



## Reverse logistics implementation barriers in organizations on the territory of AP Vojvodina

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### Abstract

*The aim of this paper is to present the results of study on the implementation of Reverse Logistics in organizations in Vojvodina, where the focus is on barriers that can occur on this occasion. Also, this paper is providing a literature review focused on the barriers in the implementation of Reverse Logistics. This review covers recently published articles related to this subject matter and synthesizes the identified barriers, proposing four different categories based on type of influencing factors. Subsequently, this categorization is discussed and depicted as a structured model which can be used as a basis for future studies in the field.*

**Key words:** Reverse Logistics, Barriers, Categorization, Influencing Factors

### 1. INTRODUCTION

Upon completion of the useful life of the product, users generally want to eliminate product residues and packaging from their surroundings. It is necessary to take this material from the users, in order to renew its use value or to neutralize the negative impact on the environment in an adequate way. In practice, reverse logistics is often identified with waste management, so it is necessary to point out their diversity. Waste management is defined as efficient waste collection and processing (products for which there is no new way to use), and reverse logistics treats products for which there is a certain usable value that can be recovered and reused. [1] The most commonly used definition of reverse logistics states that it represents „the process of

*planning, implementing, and controlling the efficient, cost effective flow of raw materials, in-process inventory, finished goods, and related information from the point of consumption to the point of origin for the purpose of recapturing or creating value or proper disposal*“ . [2]

In the leading world economies, there is great interest in implementation of reverse logistics. Reasons can be found in the concern of these societies in terms of environmental protection, sustainable development, compliance with legal requirements, social responsibility of organizations and their competitiveness, both locally and globally. Accordingly, the scientific community is paying more attention to research in the field of reverse logistics. In the growing number of scientific papers in this field, several fields are highlighted, which require more intensive research. Based on literature, it can be

concluded that previous research in this area is of a relatively limited character, since they focus on only a few activities (electronics, automotive industry and parts manufacturing for the automotive industry), or only a few developed economies or fast-growing economies (USA, China, India, Australia, Brazil, etc.). Also, previous research of this type, in the area of our country, was mostly not empirical. In the paper, efforts were made to systematize barriers for the implementation of reverse logistics, based on the relevant literary sources, attitudes and opinions of the academic community. On that basis, a research tool (questionnaire) was made, which, in the framework of the conducted research, made an empirical check of theoretical assumptions, on the research population and the sample, which can be said to be representative.

## 2. SUBJECT, OBJECTIVES AND RESEARCH CONTENT

This paper is the result of a wider research entitled "**Research on the possibilities of improving the reverse logistics in organizations in the territory of the Autonomous Province of Vojvodina**", financed by the Provincial Secretariat for Science and Technological Development, conducted by researchers from the Faculty of Technical Sciences, University of Novi Sad. The aim of researching the possibilities of improving the reverse logistics, as a key element in the supply chains of organizations in the territory of AP Vojvodina, was to use the questionnaire as a research instrument to collect data from the manufacturing sector (where companies with more than 50 employees were taken into account, according to recommendations in [3]), for the purpose of future comparative analyzes, with organizations on the domestic, and especially on the international market. Also, the aim was to point out the shortages in the supply chains that the domestic organization builds towards their customers and suppliers and provide the basis for further improvements through the mechanisms of reverse logistics in order to increase the competitiveness of our organizations in the international market. The reasons for this approach are generated from the need of accelerated and permanent development of the AP Vojvodina economy, but not at the expense of increasing the rate of environmental degradation. Part of the research was related to the identification of barriers for implementation of reverse logistics and their evaluation by respondents, ie research population at the level of organizations from AP Vojvodina.

After a survey of literature and attitudes of the scientific community in the field, a questionnaire was created, as a tool for collecting data. After the first version of the questionnaire was made, validation within the academic community was carried out. Five professors from the Faculty of Technical Sciences in Novi Sad, whose scientific area is Quality, Effectiveness and Logistics, analyzed the questions in the questionnaire and tried to provide answers. For all the questions that were vague, ambiguous, or in any way caused the problem to provide final answers are given suggestions for

improvement. After the changes were made, a pre-test was carried out among business organizations, which included visits to organizations and respondents, in order to eliminate possible ambiguities in the questionnaire and fill in the questionnaire and collect data. In this way, 30 organizations were contacted, who were expected to have a deep understanding of the problem, which is in the focus of the questionnaire, as well as to understand all the terms used in the questions. Of the 30 organizations contacted, 14 gave suggestions for the improvement of certain issues, which is respected. In this way, the final form of the questionnaire was obtained.

After that, 542 organizations were contacted by telephone, in order to obtain their consent to send them an electronic invitation for participating in the survey. The process of distributing and collecting data based on the questionnaire, as a research instrument, is based on **Dillman modified total design survey method** And the operationalization of **Social exchange theory**, in order to achieve a better response of the respondents in the research process. At the end of the survey, 106 completed questionnaires were collected.

By analyzing the data collected in the part of questionnaire with the basic data on organizations, it can be concluded that there is no statistically significant difference between the representation of organizations that participated in the research and the real representation of organizations in the territory of AP Vojvodina. In other words, the organizations that participated in the survey, by their geographical distribution, size, activity, nature and origin of the founding capital, fully reflect the actual structure of organizations from the territory of AP Vojvodina, which supports the representativeness of the sample. Also, the contribution of this research is that the research population was comprised of organizations outside the activity of the electronics and auto industry, which were most often subject to research, according to literature (Table 1). The presence of the food and beverage industry in the sample is particularly significant, which can be very important for the establishment of the reverse flow of materials, especially in terms of product packaging.

**Table 1.** Research population

| Answer Options                                     | Response Percent | Response Count |
|--|------------------|----------------|
| <b>Manufacture of food products</b>                | 30,2%            | 32             |
| <b>Manufacture of beverages</b>                    | 4,7%             | 5              |
| <b>Manufacture of tobacco products</b>             | 2,8%             | 3              |
| <b>Preparation and spinning of textile fibres</b>  | 0,9%             | 1              |
| <b>Manufacture of wearing apparel</b>              | 3,8%             | 4              |
| <b>Manufacture of leather and related products</b> | 0,9%             | 1              |
| <b>Manufacture of wood</b>                         | 2,8%             | 3              |

|  |       |    |
|--|-------|----|
| <b>and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials</b> |       |    |
| <b>Manufacture of paper and paper products</b>   | 1,9%  | 2  |
| <b>Printing and reproduction of recorded media</b>   | 0,0%  | 0  |
| <b>Manufacture of coke and refined petroleum products</b>  | 0,0%  | 0  |
| <b>Manufacture of chemicals and chemical products</b>  | 3,8%  | 4  |
| <b>Manufacture of basic pharmaceutical products and pharmaceutical preparations</b>                                | 1,9%  | 2  |
| <b>Manufacture of rubber and plastic products</b>  | 10,4% | 11 |
| <b>Manufacture of other non-metallic mineral products</b>  | 3,8%  | 4  |
| <b>Manufacture of basic metals</b>   | 2,8%  | 3  |
| <b>Manufacture of fabricated metal products, except machinery and equipment</b>                                    | 16,0% | 17 |
| <b>Manufacture of computer, electronic and optical products</b>  | 0,0%  | 0  |
| <b>Manufacture of electrical equipment</b>   | 2,8%  | 3  |
| <b>Manufacture of machinery and equipment n.e.c.</b>   | 4,7%  | 5  |
| <b>Manufacture of motor vehicles, trailers and semi-trailers</b>   | 1,9%  | 2  |
| <b>Manufacture of other transport equipment</b>  | 1,9%  | 2  |
| <b>Manufacture of furniture</b>  | 2,8%  | 3  |
| <b>Other manufacturing</b>   | 12,3% | 13 |
| <b>Repair and installation of machinery and equipment</b>  | 4,7%  | 5  |

### 3. OVERVIEW OF BARRIERS FOR THE IMPLEMENTATION OF REVERSE LOGISTICS

Due to the fact that the concept of reverse logistics promotes reuse of products, re-production (combined use of the same parts, repaired and new parts) and recycling [4], so the reverse logistics can be compared with environmental management practices and considered their work, in particular with recycling

practice. [5] The positive impact of reverse logistics on reducing waste and its generation can be achieved through changes in the processes of renewal of the product or its parts. [6] Scientific research shows numerous examples of the positive impact of reverse logistics on the performance of organizations, and especially cost savings and generating higher revenues due to the reuse of the same resources, the formalization of jobs in the field of waste collection and sorting, reduction of generated waste quantities and the resulting negative impact on the environment, etc. [7] In addition to the numerous positive effects expected from the implementation of reverse logistics to the business of organizations and their performance, the importance of reverse logistics is undeservedly underestimated by organizations [8] or there is no awareness of its significance, which is one of the basic preconditions for resisting such changes in organization [9]. There is numerous evidence of the competitive advantages of the organizations generated by the use of reverse logistics in the existing logistics processes and, in general, in the established supply chains. However, management of organizations continue to ignore or consider reverse logistics as less important in business processes than the classic product flow - manufacturer-distributor-user. [10] This phenomenon is particularly present in developing countries, where, based on previous research, barriers for implementation of reverse logistics can be grouped into several characteristic groups, as, for example, it is stated in [10] [11] [12] [13] [14] [15].

One of the earliest ways of grouping barriers, listed in [2], according to its significance, shows the division into barriers as follows: importance of reverse logistics relative to other issues, company policies, lack of systems, competitive issues, management inattention, personnel resources, financial resources and legal issues. The most common division, grouping barriers according to their internal and external character. [12] In the survey [16] barriers were divided according to their cause to the organizational, resulting from the consciousness of the management and the current organizational policies; operational, closely related to technical and technological parameters in organizations; and social, caused by climate in society, political decisions and legal norms. One of the comprehensive views is given in [15], where barriers are divided into: managerial, organizational, economic, legal (legislative), technological, infrastructural and market.

In addition to the aforementioned sources, a review was made of other previous research in the area on the basis of which the classification and grouping of barriers was performed for the purposes of this research [17] [18] [19] [20] [21] [22] [23] [24] [25] [26] [27] [28] [29]. The grouping of the barriers was performed according to the criterion of their origin, ie the factor of influence on the process of implementation of reverse logistics in the organizations. An overview of classified barriers is shown in Table 2.

**Table 2.** Classification of barriers for implementation of reverse logistics - research model

|   |   |
|---|---|
| <b>Organizational and Management Barriers (OMB)</b> | <b>OMB1.</b> Lack of competence and knowledge of top management about reverse logistics   |
|   | <b>OMB2.</b> Lack of competence and knowledge of employees about reverse logistics  |
|   | <b>OMB3.</b> Employees' resistance to change (organizational and technical-technological)   |
|   | <b>OMB4.</b> Inadequate internal and external communication of the organization about reverse product flows   |
|   | <b>OMB5.</b> Lack of cooperation with scientific institutions and professional associations, in order to gain knowledge and track trends in the field |
|   | <b>OMB6.</b> Limited capabilities of predicting and planning reverse flows of materials   |
|   | <b>OMB7.</b> Lack of top management commitment  |
| <b>Technical and Technological Barriers (TTB)</b>   | <b>TTB1.</b> The structure and size of the organizations are not suitable for implementation of reverse logistics                                     |
|   | <b>TTB2.</b> Lack of adequate technical and technological capacities  |
|   | <b>TTB3.</b> The lack of a system for measuring and managing the performance of reverse logistics   |
|   | <b>TTB4.</b> The difficulties in providing the required product quality and uniformity  |
|   | <b>TTB5.</b> Difficulties in designing products suitable for recycling and / or reuse   |
| <b>Economic and Financial Barriers (EFB)</b>        | <b>EFB1.</b> Lack of financial resources  |
|   | <b>EFB2.</b> High initial and operating costs of reverse logistics  |
|   | <b>EFB3.</b> The lack of bank funding for "green technologies" and lack of incentives by the state (eg tax relief)                                    |
|   | <b>EFB4.</b> Existence of risk (uncertainty) regarding the functioning of reverse logistics and economic benefits that would be achieved              |

|  |   |
|--|---|
| <b>Market Related and Political Barriers (MPB)</b> | <b>MPB1.</b> Lack of legislation related to reverse logistics and lack of support from the state                          |
|  | <b>MPB2.</b> Lack of cooperation with partners in the supply chain (suppliers and customers)                              |
|  | <b>MPB3.</b> User's impression of the poor quality of used (for example, recycled) products                               |
|  | <b>MPB4.</b> Lack of knowledge of users about the rights and possibilities of returning used products to the manufacturer |

#### 4. RESEARCH RESULTS

After statistical data processing, interesting results were obtained based on respondent responses. Contrary to the expectations, originating from literary sources, more than half of the respondents consider that the lack of competence and knowledge of management and staff do not represent barriers for implementation of reverse logistics in organizations, and only about 30% agree with this claim. Also, as many as 62% of respondents do not believe that the barrier for implementation of reverse logistics is lack of support from the management. Respondents marked the lack of bank funding for "green technologies" as the most important barrier for implementation of reverse logistics, as well as the lack of incentives by the state. This result, in addition to the real low allocation of funds for this area, is due to the insufficient awareness of the respondents about the possibility of obtaining funds for the realization of these activities. Also, as a significant barrier, there is a lack of cooperation with scientific institutions and professional associations, which would enable acquiring knowledge and tracking trends in the field of reverse logistics. Respondents also identified the lack of legal regulations as significant barrier, which should regulate this area of business: lack of cooperation with supply chain partners; lack of knowledge of the users about the rights and possibilities of returning used products to the manufacturer (which is to a great extent the result of legal disorder in this area); a limitation in the possibilities of predicting and planning the reverse flows of materials, which is again a consequence of the systemic disorder of this area; lack of adequate internal and external communication of the organization about the needs and models of reverse flows of materials in supply chains; a risk existence of benefiting from the implementation of a reverse logistics, which is particularly pronounced in unregulated markets. Table 3 presents all percentages of respondents' agreement with claims about the existence of barriers for implementation of reverse logistics in their organizations.

**Table 3.** The results of the research on the existence of barriers for implementation of reverse logistics in organizations in the territory of AP Vojvodina (in percentages)

|             | 1    | 2    | 3    | 4    | 5    |
|-------------|------|------|------|------|------|
| <b>OMB1</b> | 20,0 | 33,3 | 16,7 | 24,4 | 5,6  |
| <b>OMB2</b> | 18,2 | 36,4 | 13,6 | 23,9 | 8,0  |
| <b>OMB3</b> | 23,6 | 24,7 | 19,1 | 27,0 | 5,6  |
| <b>OMB4</b> | 16,9 | 28,1 | 16,9 | 28,1 | 10,1 |
| <b>OMB5</b> | 10,2 | 30,7 | 15,9 | 28,4 | 14,8 |
| <b>OMB6</b> | 12,4 | 21,3 | 24,7 | 33,7 | 7,9  |
| <b>OMB7</b> | 25,3 | 36,8 | 11,5 | 23,0 | 3,4  |
| <b>TTB1</b> | 36,4 | 27,3 | 23,9 | 8,0  | 4,5  |
| <b>TTB2</b> | 24,1 | 29,9 | 21,8 | 19,5 | 4,6  |
| <b>TTB3</b> | 17,0 | 29,5 | 23,9 | 21,6 | 8,0  |
| <b>TTB4</b> | 27,6 | 27,6 | 25,3 | 16,1 | 3,4  |
| <b>TTB5</b> | 23,9 | 23,9 | 21,6 | 21,6 | 9,1  |
| <b>EFB1</b> | 27,9 | 22,1 | 20,9 | 23,3 | 5,8  |
| <b>EFB2</b> | 17,0 | 22,7 | 29,5 | 26,1 | 4,5  |
| <b>EFB3</b> | 8,0  | 12,5 | 25,0 | 29,5 | 25,0 |
| <b>EFB4</b> | 8,0  | 15,9 | 37,5 | 31,8 | 6,8  |
| <b>MPB1</b> | 5,7  | 18,2 | 22,7 | 30,7 | 22,7 |
| <b>MPB2</b> | 11,4 | 26,1 | 15,9 | 39,8 | 6,8  |
| <b>MPB3</b> | 12,8 | 18,6 | 33,7 | 25,6 | 9,3  |
| <b>MPB4</b> | 10,3 | 13,8 | 27,6 | 34,5 | 13,8 |

1 - strongly disagree / 2 - mostly disagree / 3 - neither agree nor disagree / 4 - mostly agree / 5 - strongly agree

By further analysis, it can be noticed that the respondents expressed a certain degree of agreement with the stated claims about the existence of barriers, evenly for 3 of 4 groups. The smallest degree of agreement is present in the group of technical and technological barriers. According to the given answers, it can be concluded that the respondents consider that the mentioned barriers are not significant and that in practice they can be relatively easily overcome or neutralized.

## 5. CONCLUSION AND SUGGESTIONS FOR FURTHER RESEARCH

The result of the research in this paper is an overview of the literature and attitudes of the scientific community in the field of reverse logistics, with a focus on barriers for implementation of reverse logistics. An analysis and grouping of barriers and the formation of a research model were carried out. Based on the questionnaire, as a research instrument, research in the manufacturing sector of AP Vojvodina was conducted and the results of the research were presented.

Further research should include the examination of the impact of these barriers on the connection between the factors (the motivators) for the implementation of reverse logistics and the achieved performance of the organizations, which certainly represents the beginning of a comprehensive analysis of the basis for systemic implementation of the concept of reverse logistics in the manufacturing sector of AP Vojvodina, and therefore the Republic of Serbia. This would take into account the possibilities for achieving efficiency gains in the

established supply chains and the competitiveness of organizations in the domestic and international markets. Also, the future research should be put into the focus of the organization in the manufacturing sector, with the aim of exploring the current level of implementation of the concept of reverse logistics in them. By examining the interdependent effects of these variables within the barriers and motivators for the implementation of reverse logistics, it is necessary to highlight key motivators and the most significant barriers in order to effectively implement the reverse logistics in the existing logistic processes and improve the performance of organizations. Consequently, the future research should, as a result, help organizations in understanding the importance of reverse logistics and its contribution to the sustainable development of our country, as well as creating a database of staff perceptions about reverse logistics and its impact on the competitiveness of organizations. For the purpose of forming a database of information and future development strategies, it is necessary to collect data on the number of organizations that are planning in the future to start activities on the implementation of reverse logistics. This would contribute to: the sustainable development of our country, reducing the use of non-renewable natural resources, reduction of generation and adequate waste disposal and, in general to environmental protection.

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