Evaluation of More Economical Collection and Removal of Old Vehicles

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Abstract. The duty of every person is to maintain such a world as we know it today. To fulfill this obligation, each of us should strive to ensure that together we are able to evaluate different types of waste, and thus again "transform" them into something useful. One of the types of everyday waste which people should deal with is the constantly increasing volume of waste created by old cars. Because of this, we have decided to focus on the following issue in order to point out the fact that if we process waste at substantially lower costs, we can maintain the current ecology. The administrative decisions we will try to build on current information legislation, technology processing or directly from the processor to waste. We will evaluate the collection points and authorized recyclers of old cars. This work was supported by project VEGA 1/1056/12.

Keywords: Reverse logistics · Decisions · Old car · Environment · Waste

1 Introduction

In the present time it should be the duty of every person to conserve nature and in fact the whole world in the state we find it in today – and not to damage, devastate and destroy it. Although this topic is drawing ever more attention, in many production and non-production enterprises and in households this issue is still being neglected or underestimated. In manufacturing companies return (reverse) logistics and recycling should deal with these problems. Despite the fact that reverse logistics was formulated back in the 1990 s, the attention being paid to it is insufficient, or interpreted in different ways. In the literature too there exist two streams: American authors perceive exclusively goods which are returned from stores in the form of unsold products or returns, while German authors who have carried out detailed analyses of the possibilities of recycling industrial and communal waste, have another view on reverse logistics. This relates principally to growing ecological demands and not just that from pressure groups, but also to proposed legislation in this area. In the present period, reverse logistics has come to be oriented not only on returned goods but also on the possibilities for adopting legislation in the form of manufacturing products which are made from recyclable materials. As has been mentioned previously, this should be a priority for each of us. We should be trying to achieve valuations of different types of waste, in other words to 'remake' them into something useful. One of these types of waste which

R. Giaffreda et al. (Eds.): IoT360 2014, Part II, LNICST 151, pp. 16–20, 2015.
DOI: 10.1007/978-3-319-19743-2_3

people should closely examine is discarded vehicles, whose volume is continually on the upturn. Through this theme, we will try to point to the fact that if we can process waste at lower costs, we can manage to maintain contemporary ecological levels. In making decisions, managers should start from existing information on legislation, processing technologies, and this right at the creators of such waste. In the following text we will evaluate collection points and authorized old car dealers.

2 Parameters and Methods of Evaluating Distribution Chains

Contemporary collection center have their places in distribution channels. Their task is pivotal in the storing of used automobiles. We will evaluate one firm which administers 28 collection centers, and will look at it on the basis of the following selected three parameters. This will help us gain an overall picture of its successfulness. The parameters are as follows:

- *Number of vehicles purchased per* year – this is a positive parameter, which tells us about the maximum capacity of the distribution channel. It is essentially a summary evaluation number which characterizes how many used vehicles are taken into the collection center per year.
- *Distance to a collection center* – this is a negative parameter, since an increase in the number of kilometers from a processing center reduces the financial 'benefit,' since it is necessary to transport a car from a further distance. This parameter naturally increases costs since the shipping of a discarded vehicle includes expenses such as tolls, petrol costs and the time a driver spends delivering the vehicle.
- *Number of pick-ups* – in this parameter, one pick-up represents one necessary stop by the haulage truck to 'collect' an old car. With an increased number of purchased vehicles, the number of pick-ups also directly increases proportionally.

2.1 Graph Method

In the following Fig. 1 we perform a comparison of centers in the three parameters listed above. It is necessary to mention however that the height of the columns do not correspond mutually among each other for each collection center, but only in the given category with other collection centers (according to color).

From this it can be seen that although some collection centers have roughly as far a distance as the others, the number of automobiles purchased can be essentially different. From the graph it can be seen which centers are most successful in terms of vehicles purchased per year.

On the contrary, in relation to the distance from the collection center it is evident which centers are not positive. But this graph method does not provide specific quantifiable results, and so we consider it only as provisional. Its advantage however is that it allows a very clear graphic comparison and is sufficient for 'basic decision-making'.

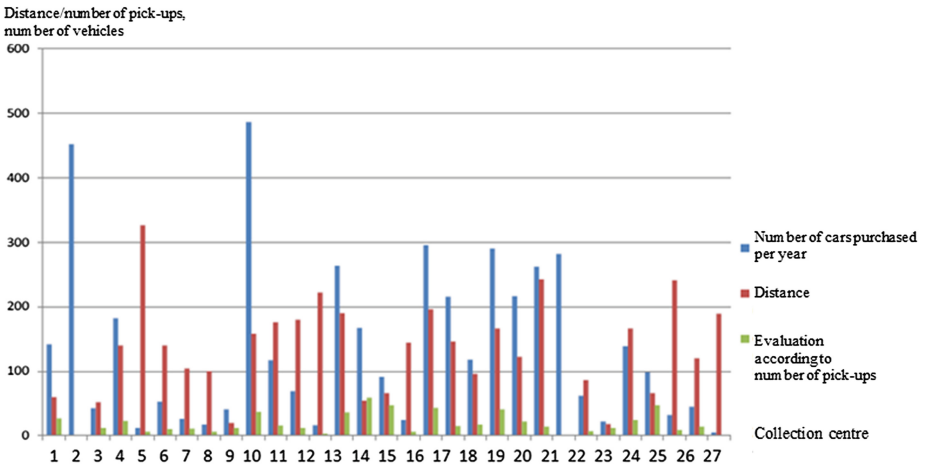

Fig. 1. Comparison of collection centers according to the parameters [3]

2.2 Point Method

Another means or method to express the relationship, evaluating the individual centers by points according to a coefficient of costing, is described below.

We can define the coefficient of costing as a coefficient expressing how many discarded vehicles were stored at collection centers per given year per shipment. It is clear that if this number is low, the given center did not manage to collect a sufficient number of old cars and so the haulage trucks after pick-ups, travel half-empty or insufficiently loaded. We calculate this coefficient according to a formula drawn up by us:

$$k_n = \frac{P_{OVx}}{P_{ZVx}} \tag{1}$$

With the individual parameters having the following meaning:

P_{OVx} – number of vehicles purchased per given year 'x' (for the specific collection center)

P_{ZVx} – number of pick-ups per given year 'x' (for the specific collection center).

This means therefore that this coefficient expresses numerically how many old automobiles are hauled away on average by a haulage truck per load. It is understandable that if the value of this coefficient is for example '1', it would mean that the truck leaves the collection center after leaving one old vehicle. The higher the coefficient, the more is the center attractive from the viewpoint of lower expenses per pick-up.

In Fig. 2 can be seen, the color differentiated values which indicate how many vehicles per individual center were picked up per trip. We can consider the red values as negative numbers since the haulage trucks carrying wrecks returned to the collection centers insufficiently loaded.

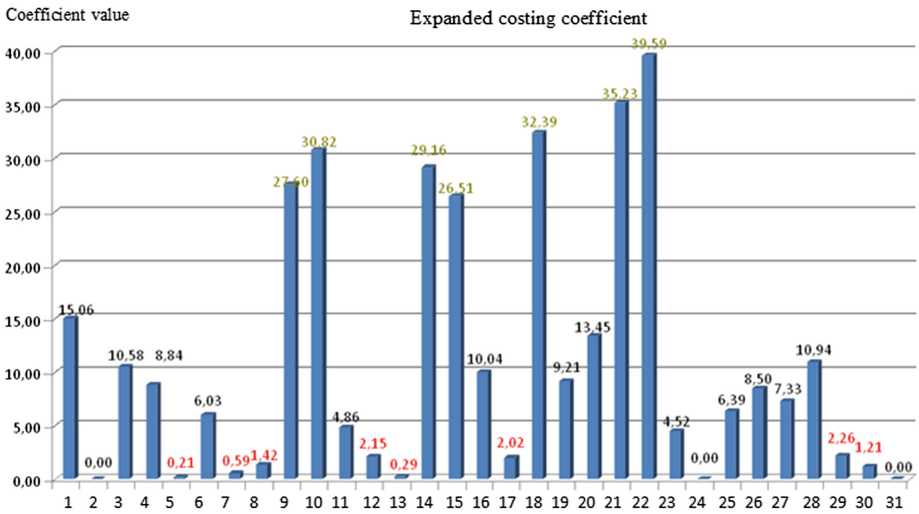

Fig. 2. Expanded costing coefficient

2.3 Quantification Method

A third approach to evaluation is the method on the basis of quantifiable parameters expressed by the formula:

$$k_{n2} = \frac{(P_{OVx-1} + P_{OVx}) * k_n}{S} \tag{2}$$

Meaning of the individual parameters:

$P_{OVx\text{-}1}$ – number of vehicles purchased in the preceding year for the given year x (for a specific collection center)

P_{OVx} - number of vehicles purchased for the given year x (for a specific collection center)

S – distance to the collection center from the place of processing.

Through this third evaluation we are attempting to express an evaluation of the centers only for the last two years. At present, the existing collection centers have been in operation for the last two years, so the statistical selection of the given formula will have the most accurate values of the considered phenomenon precisely in these two years. Their existence in the period prior to the past two years need not be relevant. This evaluation can be considered as the most important, since the future prediction of the successfulness of the centers is of main interest to us, and this is preferably derived from the most up-to-date data. As with the preceding indicators, a higher final value is characteristic of greater success. The resulting values - data do not describe the specific properties of the collection center, but only a 'point' evaluation of a given collection center. However, such information is always of interest to us.

3 Conclusion

We must include the following facts into the total evaluation of the collection centers. The firm also has collection centers on land that does not belong to it, and so these premises are under rental contracts. The above-mentioned evaluation of the collection centers can help us decide which specific collection centers are prospering and which are not.

From the investigated facts it follows that the issue of handling used vehicles contains in itself many obstacles which the companies must deal with daily in order to be successful in their business activities. Some ideas could form the basis for bringing in changes, combining or closing down certain collection centers in light of the set parameters, costs and other characteristics (distance, number of purchased vehicles, cooperation with the processing centers on the basis of the number of pick-ups per year) for unsuccessful (loss-making) places. It could be said that transportation and the expenses connected with the recovery of old vehicles are a relatively significant parts of the activity of waste recycling itself. That is precisely why it has great importance to deal further with this theme and to continually seek solutions for decreasing the amounts of waste.

Acknowledgement. *This work was supported by project VEGA 1/1056/12.*

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