

Reverse Logistics

Subjects: Business

Contributor: Željko Stević

Reverse logistics is a term commonly used to describe the management of end-of-life products, and mostly refers to the terms reduce, reuse, remanufacture, and recycle. Reduce is a term that refers to waste reduction in manufacturing and the packaging of products. The term reuse refers to the return of an unused product to the manufacturer in order to put the product back into use. The term remanufacture refers to a process of repairing, restoring, or overhauling products to extend their lifespan. Recycle refers to a process in which any component of a product that contains a certain value is returned to the manufacturer. RL should be designed outside the company and should not be limited by waste collection and recycling actions, but other activities should also be included to preserve the value and usefulness of materials for the longest possible period, which would make significant gains for the company's value chain. Implementing RL helps reduce production waste and helps companies make a profit.

Keywords: quality ; reverse logistics ; sustainability ; SERVQUAL model ; waste management ; Signum test ; FUCOM

1. Introduction

The globalization of business together with information technology development has influenced the changes that are happening in the market. The world market is available to all organizations and they can participate in it, which leads to increased competition in the market. Hoping to improve market competitiveness and ensure better long-term development, companies are devoting more and more attention to logistics. Strong, healthy, and well-operated logistics can be an efficient means to reduce costs and increase profit margins ^[1]. Social pressures, environmental legislation, and economic opportunities have put pressure on companies to increasingly advocate for sustainable development policies ^[2]. All of this has influenced companies to increasingly address the issue of how they affect the environment. This has motivated companies to establish the concepts of circular and green economies, as well as sustainable and environmentally friendly logistics development, with reverse logistics (RL) emerging as a means of strengthening their competitive position in the market and mitigating their environmental impact ^[3]. RL includes recycling and the reuse of materials and goods ^[4]. RL is part of logistics and its main task is to enable the return of products from the customer to the manufacturer in order to fully recycle the product or to separate the components that could be reused. The remanufacturing process is widely used in RL ^[5]. The main applications of remanufacturing are forecasting problems, production scheduling, capacity planning, production planning, and inventory management ^[2]. The focus of RL is to maximize the value of end-of-life products through reuse, refabrication, remanufacturing, recycling, and energy recovery of the products ^[6]. RL represents an important segment of sustainability due to aspects of the recycling process and green supply chain issues ^[7]. The proper application of RL not only creates a cleaner environment and allows for proper waste management, but it can also have a significant impact on a country's economic development ^[8].

Adequate waste management, including the implementation of RL, is one of the main challenges facing all countries. It is characteristic of Balkan countries to only recycle a small percentage of waste and to use RL rarely ^[9]. In addition, there is a generally negative perception of quality among consumers regarding the application of RL, and it is necessary to enhance efforts to raise awareness among consumers in the Balkans ^[10]. It is necessary to strengthen the citizens' awareness of recycling and introduce RL in Bosnia and Herzegovina (B&H) wherever possible in order to manage waste.

This research aims to determine the quality of services in RL for the utility company Komunalac Teslić by its service users using an original integrated SERVQUAL–MCDM model. The research, conducted at the company Komunalac Teslić, aims to identify and possibly eliminate certain shortcomings. Using the SERVQUAL model and its five dimensions: responsiveness, empathy, assurance, reliability, and tangibles, the service quality of the utility company Komunalac Teslić will be determined. The most important issues, i.e., goals, that this study addresses relate to the following:

Forming an original SERVQUAL questionnaire of 21 statements used for the first time in the literature of reverse logistics.

Forming an integrated model for determining the quality of service, using Delphi and FUCOM methods to identify the significance of dimensions.

Identifying where the biggest gap is in terms of expectations and perceptions of the quality of RL services in this company.

The application of this approach will enable the company Komunalac Teslić to improve the quality of RL services. In this way, the amount of waste in the city of Teslić will be reduced and the environment will be protected. Therefore, it is necessary to obtain feedback from users in order for RL to have better results in waste management.

2. Details about Reverse Logistics

There are many reasons why business professionals and scientists turn their attention to RL, including the following: growing concern for the environment, competitive advantage, financial potential, legal reasons, and social responsibility ^[11]. RL is closely related to the elements of sustainability within supply chains ^[7]. Creating a sustainable supply chain and sustainability in business itself are the main conditions for competing in the global world market ^[12]. RL plays a significant role in many traditional efforts related to the sustainability of enterprises ^[13]. However, RL is not always required for a supply chain to be sustainable or environmentally friendly, but it is linked to the environmental awareness of enterprises ^[7]. Therefore, it is necessary to observe RL separately from a sustainable supply chain, since it is not an element of sustainability but plays a significant role in reducing the negative effects that a company has on ecology and the environment.

In contrast to the supply chain, i.e., logistics, RL starts from the final destination (customers) and ends at the place of origin (suppliers) ^[14]. Based on that, it can be stated that the user is a key participant in RL. Therefore, it is necessary to develop RL based on user expectations or increase existing customer satisfaction ^[15]. Increasing customer satisfaction is achieved by improving services. The improvement of RL services is achieved by improving the system of quality in companies. Quality management does not directly affect competitiveness, but it does affect certain dimensions, such as increasing customer satisfaction, attracting new customers, improving the image of companies and various other factors that lead to an improved competitiveness within companies and their market survival in times of crisis ^[16]. Quality management seeks not only to meet or exceed customer expectations but also to meet the expectations of other interested parties important to the company, e.g., the public, regulatory bodies, and suppliers ^[17].

In order to manage quality in RL, it is necessary to examine customer satisfaction, as this is key to RL. To achieve this, different models are used, and the most prominent is SERVQUAL. Wang et al. ^[18] showed that the SERVQUAL model was used the most and cited by researchers, and thanks to that the model significantly contributed to service quality research. Apart from that, many organizations have improved their quality after the application of the SERVQUAL model after obtaining poor results in the initial stage. In addition, SERVQUAL is a very useful tool for recognizing customer requirements ^[19]. The SERVQUAL model was known as the Gap Model, and it is used to measure quality in relation to expectations and the evaluation of performance ^[20]. The difference between expectations and the evaluation of performance is quality. If expectations are higher than the evaluation of performance, then the level of quality is low and vice versa.

Meidutė-Kavaliauskienė et al. ^[21] have proved that the SERVQUAL method is suitable for identifying sectoral value gaps in logistics and its application ensures competitive advantages. Prentkovskis et al. ^[22] proved the applicability of the SQ model in combination with a MCDM method using the example of a logistics service in an express post company. In their research applying SERVQUAL, Kilibarda et al. ^[23] proved that the quality of logistics services was not at a satisfactory level in Serbia. Using SERVQUAL, Knop ^[24] showed that the quality of the service provided by transport and logistics operators in the pharmaceutical industry was such that the expectations regarding the quality of services provided by these operators were higher than the actual quality level obtained for all dimensions of the service quality being evaluated. Limbourg et al. ^[25] examined the quality of logistics services using SERVQUAL on a sample of 200 logistics service users in the city of Da Nang and showed that the customer support programs needed to be improved. Using the SERVQUAL model, Memić et al. ^[26] showed that the users were not satisfied with the logistics services of a passenger transport company since all the dimensions had negative values regarding the difference between the observations and the expectations. Czajkowska and Stasiak-Betlejewska ^[27] used the SERVQUAL method to measure the expectations and the perceptions of the quality of logistics services in companies operating in Eastern Europe and showed that the quality of the services in the areas of "Empathy" and "Materiality" should be improved. Roslan et al. ^[28] proposed a SERVQUAL-based model to measure the differences between customer satisfaction and desire in terms of the quality of logistics services provided by manufacturers in Iskandar, Malaysia. Parmata et al. ^[29] used SERVQUAL to measure the quality of

the service of three major pharmaceutical distributors in India and to show how service quality affects service satisfaction. These studies have shown the effectiveness of the SERVQUAL model in testing the quality of services in logistics.

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