

GREEN SUPPLY CHAIN – BARRIERS AND BENEFITS OF IMPLEMENTING THE NEW MANAGEMENT STRATEGY – ANALYSIS OF THE EMPIRICAL RESEARCH

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ABSTRACT	The point of view of the considerations shows the main goal was to show the barriers, benefits, and motivators for taking action to build a new management strategy namely the green supply chain. To realize of the aims was used literature analysis, which let to the selections of the extracted factors, and their verifications were based on empirical research conducted in two industries: food and clothing manufacturers. The catalog of factors is the basis for consideration and recommendations for organizations and supply chains, what elements to avoid, or which ones may be a problem in creating the green supply chain, and on the contrary, and to shows they will be motivating for the implementation of the new business strategy.

Introduction and problem description

Interest in the area of the green supply chain and its management has been observed since the 1990s. The evolution of the chain's assumptions and the support of trends in tackling the negative environmental impacts of economic processes contribute to the implementation of the new business strategy in the economy. The rapid industrialization of supply chains means that ecological effects are becoming increasingly problematic. Economic

decision-making, by excluding the environmental interest, can contribute to environmental degradation, global warming, increased greenhouse gas emissions, and depletion of resources. There is no doubt that a holistic approach is needed to implement environmental goals in the supply chain, as well as the deployment of pro-environmental solutions already at the product conceptualization (and chain) stage, design, processing, assembly, storage, packaging, transportation, as well as collection, recycling, reuse, recycling and re-introduction into the economy. Activities cover both products and their packaging, and refer to all processes that take place within the supply chain. Such an approach to the problem contributes to growing interest in the green supply chain. Achieving competitive advantage requires also changes in the supply chain, traditionally understood relationships, scope, and paradigms are no longer sufficient to meet the needs of both customers and the market trends and requirements of competitors. Balancing environmental, economic and social goals contributes to building the foundations of green and sustainable supply chain management (Luthra, Qadri, Garg, Haleem, 2014). The paradigm of the green supply chain is based on the environmental and economic aspects that underpin its construction and operation. Joining the "green" into the supply chain contributes to the environmental and management implications of chain management. The goal of managing the green supply chain is to reduce waste and pollution by incorporating environmental thinking in product design (and packaging) and end-of-life management (Rehman, Shrivastava, 2011). The most important motivators for engaging an organization and reorienting its actions to implement green practices are: cost reduction and profit maximization, which also fosters competitiveness. These practices must involve all actors in the chain, suppliers, manufacturers, and customers. The cooperation of suppliers with partners and customers and producers can lead to better strategic and competitive position if environmental management is implemented in a cost effective manner (Vachon, Klassen, 2006). There is no doubt that the new management strategy is intended to help reduce negative environmental impacts and improve the efficiency of the supply chain (Seuring, Muller, 2008). It is therefore important to identify the barriers and benefits that new solutions bring to supply chain management. It should be pointed out that the presented results provide valuable information on the identified barriers and benefits in companies operating in Poland, as well as give the opportunity to compare with solutions indicated in the world literature. This is also a hint of what to look out for to turn traditional chains into greener ones.

Literature review

The implementation of green supply chain management affects both barriers and benefits. Drivers forces are motivating factors for organizations, and barriers make it difficult to implement a new business model (Jain, Sharma, 2014). It is important to both understand the essence of both occurring, often parallel elements, and be able to take appropriate action to counter the hindrances and to achieve as many positive elements as possible. Green supply chain management refers to all processes that take place in the supply chain. Despite the need to incur high initial costs and investments, the efforts are aimed at improving the quality of processes, products, and increasing customer satisfaction. Green supply chain management can be defined as: integration of environmental thinking into the framework of supply chain management, which includes: product design, materials sourcing, and selection, manufacturing processes delivery of the final product after its useful life (Srivastava, 2007). According to Zhu and Sarkis (2006) shows that processes of the GrSCM have trend to close the loop from suppliers, to manufacturers, to customers and reverse logistics. In order to improve the environmental performance of suppliers and customers, it is important to integrate environmental issues into supply chain management (Lee, Klassen, 2008). Supply chain management is understood to have motivating factors and barriers. On the basis of literature one can point to the

Table 1. Barriers, drivers and benefits for the green supply chain management – selected criterion for the empirical research

Barriers	Drivers
Increase in charges for waste disposal	Supporting the principles of sustainable development
Increase in financial outlays	Development of modern logistics
Increase in energy consumption	Investment recovery (sales) of excess stocks/materials
Stock up	
Increase in investment	Designing products with reduced material energy consumption
Increase in operating costs	
Increase in training costs	Designing products for reuse, recycling, material recovery, components
Material cost increase	
The increase in costs for the purchase of environmentally friendly materials	Product design to avoid or reduce the use of hazardous products and/or their manufacturing process
Increased requirements for suppliers	
Requirement of "green" investment	Collaboration at various levels and in areas to improve the environment
The need for close cooperation in the chain	
No approval from employees	Comprehensive environmental quality management
No demand	Implementation of audit programs
No customer acceptance (cost increase)	Entering new markets
Benefits	
Increased use of "alternative" energy sources	Reduction of solid waste
Improve the image of your business/supply chain	Fall in stocks
Increase the efficiency of processes in the chain	Decrease in the cost of materials purchases
Increase employee involvement in implementing environmental	Decline in consumption/harmful/hazardous materials
Increased customer satisfaction	The decrease in material costs
Increase in the amount of goods delivered on time	Reduce the frequency of environmental accidents
Increase in customer satisfaction	Reduction of waste charges
Increase in profits	Reduce energy costs
Increased productivity of processes in the chain (including logistical processes)	Reducing the fee for waste (pollution related)
Improving energy efficiency	Reduction of fees for ecological disasters
Improvement of the company's environmental situation	Reduce energy costs
Improved operating performance in the chain	Reduction of waste charges
Improved capacity utilization	Reduction of charges for waste released
Improving the quality of processes/products	Reduction of charges for environmental accidents
Increasing the rate of decline of pollutants and waste	Supplier risk management
Falling energy consumption	Trust suppliers
Reduction of pollutant emissions into the atmosphere	Flexibility
Wastewater reduction	Better image

Source: own elaboration.

driving forces that contribute to the implementation of new solutions. The most important ones include: increased intensity of competition, changing economic trends, government regulations, increasing consumer awareness and pressure. There is a close link between driving forces, and economic performance and competitiveness (Rao, Holt, 2005). So far, however, a complete catalog of driving forces, barriers and benefits of greening both in the chain as well as in the single link has not been established. Green supply chain management is based in principle on green procurement, procurement, production, storage, distribution, packaging and transport, green design and green operations (manufacturing and remanufacturing, reverse logistics, waste management) (Srivastava, 2007),

Under which it is important to implement the principles of environmental management, redefine the concept of supply chain, use of recycling and remanufacturing processes, and change the performance measurement system (Beamon, 1999). The catalog of barriers and opportunities can be greatly expanded depending on the specificity of the organization, chain or geographic aspect, the issues are broadly described in the literature of the subject. The main sources of literature include: W. Niemann, T. Kotze, F. Adamo (2016), H. Walker, L. Di Sisto and D. McBain (2008), E. Ojo, C. Mbowa and E.T. Akinlabi (2014), S. Luthra et al. (2014), E. Nikbakhsh (2009). P. Srivastav and M.K. Gaur (2015). M. Javaid, M. Shoeb (2015), A. Diabat, K. Govindan (2011). Literature studies and pilot studies have allowed the selection of elements for the study, which is presented in Table 1.

Research goals and questions

The research objectives of the discussion are based on identifying and verifying motivators, barriers and benefits of greening processes and supply chain links based on literary analysis and empirical research. The most important issues to be addressed in the discussion include:

- what are the motivating factors and barriers to the implementation of green practices in the supply chain in the research organizations,
- which one has the greatest impact on the creation of the green supply chain.

Solution methodology and data collection

The paper was prepared using the method of critical analysis of the literature (Cotrell, 2011). On this basis were selected the criteria catalog for the drivers, barriers and benefits of the implementation and creating the green supply chain management (Table 1). The data was used to create a questionnaire. The empirical studies were prepared in the form of questionnaire (Lydeard, 1995), then were selected a sample of the research and conducted the empirical studies on a selected group of the entities. Criteria selection took place after pre-selection and expert investigation. It was agreed that the factors included in the questionnaire will be taken into account in the questionnaire. The next phase of the survey was followed by an analysis and interpretation of the data. The survey using a questionnaire was conducted throughout of Poland, using the CATI method, in connection with an extensive questionnaire and the need to sacrifice more time to fill it, interviewers performed them for 3 months. The survey was directed to the Food and clothing Industry. On the basis of randomly selected study sample, were examined 222 companies. Other limitations of the study are: the number of employees between 50 and 99 person and responding to the questionnaire employees are: middle to senior levels of management experience, for example supply chain manager, logistics manager, head of logistics or supply chain, procurement and purchasing manager.

Results and discussion

By analyzing the research conducted, one can point out that in most cases classification of elements as barriers, opportunities or motivators coincides with respondents' responses. It is also worth noting that for some respondents some factors are irrelevant when creating a green supply chain, and that, regardless of the industry, the results are practically overlapping.

Table 2. Results of the empirical research

Factors	Percent					
	clothing industry; n = 68			food industry; n = 154		
	barrier	benefits	neutral	barrier	benefits	neutral
1	2	3	4	5	6	7
Increase in charges for waste disposal	95.59	0.00	4.41	95.45	0.00	4.55
Increase in financial outlays	100.00	0.00	0.00	100.00	0.00	0.00
Increase in energy consumption	60.29	0.00	39.71	60.39	0.00	39.61
Increased use of "alternative" energy sources	45.59	30.88	23.53	44.16	32.47	23.38
Increased productivity of processes in the chain (including logistical processes)	0.00	94.12	5.88	0.00	94.16	5.84
Increase the efficiency of processes in the chain	0.00	97.06	2.94	0.00	97.40	2.60
Increase employee involvement in implementing environmental,	0.00	63.24	36.76	0.00	62.99	37.01
Increased customer satisfaction	0.00	86.76	13.24	0.00	86.36	13.64
Stock up	83.82	0.00	16.18	83.77	0.00	16.23
Increase in investment	67.65	0.00	32.35	66.23	0.00	33.77
Increase in operating costs	45.59	5.88	48.53	44.16	5.84	50.00
Increase in training costs	100.00	0.00	0.00	100.00	0.00	0.00
The increase in costs for the purchase of environmentally friendly materials	32.35	0.00	67.65	31.82	0.00	68.18
Material cost increase	92.65	0.00	7.35	92.86	0.00	7.14
Increase in profits		94.12	5.88		94.16	5.84
Improve the image of your business/supply chain	0.00	94.12	5.88	0.00	94.16	5.84
Improving energy efficiency	0.00	60.29	39.71	0.00	59.74	40.26
Improvement of the company's environmental situation	0.00	35.29	64.71	0.00	35.06	64.94
Improved operating performance in the chain	0.00	11.76	88.24	0.00	11.69	88.31
Improved capacity utilization	0.00	89.71	10.29	0.00	88.96	11.04
Improving the quality of processes/products	0.00	57.35	42.65	0.00	60.39	39.61
Increasing the rate of decline of pollutants and waste	0.00	51.47	48.53	0.00	53.25	46.75
Increase the quantity of goods delivered on time	0.00	27.94	72.06	0.00	28.57	71.43
Falling energy consumption	0.00	58.82	41.18	0.00	57.79	42.21
Reduction of pollutant emissions into the atmosphere	0.00	94.12	5.88	0.00	94.16	5.84
Wastewater reduction	0.00	70.59	29.41	0.00	70.78	29.22
Reduction of solid waste	0.00	76.47	23.53	0.00	77.92	22.08
Fall in stocks	0.00	69.12	30.88	0.00	0.00	0.00
Decrease in the cost of materials purchases	0.00	94.12	5.88	0.00	68.18	31.82
Decline in consumption/harmful/hazardous materials	0.00	38.24	61.76	0.00	94.16	5.84
The decrease in material costs,	0.00	23.53	76.47	0.00	38.96	61.04
Reduce the frequency of environmental accidents	0.00	54.41	45.59	0.00	23.38	76.62
Reducing the fee for waste (pollution related)	0.00	63.24	36.76	0.00	52.60	47.40
Reduction of fees for ecological disasters	0.00	67.65	32.35	0.00	64.29	35.71
Reduce energy costs	0.00	47.06	52.94	0.00	66.23	33.77
Reduction of waste charges	0.00	35.29	64.71	0.00	48.70	51.30
Reduction of charges for waste released	0.00	41.18	58.82	0.00	35.71	64.29
Reduction of charges for environmental accidents	0.00	42.65	57.35	0.00	41.56	58.44
Increased requirements for suppliers	57.35	0.00	42.65	0.00	42.86	57.14
Requirement of "green" investment	61.76	0.00	38.24	57.79	0.00	42.21
The need for close cooperation in the chain	22.06	32.35	45.59	61.69	0.00	38.31
No approval from employees	38.24	0.00	61.76	22.73	33.12	44.16
No demand	69.12	0.00	30.88	38.31	0.00	61.69

1	2	3	4	5	6	7
No customer acceptance (cost increase)	55.88	0.00	44.12	70.78	0.00	29.22
Supplier risk management	14.71	26.47	58.82	57.14	0.00	42.86
Trust suppliers	0.00	70.59	29.41	15.58	25.32	59.09
Flexibility	0.00	70.59	29.41	0.00	70.78	29.22
Better image	0.00	58.82	41.18	0.00	58.44	41.56
Supporting the principles of sustainable development	0.00	70.59	29.41	0.00	70.78	29.22
Development of modern logistics	0.00	67.65	32.35	0.00	66.88	33.12
Investment recovery (sales) of excess stocks/materials	0.00	16.18	83.82	0.00	18.18	81.82
Designing products with reduced material energy consumption	0.00	10.29	89.71	0.00	11.69	88.31
Designing products for reuse, recycling, material recovery, components	0.00	8.82	91.18	0.00	9.74	90.26
Product design to avoid or reduce the use of hazardous products and/ or their manufacturing process	0.00	8.82	91.18	0.00	9.74	90.26
Collaboration at various levels and in areas to improve the environment	0.00	22.06	77.94	0.00	21.43	78.57
Comprehensive environmental quality management	0.00	16.18	83.82	0.00	16.23	83.77
Implementation of audit programs	8.82	7.35	83.82	8.44	7.79	83.77
Entering new markets	0.00	16.18	83.82	0.00	16.23	83.77

Source: own elaboration.

Interestingly, there is a lack of demand in the clothing industry is a barrier, which is not a problem for the food industry. In other cases, respondents respond similarly. It is clear that certain criteria in literature describe as barriers are barriers to the organization, which were examined, as well as opportunities or motivators. The interesting result is that for the most organizations, drivers are considered it indifferent to creating a green supply chain. This means that actions need to be taken to reduce the number of barriers and costs associated with them, and the implemented solutions will contribute to increasing the benefits, both in terms of their numbers and percentage of respondents who take the actions they consider beneficial, and not, for example, affecting the creation and operation of the supply chain.

Limitations

Definitely a limiting factor, both considerations as well as interpretations and general conclusions are the selected sectors, the number involved in the study and the size of the enterprise. One should ask yourself whether in other conditions and in other industries the results would appear in a similar way.

Conclusions

By analyzing the empirical research conducted, it is important to point out that the identified factors indicating the benefits, barriers or motivators for undertaking green supply chain construction activities in a large part were confirmed by the respondents. The biggest barriers are Increase in charges for waste disposal, Increase in financial outlays, Increase in training costs, Material cost increase. As benefits it could be point: Decrease in the cost of materials purchases, Reduction of pollutant emissions into the atmosphere, Increase in profits, Improve the image of your business/supply chain, Increased customer satisfaction, Increased productivity of processes in the chain (including logistical processes), Increase the efficiency of processes in the chain. An interesting element of the discussion is the indication that some of the respondents recognize the presented factors as completely

indifferent. This means that they do not have an impact on the creation and operation of the green supply chain. Recommendations may refer to further education and training, which will help to identify benefits and barriers better to offset the number of neutral factors that respondents do not consider relevant and which affect the development of the green supply chain. The study also showed that both the number and the range of benefits are definitely greater than the potential barriers. Motivators should be supported and benefits should be emphasized, and costs and barriers to the introduction of the green supply chain should be eliminated.

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