include Supply Chain Management, controlling and pre - assembly. Supply of goods to the assembly line and services provided to end customers are also of great importance.

Reference

1. www.wnp.pl
2. „*Logistyka*", Czasopismo dla profesjonalistów 3/2004 maj- czerwiec.
3. „*Gospodarka materiałowa & Logistyka*", 3/2005 Polskie Wydawnictwo Ekonomiczne.
4. www.operatorlogistyczny.pl
5. „*Logistyka*" Czasopismo dla profesjonalistów, 5/2004 wrzesień- październik.
6. Prace Habilitacyjne, M. Szymczak , *Logistyka w procesie internacjonalizacji przedsiębiorstw*, Poznań 2004.

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MAIN MATTERS OF REVERSE LOGISTICS

Abstract.: Reverse logistics is a very useful tool for enterprises which have to deal with production wastes and commercial returns. Forward logistics is not able to manage them, because they show up on the beginning of reverse supply chain. That is the reason for growing importance of reverse flows. Reverse logistics is quite new logistics system and the most common is using in developed countries. The reasons of this are high costs of such system and some organizational problems. This paper presents the idea of reverse logistics, main differences between forward and reverse logistics, its costs and major problems.

Key words: forward logistics, reverse logistics, wastes, returns

Logistics should be treating not only as a theoretical discipline, but also as a practical one. The reason for that are a strong connections between logistics and many others areas of knowledge and economy activities. Logistics might be consider as a discipline and also as an activity which is supporting management of materials, transport, production, distribution or all infrastructure. Also, it can be an important factor for effectiveness assessment or determinant of competitive position[1].

As a main point of formulating forward logistics definitions is "7R" rule, which specify that fundamental of logistics is to provide the right products, at the right time, at the right place, to the right customer, with the right volume, right quality and right cost[2].

The most common logistics definition says that it is the part of the supply chain which is connected with planning, implementing, and controlling flows and storage of products, services and related information from the point of origin to the point of consumption in order to meet requirements of customers[3].

The forward logistics processes are characterized by activities concerning flows of goods, their physical movements, materials and products storage and flows of information needed in each economical process and its successful realization[4]. So in very short way traditional logistics consist in delivery the final product to the end consumer.

For past decades enterprises have been using forward logistics processes in their economic performance and their management was fully successful. But since few years forward logistics become insufficient for some parts of management. A lot of companies faced of problems concerning high costs of materials to production, high costs of waste final disposal or problems with return

[1] Kościelniak H. „Effectiveness Evaluation of Enterprise Logistic Systems." Prace Wydz. Zarządzania Politechniki Częstochowskiej nr 7, Częstochowa 2002.
[2] Abt S. „Logistyka w teorii i praktyce" AE w Poznaniu Poznań 2001, s.16
[3] Council of Logistics Management (CLM), Oak Brook, Illinois, 1999.
[4] Skowronek C., Sarjusz-Wolski Z „Logistyka w przedsiębiorstwie" PWE Warszawa 1995.

products. Additionally many countries made their law stricter, what became a reason for firms to find some alternative ways to manage their problems[1].

Such alternative is reverse logistics. In Poland reverse logistics is really new system and not many companies are using its support, but in many other countries reverse logistics is very popular and useful, especially in developed countries. This subsystem of forward logistics is the answer for growing technical and technological innovations, which cause environmental pollution and conflict between growing economy and ecology. Here was necessary to create environmental management where the most important tool is reverse logistics. Their role is to recreate and restore the economical and ecological balance.

Because reverse logistics is quite new system, there are also many different terms in literature, which sound different but mean the same. "Green logistics", "ecologistics", "return logistics", "waste logistics" or "reverse distribution" – all the terms have the same meaning as reverse logistics[2].

The most common definition of reverse logistics is the one made by Council of Logistics Management – this organization also standardize the name. By definition reverse logistics is the term used in connection with the role of logistics in recycling, waste disposal and managing hazardous materials. In wider perspective reverse logistics include all activities connected with logistics and used for reduce, recycling, substitution or reuse materials and final disposition[3].

Farther definition says that reverse logistics is the movement of products or materials in the opposite direction for the purpose of creating or recapturing value, or for proper disposal, so the reverse flows may consist products or packing[4].

In literature very often exists an opinion, that the main purposes of reverse logistics are: waste collection and segregation, their transport, storage and remanufacturing or utilization. It is because the major sources of reverse flows are products which are returned by the consumers and wastes coming from the production and after production.

Reverse flows are very different from forward flows, the same as different is reverse logistics from forward logistics (see Table 1). The greatest difference between them is, that all processes of reverse logistics are leading inversely.

Planning strongly connected with forecasting in reverse logistics is hardly more difficult than in traditional logistics. Its because usually the demand for new products and materials in forward flows is known and in reverse flows unknown is the returns rates and waste volumes. Also the distribution is harder in reverse logistics. In forward one all products are taken from one distribution place and transporting to sales points. In reverse logistics products and materials are taken from different points and are collected in one distribution place. Than, usually the quality of materials and products in reverse flows is lower than in forward. They might be damaged or just used, what makes necessary to add some more value for them before will be use again.

Reverse logistics characterization is quite hard because of the differentiation reverse processes in comparison with forward logistics. Reverse logistics system has its beginning when the used products are coming back to the supply chain or when some kinds of wastes show up in the production processes. So reverse logistics processes are strongly connected with production wastes or returned products. To make sure that after creation of reverse logistics system in the company there will be the

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[1] Kościelniak H. „Logistics and the Activity Effectivenes of Enterprises." Eighth International Symposium on Inventories Abstracts Budapest, 1994.

[2] Melissen F. W., de Ron A.J. "Defining recovery practices - definitions and terminology". International Journal on Environmentally Conscious Manufacturing and Design, 8(2):1–18, 1999.

[3] Stock J. R. "Reverse Logistics". Council of Logistics Management, Oak Brook, IL, 1992.

[4] Rogers D., Tibben-Lembke R. "An overview of reverse logistics practices". Journal of Business Logistics, vol. 22., 2001.

stable flow of used products or wastes, there are forming special organizations, like collection centers, which collect and manage objects for reverse logistics and reverse flows. Than the objects are selected, what means the control and tests of quality, which products or materials can be remanufacture and reuse. These with very small value are disposing on the landfill. And these, which are still valuable for the enterprise are farther reprocessing and remanufacturing and after depending on this value are using in processes like reusing, repairing, refreshing or recycling. When products are on the end of reverse supply chain, than they can join the beginning of the forward supply chain[1].

Table 1. Main differences between forward and reverse logistics.

FORWARD LOGISTICS	REVERSE LOGISTICS
Quite easy forecasting	Not predictable forecasting
Distribution from one point to many	Distribution from many points to one
Uniform product quality	Different product quality
Uniform product packaging	Damaged product packing
Specified destinations and routes	Not specified destinations and routes
Specified decision options	Not specified decision options
Uniform pricing	Pricing depends on many factors
Speed importance	Speed is not necessary
Clear costs of distribution	Costs of distribution less visible
Consistent inventory management	Not consistent inventory management
Controllability product life cycle	Complexity of product life cycle
Easy negotiations in supply chain	Complicated negotiations in supply chain
Well-known marketing methods	Complicated marketing by many factors
Large transparency of processes	Small transparency of processes

Source: Based on: Grabara J.: Wykorzystanie Handlu Elektronicznego do Realizacji Zadań Logistyki Odwrotnej, [w] Komputerowo Zintegrowane Zarządzanie; 2004.

In theory organization of reverse logistics processes should not be very complicated. But the practice shows that it is much more difficult as it seems. The problem here is with proper tracking used or damaged products while they are returning. It is really important issue here, because if it is not clear when the product will be return and where is it from, than the costs might be really high and connected with necessity for waste transportation and storage.

In reverse logistics the costs of this system are usually higher than in forward one. That is one of the reasons why many companies are still delaying the introduction. Here, thinking about the costs, it is possible to compare the costs of reverse logistics and forward logistics[2]:

- Costs of transportation are much greater in reverse logistics, because usually reverse shipments are smaller.
- Costs of inventory holding are lower in reverse logistics than in traditional one, the calculation here is based on inventory theory, where this costs is counting as a percentage of the product value – so when in reverse logistics the products have always lower value also the costs of inventory holding should be lower.
- Costs of handling are much higher for reverse logistics, because smaller volumes of shipments are connected with more material handling costs.
- Costs of obsolescence may be higher for reverse logistics, because returned products may be returned or shipped after a long time and after this period these products are loosing value and are obsolescence and the same have less options for reusing.

[1] Grabara J. "Logistyka odwrotna jako element zwiększenia konkurencyjności rynkowej przedsiębiorstw". VII.Konferencja Logistyki Stosowanej."Total Logistic Management".TLM. Zakopane 2003.

[2] Tibben-Lembke R., Rogers D.: "Differences between forward and reverse logistics". Supply Chain Management: An International Journal. Nr 5, 2002.

- Costs of quality control and tests are much greater in reverse logistics because each returned product has to be controlled and tested before any decision will be made. It is necessary to make sure that product can be reuse.
- Costs of collection are much higher and less standardized in reverse logistics and they are the major costs, they are connected with collecting returned products from different localizations.
- Other costs which do not exist in forward logistics like costs of refurbishment, repacking, changing value, reworking – which are strongly connected with adding value to returned products.

So as it is presented, costs of reverse logistics usually are higher than in forward logistics. But here is one important aspect of this – costs are high but the benefits of such reverse system are really important.

Considering reverse logistics it is necessary to mention about four rules, which are important for successful using reverse logistics systems. These rules are[1]:

- using in production materials coming from recovery instead new materials,
- using environmental friendly materials,
- reusing materials coming from recovery (especially packing),
- recovering of materials and used products.

All these activities are very expensive and need a lot of efforts from companies. It is very important to implement reverse logistics system from the beginning. So at first there is need for proper product designing. It has to be special design to make possible its later reuse. It means, that before production starts, the product has to be already forecast for later return and recovery.

By using reverse logistics companies at first might have better competitive position on the market. It is because customers treat them as more responsible, but also here a big advantage is the possibility for returning used products. Than, these enterprises follow the law regulations connected with environmental protection. It is really important, because reverse logistics may be treated as the major tool for environmental management.

References:

1. Abt S. „Logistyka w teorii i praktyce" AE w Poznaniu Poznań 2001, s.16
2. Council of Logistics Management (CLM), Oak Brook, Illinois, 1999.
3. Grabara J. "Logistyka odwrotna jako element zwiększenia konkurencyjności rynkowej przedsiębiorstw". VII Konferencja Logistyki Stosowanej "Total Logistic Management" TLM. Zakopane 2003.
4. Grabara J.: „Wykorzystanie Handlu Elektronicznego do Realizacji Zadań Logistyki Odwrotnej", Komputerowo Zintegrowane Zarządzanie, 2004.
5. Kościelniak H. „Effectiveness Evaluation of Enterprise Logistic Systems." Prace Wydz. Zarządzania Politechniki Częstochowskiej nr 7, Częstochowa 2002.
6. Kościelniak H. „Logistics and the Activity Effectivenes of Enterprises." Eighth International Symposium on Inventories Abstracts Budapest, 1994.
7. Melissen F. W., de Ron A.J. "Defining recovery practices - definitions and terminology". International Journal on Environmentally Conscious Manufacturing and Design, 8(2):1–18, 1999.
8. Rogers D., Tibben-Lembke R. "An overview of reverse logistics practices". Journal of Business Logistics, vol. 22., 2001.
9. Skowronek C., Sarjusz-Wolski Z. „Logistyka w przedsiębiorstwie" PWE Warszawa 1995.
10. Stock J. R. "Reverse Logistics". Council of Logistics Management, Oak Brook, IL, 1992.
11. Tibben-Lembke R., Rogers D.: "Differences between forward and reverse logistics". Supply Chain Management: An International Journal. Nr 5, 2002.
12. Wu H.J., Dunn S.C.: "Environmentally Responsible Logistics Systems", International Journal of Distribution & Logistics Management (25); 1995.

[1] Wu H.J., Dunn S.C.: "Environmentally Responsible Logistics Systems", [w] International Journal of Distribution & Logistics Management (25); 1995.