REVERSE LOGISTICS IN AGRICULTURE

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Abstract Reverse logistics is a relatively new research area, both in theoretical and empirical terms. Due to the requirements of modern civilization, the present society produces more and more material goods that satisfy it different needs. The consequences of these actions include a huge amount of waste both during production of these goods as well as after their use. The article defines the concept of reverse logistics. Consider problems in reverse logistics in agriculture, organization of reverse logistics operations and ways to improve reverse logistics operations.

Keywords: logistics, agriculture, reverse logistics costumer, food, logistics organization.

University of Maribor Press

DOI https://doi.org/10.18690/978-961-286-406-4.5
ISBN 978-961-286-406-4

1 Introduction

Due to the requirements of modern civilization, today's society produces more and more material goods that meet various requirements. The consequence of these activities is a huge amount of waste generated both during the production of these goods and after their use. These wastes have become an inseparable factor of human living and economic activity. Technologies of production are changing and the variety of waste is changing[1].

The object of interest of modern logistics is increasingly solving problems and looking for new paths related to waste management.

Because of this reverse logistics developed. It covers all processes related to waste and information flows from places where they arise to their final destination[2].

2 Reverse logistics

Reverse logistics is a field of logistics dealing with the examination of the patterns associated with the flows of products whose life cycle has ended. Waste management can be significantly supported through logistic activities- hence the concept of reverse logistics[3]. Reverse logistics is a quite young term in the literature, and perhaps that is why there is no final clear definition. Reverse logistics is also known by the concepts waste logistics, disposal logistics, recycle logistics. The concept of reverse logistics appeared already in the 1980s. Lambert and Stock (1981) defined reverse logistics as the flow direction is opposite to the traditional flow materials in the logistics chain. In the 1980s, Murphy and Poist (1989), inspired by the reverse direction of product flows, defined reverse logistics as the products flow in the supply chain from consumers to producers. Polen and Farris agreed with this definition (1992), they defined the final consumer and emphasized the reverse nature of the product flow in the supply chain, but did not define the main activities of reverse logistics. The concept of reverse logistics continued to evolve in the 1990s. Stock (1992) formulated a definition that emphasized the role of recycling in the logistics of waste disposal and reuse. This definition was summarized by Kopicki (1993): 'adding information flow to the reverse supply chain keeps it functioning'. In the late nineties, Rogers and Tibben-Lembke defined goals and logistics processes, defining reverse logistics as a planning process, design, implement and

control, cost effective flows of raw materials, production inventories, finished products and related information from destination to origin for restoration or total disposal. Reverse logistics applies to flows where there is the possibility of reimbursing the cost of used products and where the release of these products creates a new supply chain. The full definition of reverse logistics, as according to The Council of Logistics Management, is the process of implementing, controlling, and planning the cost-effective flow of finished goods, raw materials, and in-process inventory. The flow is from the point of consumption (i.e. the customer) to the point of origin (i.e. the manufacturer), to properly dispose of these or to recapture value. Included in this definition is any re-manufacturing or refurbishment of goods.[4]

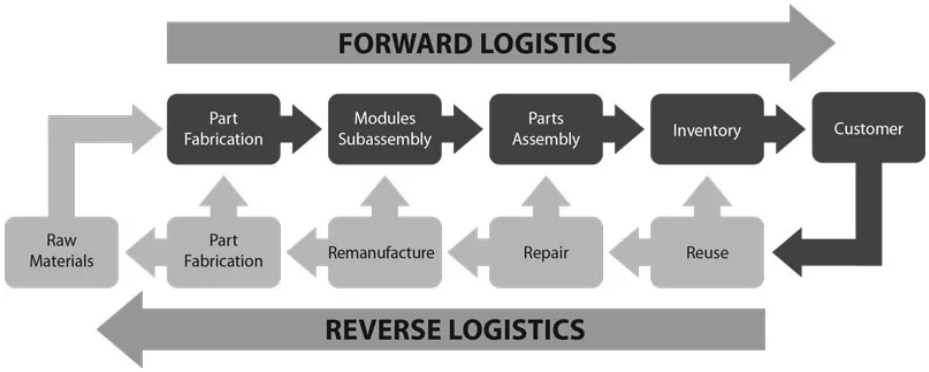

Figure 1: Reverse logistics scheme

Some reverse logistics examples are: Return of goods by customers, Return of unsold goods by distribution partners due to contract terms, Re-use of packaging, Refurbishment of goods, Repairs and maintenance as per guarantee agreements, Re-manufacturing of goods from returned or defective items, Selling of goods to a secondary market in response to returns or overstocking and Recycling and disposal of end-of-life goods.[5]

3 Reverse logistics in agriculture

Reverse logistics can be used in agribusiness to reduce food waste and provide consumers with quality and safe food without posing a serious threat to human health, well-being and the environment. A chain of over-purchasing, premature harvesting, inappropriate labelling and storage instructions, poor storage and

transportation, manufacturing errors, trial runs, packaging defects and incorrect weight and size which directly affect stock forecasting, continuous food supply, quality management, return and waste management.

3.1 Reverse logistics problems in agriculture

The biggest problem with reverse logistics processes for agro-food products is their perishable nature, which can become unsafe even due to small failures in process control, which creates a food safety incident and can subsequently pose a possible threat to the health of consumers.

Agribusiness companies try to avoid returns and rejects whenever possible. If a return does occur, the process usually consists of checking the batch number, writing off the shipment, and making a trip to the nearest food dump. Which is the second problem of reverse logistics in the agriculture industry: lack of experience, networks and manpower to safely return products.

Each return that occurs in the food supply chain is treated as a unique, separate transaction, and therefore, these returns tend to involve higher downtime and costs. They can also disrupt the existing supply chain since they may repurpose buildings and personnel to handle a transaction they do not usually do.

In the food industry, it is very important to monitor the supply chain and disruptions due to food spoilage. Reverse logistics in the food industry demands carefully developed practices tailored to a reverse supply chain as well as transportation assets and facilities.

Some of the key factors in setting up the Reverse Logistics operations are:

- **Segregation and sorting:** this process needs to be optimized in order to avoid excessive spending on transportation. Also, large volume of similar type of products are likely to be handled more efficient than a group of products with divergent characteristics.
- **Transportation management:** reverse supply chain has its own practices and needs, hence using transportation and facilities that serve existing forward supply chain can cause disruptions and interfere in getting sellable

products to the market. However, this can be avoided by simplifying the operation i.e. by allowing each store to return material only when they are the last in the supply route since for retailers with multiple supply stores it is most efficient to collect the returned material to the Distribution Centres with the same truck that delivers the products.

- **Warehouse management:** warehouse design for placement and handling of returns, storage, waste management and integration of sale or reprocessing. All returned products that are nearing the end of their lifecycle may not always be sold at their original price, but can be put back in stock to be shipped to another market.
- **Information Management:** effective information systems are needed to individually track and track product returns. Uses barcodes, computerized return tracking, electronic document interchange to improve their reverse logistics operations and tracking. Complexity in the agricultural industry, producers must protect and control not only batches, but also the shelf life of products[6].

Ways to improve reverse logistics operations:

- **Automation:** automating return processing for similar items or items packed in the same container can simplify operations.
- **Efficient warehouse planning:** for efficient cargo handling, it is necessary to take into account return handling (destination and future storage locations) when designing a warehouse, and not just a direct flow.
- **Better In-house Operations:** food retailers and processors can speed up the process and reduce waste through better screening, segregation, centralized return.

4 Conclusion

Landfill disposal might be a simplest option, but it should be a last resort for both financial and environmental reasons. Ideally, recalled food product should be composted and any packaging recycled. Organic waste should be converted to renewable energy and polymeric materials should be recycled and reused. Reverse

logistics in the agriculture demands carefully developed practices tailored to a reverse supply chain as well as transportation assets and warehousing.

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