REVERSE LOGISTICS MANAGEMENT, DRIVERS AND PROFITABILITY - METAL VERSUS OTHER INDUSTRIES

KLAPALOVÁ Alena

Masaryk University, Faculty of Economics and Administration, Brno, Czech Republic, EU
klapalov@econ.muni.cz

Abstract

Although profitability of reverse logistics can have its roots in rather diverse areas, most of them can be attached to how and how well reverse flows are managed. Specific character of reverse flows requires planning and innovative approach as well as some level of managers´ understanding and commitment, there are also several drivers for companies which make them to be involved in reverse logistics management. These drivers can be placed on the continuum from the pure economic and/or financial ones to the non-economic. Although it can be very individual, some presumptions may be formulated that link some typical drivers to some industries based on characteristics of the environmental forces (drivers). This idea stands as the background for the survey presented in the paper. Analysis of responses from 32 companies from metal industry compared to 147 companies from other industries revealed some expected and some surprising differences in perceived drivers of reverse logistics management linked to the profitability and some other managerial issues. Although the findings cannot be generalized due to the small number of companies in the sample, results show several points for food for thought and further research.

Keywords: Reverse logistics, management, drivers, profitability, metal industry

1. INTRODUCTION

Profitability belongs to the most important measures of the success of the business management. Without profit a business cannot survive [1] at least not in the long term. The ways of how to be profitable are manifold and many factors from the internal as well external environment of companies influence the final profit results [2]. Those factors can be understood as the both drivers and barriers and a part of them are more or less dependent on some specific industry conditions or character [3]. Profitability also falls into the group of economic drivers for reverse logistics [4].

The purpose of this paper is to present findings from the survey, which pursues various aspects of reverse logistics and management of reverse flows that present the main matter of interest of reverse logistics. The emergence of reverse flows (type and volume, time and reasons of origin) are highly industry-dependent [5]. The basic presumption of the analyses done with the data obtained from the survey is as followed:

Some specificities of metal industry (in general, i.e. regardless of the distinct characteristics of individual sectors within this industry) influence the perception and management of reverse logistics and reverse flows in comparison with other industries and this expectation is reflected in driving forces of reverse logistics management.

The aim of the analyses (and the paper) is therefore to identify the differences and to contribute to the discussion in the frame of reverse logistics. The area of reverse logistics is rapidly developing, especially because of many environmental pressures and better knowledge of current situation based on comparison can lead to the search for the potential ways for the future.

2. THEORETICAL BACKGROUND

The concept of profitability can have many explanations. In rather general meaning Gibson dependent [6, p. 345] defines profitability as "*the ability of firms to generate earnings*". According Brigham and Ehrhardt [7, p. 107] "*profitability is the net result of various policies and managerial decisions*". The ability mentioned in the first definition is an inherent part of managers' knowledge, skills and capability (or competencies) and concrete policies and managerial decisions are just the reflection of this ability and competencies. Policies and managerial decisions incorporate also understanding the opportunities and threats, weaknesses and strengths from the external and internal environment that might be utilized and consciously managed for the future development of firms and often need some change in thinking and acting [8].

Reverse flows - specifically the tangible ones - that present the object of reverse logistics management can be understood as products or materials (or raw materials) for which resources were spent within and during the forward operations [9]. Due to some reason(s) they flow backward through the supply chain within so called reverse supply chain with the employment of processes and activities of reverse logistics [10]. One possible way how to increase profitability is through the improvement of resources utilization [11] which in other term stands for the productivity. As regards to reverse logistics practice and reverse flows Ravi et al [12] identified productivity enablers (factors that help improve reverse logistics) and results that show the performance outcomes of reverse logistics if performed well (efficiently and effectively). Productivity and performance (which comprises also profit) are at the top of results (and goals of firms) and can be gained through the interconnected enablers and outcomes on various hierarchical levels. Both enablers and outcomes can be reckoned as the drivers for reverse logistics management. Authors made the list from the extensive literature research focused on the theoretical knowledge related to various driving forces, motivators, reasons why to deal with reverse logistics. Another enumeration of reverse logistics drivers with more or less direct linkage with profitability is summarized for instance in Klapalová et al [12].

Metal industry 'specificities, which are reflected also in reverse logistics management issues, are miscellaneous. First because of the relative shortage of raw materials needed for production in metal industry (metals), high involvement of typical reverse logistics activities is necessary (recycling, reuse, remanufacturing). Second, most of sectors in metal industry (if not all of them) are risky for the environment and legislation requires many steps to reduce the negative impact of processes connected with the distribution and transport and production of metal products. It means also that reduction of reverse flows and waste is needed [13]. Third specificity is the length and complexity of supply chains and reverse supply chains with global extent and complicated reverse supply streams and processes and the fourth is the lower flexibility, innovativeness of management, especially due to the age and size of companies that prevalent in this industry (out of the individual managerial abilities and competencies) [14].

Research done by Genet and Liebman analysed the situation of steel industry (as one representative of metal industry) worldwide and its competitive position with other industries. This comparative analysis demonstrates much weaker position of steel companies in terms of profitability among all as the impact of raising costs for raw materials and energy and owing to less efficient operation management [15]. As mentioned above reverse logistics can enhance improved efficiency and effectiveness [16].

3. METHODOLOGY

Data from the empirical survey were analysed to get answers to the research questions. Survey was realized during the winter months of 2013 and 2014 with the random sampling approach. 179 questionnaires answered by the respondents (typically top managers of firms or functional managers) from the same number of firms were employed for the analysis. Firms established in the Czech Republic were surveyed. Questionnaire contained 29 questions. For the purpose of this paper only 11 questions entered the analysis. Eight dichotomous questions (with the answers yes or no) related to the drivers to manage reverse flows and the respondents should state if the individual factor is perceived as the driver to manage reverse flows in firms.

One question inquired the perceived rate of profitability. It means that no concrete figures were given by respondents, who were asked just to evaluate the average profitability of their firm during the last three years of the existence on the 7-points scale (1 stands for "high loss" and 7 stands for "high profitability"). One question explored the perception of the reverse flows impact on profitability (7-points scale question where 1 means that reverse flows are the reason of high loss and 7 means that they are very contributive for profitability). One nominal question helped to rank companies into the industries. This question was recoded into the dichotomous one and divided companies to the group of Metal industry with several sectors, mainly from steel producing business (Metal or Metal group in the text below) - and to the group named "Other" (or Other group), where very diverse industries were included. Only 32 firms belong to the group of Metal industry, while the 147 firms represented the other industries and sectors.

For the comparison of both groups several statistical methods were applied, namely frequency analysis, chi-square tests and non-parametric Mann-Whitney U test for the scale questions (the obtained data are not normally distributed). Statistical significance of difference is measured at the 0.05 level.

4. RESULTS

As introduced above, 147 firms from different industries and 32 from Metal industries were involved in the statistical analyses. The firms from Metal industries are bigger in average (size was measured as the scale after recording number of employees into the three categories - small, middle and big). Mean for Metal is 1.78 (Median = 2) and Mean for other is 1.69 (Median = 1). 10 firms (31.25%) from Metal group are subsidiaries of multinational companies on comparison with only 24 firms (16.3%) from Other group.

- **Drivers of reverse flows management**

Perception of the individual drivers influence on reverse flows management is distinctively different as it is illustrated by outcomes in **Table 1** a **Table 2**.

Table 1 Drivers of reverse flows management- frequencies and ranking

drivers of RF management	Metal frequency (N) Total = 32	Metal ranking	Other frequency (N) Total = 147	Other ranking
competition	23	3.	108	3.
value retrieval	27	2.	76	6.
cost reduction	30	1.	109	2.
productivity increase	27	2.	65	7.
customer satisfaction	14	5.	128	1.
customer loyalty	23	3.	108	3.
governmental requirements	21	4.	35	9.
image of a firm	10	7.	93	4.
differentiation	11	6.	79	5.
CSR	7	8.	45	8.

In **Table 1** the rankings of drivers are shown. As can be seen, Metal firms are more efficiency oriented - cost reduction took the first position, productivity increase and value retrieval the second position while for Other group cost reduction was placed second and productivity and value issues are ranked much lower. The results show that effectiveness drivers are prevalent in perception by firms from Other groups. Customer satisfaction

ranked first position, on the contrary in Metal group this factor is not reckon to be so dominant. Nevertheless the driver of keeping and supporting customer loyalty through the management of reverse logistics holds the third place in evaluation of both groups as well as the driver "competition". The same position regards also the driver of Corporate Social Responsibility with one difference, which is the fact that for Metal firms this driver took place as the least mentioned driver from all investigated but for firms from Other group the last position concerns the governmental requirements. On the contrary this factor positioned higher with Metal group (4th rank). Image and differentiation through reverse flows management is more frequent with Other group as well.

Statistically significant results are documented in **Table 2**. The biggest differences between two groups of firms are with productivity increase (more often stated by Metal firms), customer satisfaction (more often stated by Other firms) and governmental requirements (more often stated by Metal firms), followed by value retrieval (more often stated by Metal firms) and image of a firm (more often stated by Other firms) and finally cost reduction (more often stated by Metal firms). When taking into consideration 1-sided effect of statistically significant difference, also the driver of differentiation is another factor that stands for the distinctness of both groups (more often stated by Other firms). In other words, Chi-square statistics verified the above introduced idea that firms from Metal industry are more efficiency and on financial performance oriented compared to the more varied group of other industries

Table 2 Drivers of reverse flows management - Chi-square

drivers of RF management	frequency (%) Metal → other	Chi-square p value (2-tailed)	Chi-square p value (1-tailed)
competition	71.9→73.5	0.829	0.505
value retrieval	84.4→51.7	0.001*	0.001*
cost reduction	93.8→74.1	0.018*	0.010*
productivity increase	84.4→44.9	0.000*	0.000*
customer satisfaction	43.8→87.1	0.000*	0.000*
customer loyalty	71.9→73.5	0,829	0,505
governmental requirements	65.6→23.8	0.000*	0.000*
image of a firm	31.3→63.3	0.001*	0.001*
differentiation	34.4→53.7	0.053	0.036*
CSR	21.9→30.6	0.394	0.223

- **Profitability and reverse flows management**

As the figures in **Table 3** shows profitability of firm is perceived nearly on the same level by the respondents from both groups of firms.

Table 3 Profitability of firms and perceived impact of reverse flows on profitability

	Metal		Other		All				
	Median	Mean	Median	Mean	Median	Mean	n	U	p
profitability	5	4.56	5	4.5	5	4.51	178	2207,000	0.564
RF impact on profitability	4	3.94	4	4.56	4	4.45	178	1850,000	0.058

The findings are different when analysing the perceived impact of reverse flows on profitability. This impact is evaluated as more negative by managers from metal industry (more answers evaluate reverse flows as inducing the loss for firms) in comparison with the managers' evaluation of Other firms. They consider reverse flows to be more profit-making or helping the firms to earn profit (1-tailed p-value = 0.029, statistically significant difference).

Such finding has the strong implication for management. It shows that understanding and perception of some trends and the openness to the driving forces is very important issue in managing business. There are not many other explanation of such result as just this reflection and proof of managers' views.

5. LIMITATIONS, DISCUSSION AND CONCLUSIONS

Presented survey has several limitations that can be overcome through the future research with the development of some areas that were not well or enough deep elaborated in our case. First limitation is with the number of companies in the sample and specifically with number of metal industry companies. These numbers are very small and no generalization of results is possible. Very simple statistical tools were applied as well that together with the size of the sample do not enable to bring rich picture of the situation.

Despite these limitations the findings show some interesting facts and offer much space for thinking. The most important finding lies probably with the evaluation of reverse flows as causing more loss than to boost profitability of business. Of course, this can be true; just there is the question behind if managers of companies from metal industries really utilize every opportunity that reverse logistics in their environment offers. As the findings indicate, metal industry managers are much more efficiency oriented and much less effectiveness oriented and this orientation may have negative impact on profitability, especially on long-term profitability.

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