 4 (Oktober-December), pp.25-28, ISSN 2067-3809, 2017
- [2] Rakovska M., Comparative Assessment of Logistics Efficiency in Bulgaria and Germany, Proceedings of the Twelfth International scientific conference "Innovative strategies for competitive business," pp. 46-51
- [3] Lukanov K., Timeliness of Deliveries as a Factor for Raising the Service Level of Logistics Company Customers, Proceedings of the 10th International Scientific Conference "Logistics in the Changing World", UNWE, October 17-18, 2016, 262-274.
- [4] Bushuev M. A., Guiffrida A.L., Optimal position of supply chain delivery window: Concepts and general conditions, Internation Journal ot Production Economics
- [5] McMillan Ch., Global Logistics and International Supply Chain Management, The Handbook of Technology Management (New York: Wiley, 2008)
- [6] Green K.W Jr., Inman R.A., Birou L.M., Whitten D., Total JIT (T-JIT) and its impact on supply chain competency and organizational performance, International Journal of Production Economics, Vol 147, part A, January 2014, Pages 125-135
- [7] Demirova S., Reorganization of logistic processes in accordance with the requirements of "Industry 4.0", International Scientific Journal "Industry 4.0", Year I, ISSUE 2/2016, Sofia, ISSN 2543-8582, pp.70-73, 2016
- [8] Kropf A., Saure P., Fixed costs per shipment, Journal of International economics, Volume 92, Issue 1, January 2014, pages 166-154, <https://www.sciencedirect.com/science/article/pii/S0022199613001001>
- [9] Wang H., Tan J., Guo S, Wang S., High-value transportation disruption risk management: Shipment insurance with declared value, Transportation research Part E: Logistics and Transportation Review, vol 109, January 2018, pages 293-310