

## Relationship between Knowledge Management and Reverse Logistics. A theoretical approach

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**Abstract.** Reverse Logistics is essential for the competitiveness of firms identifying and optimally coordinating the movement of manufactured products that return to the company. In Reverse Logistics activities is particularly relevant Knowledge Management. Capture the knowledge generated in these activities helps to address the problems of organization, identification, location and use of knowledge logistics. Therefore Reverse Logistics and Knowledge Management are closely related as is shown in theoretical foundations that have shared, in the importance of the creation of knowledge and information systems for Reverse logistics.

**Keywords:** Reverse Logistics, Knowledge Management, Information System

### 1. Introduction

Despite recent advances in Logistics and Reverse Logistics, the need to develop theoretically the strategic role of the Logistics and Reverse Logistics remains a priority [1, 2]. Current competitive environment requires more agile firm in the market to survive and succeed. Therefore, the importance of Reverse Logistics is growing for companies [3]. Changes in the economy, which has become more intensive in information, more global and more dependent on technology, makes the Logistics and Knowledge Management a major source of sustainable competitive advantages [3, 4, 5]. Furthermore, consideration of a reverse flow in the Logistics function amplifies the competitive capabilities of the company, increasing the resources on which to develop the potential of leading to the achievement of sustainable competitive advantage [1].

Theoretical adaptations of other topics are common and beneficial to raise the level of theoretical development [1]. Knowledge Management and Reverse Logistics are two areas of knowledge of great interest that grows continuously, but still have a lack of research concerning its interrelations, so due to the importance of both topics we propose analyse this relationship by focusing firstly on the theoretical foundations both topics have in common. Secondly, we examine the creation of knowledge including Reverse Logistics. Finally, we discuss the importance for the Reverse Logistics and Knowledge Management of information systems and information technology.

### 2. Common theoretical foundations: Knowledge Management and Reverse Logistics from the perspective of the Resources Based View theory

Intangibles resources have become very important [6] and between all the intangibles stands out for its highly strategic role the knowledge [7] that currently leads to the birth of the "vision of the firm based on knowledge" and to the need to manage this knowledge. Knowledge Management is an extension to the Resources Based View theory and focuses its study on knowledge as an important resource [6]. Resources Based View is fully linked with the concepts associated with Knowledge Management. Both approaches

focus on the creation of distinctive capabilities (also called core competencies) in the long term. These distinctive capabilities are based primarily on resources and capabilities of an intangible nature.

Also researches about strategic capabilities under the approach of the Resources Based View have an implicit influence on recent investigations about Reverse Logistics [8]. The Resources Based View has the potential to be applied to important areas of Reverse Logistics research. On the Resources Based View to analyze the resources we distinguish between tangible and intangible resources [9] and these can be developed within the company or purchased outside where they adapted and developed. The resources can be grouped into 3 categories [6, 10, 11]:

1. **Inputs.** Generic resources that can be purchased on the market. The logistical inputs include those related to raw materials (forklifts, store shelves, packaging, inventory) and management (skills in obtaining, handling, collection, and computation). When transformed or applied, the inputs become part of the assets or capabilities of the company contributing directly to the final product of the company.

2. **Assets.** These are stocks of available factors owned or controlled by the firm [10]. Can only be generated through the accumulation, through or investment flows over time. Assets can be tangible or intangible, and are visible resources [11]. Examples of assets are capital goods, patents, brand name, articulated and codified knowledge [12]. Examples of logistics assets are stores, plant, fleet management, communications technology satellite trucks and computer networks.

3. **Capabilities.** Are complex sets of individual skills, assets and accumulated knowledge acquired in the organizational processes that allow the company to coordinate activities and make use of their resources [4, 10, 12]. Examples of logistics capabilities are: the ability to manage supplier relationships, technological skills, the ability to work as a team, service delivery, and compliance with orders. The difference between assets and capabilities is that the assets referred to "take", while capabilities refer to "doing", which makes them invisible [11]. In addition, capabilities using knowledge based on resources that combine action and cognition [4]. The knowledge base of capabilities makes the company specific, socially complex and systematic.

### **3. Knowledge creation and Reverse Logistics**

During the last decades research in Reverse Logistics has intensified significantly. Several authors have paid attention to the creation of logistics knowledge [2,13].

To Analyze Knowledge Management previously it should be differentiated the concepts of data, information and knowledge to gain a better understanding of the whole process of knowledge management. In Reverse Logistics, the data have a variety of sources: corporate allies reverse flow system, as suppliers, retailers, manufacturers, remanufacturing, and reverse logistics service providers [14]. Specialists who act as collectors of products for the return string are a key source of data. Employees, scientific studies and questionnaires also serve as data sources. The creation and data processing of returns is a target for Reverse Logistics. Thus it may be important to develop an experimental platform that will eventually allow testing of various configurations for the return string, and add the establishment of different operations and planning for each of the units from the client after use. The platform will be used as an integration tool for a variety of activities in return, converging in one place. This experimental platform could be formed by software that would manage collectively the supply management of returns, remanufacturing and redeployment operations, using local materials and detailed information [14].

Regarding the information in Reverse Logistics, we must bear in mind that planning and control is a complex process in Reverse Logistics due to the uncertainty in the customer time, uncertainty about the origin and quality status of returns. Reverse Logistics in the information flows in line with product flows, but have a lag compared to physical flows, that is, information is generated by a physical process that occurs in some physical flows. Here, the information can be used to get information from coming back before reaching the physical flow process [14]. As noted [15] information and communication technologies (ICT) can be used to minimize uncertainty volume of incoming returns. To achieve this, the Reverse Logistics to share real-time information on the product design for disassembly information, local information and information

lifecycle. Thus, participants in the reverse flow can manage the knowledge and activities related to return on several levels.

With regard knowledge in Reverse Logistics, saying that since the high degree of uncertainty an important characteristic of reverse logistics, knowledge management can play an important role in this domain. A workable plan for the collection and recovery can be a difficult task for the decision maker. Moreover, the shape of the recovery and the sequence of steps required for this process are often dependent on the quality of the input, knowledge and information about the returned product, which is another unknown factor. The main advantage of the Knowledge Management in Reverse Logistics is that this facilitates the management of diverse resources and shifting nature of the activities of Reverse Logistics [14]. Mostly, knowledge management focuses on understanding how knowledge is acquired, created, stored and used in an organization. Knowledge Management in Reverse Logistics integrates information from external and internal elements of the management process of the product returned, aid to allies in Reverse Logistics to make appropriate choices, supports the process, and manages partnerships [14]. The knowledge needed to be integrated in different phases is shown in Table 1.

Table n° 1. Phases of integration of knowledge in Reverse Logistics

<b>Origin of knowledge</b>	<b>Type of knowledge</b>	<b>Application of knowledge</b>
Collection Phase	Availability of the collection center Transport distance Transit time Transport costs Product Categories	Inspection / Separation specialized
Recovery Phase	inventory Inspection / Separation Product design knowledge and expertise Cost of remanufacturing knowledge of the time Knowledge of the availability	Product design and development Production planning and control of collection and distribution phase
Distribution	Distribution of cost and time Customer feedback and awareness of the availability of orders	retail customers Phase of recovery and collection

Source: Wadhwa and Madaan [14]

To store and later retrieve the knowledge generated in various functional points of Reverse Logistics, determine what knowledge is important to keep, and the best way to hold it. Knowledge of various points of the Reverse Logistics and who needs that knowledge is shown in Table 1. So, the generation of knowledge can play key roles in creating value in reverse logistics activities [16].

#### **4. Information systems in Reverse Logistics**

The increased importance of the role played by information in the structure and management of the relationship between companies justifies the need to develop new capabilities to generate, transmit and process information. Here is the importance of Knowledge Management in Reverse Logistics. In addition, information has a key role as a minimizer of the uncertainty in the decision making process [17] and planning [18].

One of the most important roles in knowledge management is carried out by the information technology / information systems. These keep the memory of the organization that enables companies to have specific knowledge as well as the idiosyncrasies of their business. In logistics systems can distinguish two types of information companies: tactical information to optimize the logistics processes between companies, commonly called common local competitive advantage, and strategic information on the learning in each company, called individual competitive advantage [19]. The information technology / information support has been long recognized as a competitive weapon, able to achieve profitability for the firm[20]. More specifically, the information and its relationship with profitability are well documented and recognized in

logistics [21]. The empirical research of Closs et al. [21] serves to quantify the relationship between the capabilities of information systems and competition logistics / logistics performance. Information support is particularly critical for efficiency in Reverse Logistics operations [22]. Reverse Logistics is often characterized by uncertainty and the need for time / fast processing. While some industries can use a record of information to project the type and quantity of returns, returns in other industries are much more difficult to predict. Even in those industries less predictable, but managers cannot know when (or if) the products are returned; they must be prepared to process and handle products quickly on demand. Thus, an accurate exchange and access to information should be considered the top priority. In these situations, coordination of information is complicated by the multiple parties involved, which require such coordination to ensure maximum efficiency, and communication becomes particularly critical to facilitate interactions and promote long-term business relationships [23].

Global logistics organizations recognize the importance of information support and focus on its capacity and compatibility. However, sharing information between organizations quickly is only possible if information systems are compatible [22]. In the context of Reverse Logistics, this would mean that the information system must be matched to the channel members [22].

In summary, Reverse Logistics programs illustrate the need for an information carrier and it requires coordination among multiple parties [23]. Buyers and sellers should interact to set tasks such as management or the highest good. This requires support systems to facilitate the exchange. Moreover, the procedures in reverse logistics are not standard in the distribution to buyers and when the seller must claim the product the buyer. As noted by Rogers and Tibben-Lembke [24, pp 43]) "one of the most serious problems facing enterprises in the execution of the operation of Reverse Logistics is the lack of good information."

## 5. Final remarks

Reverse Logistics activities require an appropriated Knowledge Management at all stages of return of the product to solve problems that must be addressed in all these processes [14].

Knowledge Management and Reverse Logistics have common theoretical foundation. The strategic role of knowledge as an intangible that achieves sustainable competitive advantage for the organization fully connected with the Theory of Resources and Capabilities. Moreover, this theory can be applied to important areas of research of reverse logistics, as the tangible and intangible resources can be developed inside the company [9] as logistical inputs, logistics assets and capabilities logistics [3, 4]. Therefore, both variables have a leading strategic role in business management.

Thus, the logistics activities are quite complex and have a high uncertainty [14] by treating the information [15], the creation of logistics knowledge, especially through the creation of knowledge [14], plays a key role in value creation [16]. Also, due to the importance of knowledge in logistics, it is necessary that the organization has the capacity to generate new knowledge, which also reduces the uncertainty [17,18] and improves responsiveness to the continuous changes of Reverse Logistics systems.

In this sense, sharing information between organizations quickly is important for organizations and it needs information systems are compatible the channel members [22].

In short, Knowledge Management and Reverse Logistics play a key strategic role for the company and both have a close relationship support what the company could greater advantages.

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