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ISO 14001 AND THE CREATION OF SSCM IN THE TEXTILE INDUSTRY

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Abstract: The aim of this publication was determining the impact of implementation of the ISO 14001 standard requirements on creating sustainable supply chains in the textile industry. The research process included the development of research tools such as questionnaires. Surveys of anonymous nature were sent by e-mail to top management representatives organizations operating in the south-eastern Poland and Slovakia who hold a certified quality management system according to ISO 14001. The research process carried out as well as the analysis of the obtained results allowed to respond to the research questions. As a result it can be stated that the ISO 14001 standard is an instrument that has a noticeable impact on improving the concept of sustainable supply chain management (SSCM) in the textile industry.

Keywords: ISO 14001; SSCM; Textile industry; Sustainability

1. Introduction

In recent years, there has been an increasing interest in the concept of sustainable management in supply chains (Srroufe, 2017; Khalid et al., 2015). The reasons for this state of affairs are many to the basic ones include, among others: pressure from consumers, increased awareness of the pro-ecological society, increased importance of the concept of responsible business (Roy et al., 2018; Straka et al., 2019) or global trends such as 17 SDGs (Sustainable Development Goals). Therefore, regardless of the type of business, management representatives are aware that they are expected to not only deliver products or services, but also actively involved in solving problems on the wider issues of social, economic and environmental (Wang & Dai, 2018; Seuring & Müller, 2008; Krolczyk et al., 2019; Malindžáková et al., 2018). Considering the problem of sustainable development in the context of supply chain management, it can be stated that it is a management concept in which links of the supply chain outside of their own goals make

efforts to implement environmentally friendly solutions and support current and future generations in the moral, economic and technical aspects, legal, social and political (Chen & Kitsis, 2017; Fonseca et al., 2018; Brandenburg et al., 2013). The concept of sustainable supply chain management seems particularly important for companies operating in the textile industry (Diabat et al., 2014) because this industry is one of the main areas of the European economy at the same time generates significant environmental damage; moreover, the industry is creating a fashion that can be used in a more sustainable way (Pui-Yan et al., 2011). According to Oelze (2017) key challenge for companies operating in global textile supply chains is the balance between achieving a competitive advantage and acting sustainably while fulfilling their different stakeholders' expectations in order to preserve reputation, legitimization, and credibility. Companies face a strong reputational risk of negative public perception by important stakeholders such as regulators, customers, shareholders, media, and non-governmental organization.

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Researchers also point out that in the textile supply chain, fraud and irregularities are relatively frequent (Søgaard Jørgensen et al., 2010).

In addition; it is worth mentioning that supply chain management in the textile industry requires special attention from entrepreneurs due to two basic features: customers have a decisive bargaining power and this sector is characterized by a high degree of complexity in supply chain management due to its global nature. In addition, the basic problems of sustainable supply chain management in the textile industry may include (Zimon & Malindzak, 2017):

- strong dispersion of individual links in the supply chain resulting from efforts to minimize labor and production costs,
- widespread adoption of outsourcing of finished products far away from sales markets,
- problems with managing the return of post-seasonal clothing items,
- implementation of Fast Fashion strategy based on maximum shortening of product flow time in supply chains.

Bearing in mind the above considerations and the fact that care for sustainable management in the supply chain requires understanding and acceptance of this concept by all participants in the supply chain and working out a common ground for implementing a uniform strategy in this area, these concepts should be implemented in a highly thought-out way. Therefore, it seems that the implementation of environmental standards requirements through the most important links co-creating the supply chain may prove to be a good solution for supply chains oriented towards sustainable management (Chiarini, 2012; Fonseca & Domingues, 2018; Cogollo-Flórez & Correa-Espinal, 2019; Zimon & Madzik, 2020; Woźniak 2019). While reviewing literature covering issues related to the impact of ISO 14001 standard on sustainable supply chain

management (SSCM). It can be said that there are many studies on this issue. The authors indicate in them that the standard ISO 14001 supports the implementation of ecological solutions in supply chains (Beske-Janssen et al., 2015; Savita et al., 2016), may be a factor in the competitive advantage (Cirkovic & Sroufe, 2011; Lee et al., 2015), contributes to minimising errors and supports improvement actions (Brouwer & Van Koppen, 2008; Zimon & Domingues, 2018). Unfortunately, in the literature of the subject (especially in reputable journals) there is still no research and consideration about a problem of the functioning of ISO 14001 in supply chains operating in the textile industry (especially in Europe Central and Eastern Europe). The objective of the article is to, at least, partially fill the signalled gap and urge to call for a broader discussion on the subject. The considerations outlined in this article should be helpful for both, entrepreneurs co-creating supply chains in the textile industry as well as scientists interested in the SSCM issues.

In the article, the authors will try to answer the question how the ISO 14001 standard can support sustainable supply chain management in the textile industry?

2. Research Methodology

The aim of this publication was determining the impact of implementation of the ISO 14001 standard requirements on creating sustainable supply chains in the textile industry. The explanation of such a generally outlined research problem as well as more detailed research issues prompted the authors to formulate the following research questions:

- How is the ISO 14001 standard perceived by organizations that co-create supply chains in the textile industry?
- How the respondents evaluate the impact of implementing the ISO 14001 standard requirements on the implementation of processes

contributing to the sustainable management of supply chains?

The research process was conducted in 2018 year. It was preceded by extensive literature review of sustainable development and quality management and supply chain. In the research process, the focus was on the analysis of the ISO 14001 standard, which is relatively popular among Polish and Slovak organizations (according to ISO Survey in 2017, this norm had 2885 organizations in Poland and 1485 in Slovakia).

The research process included the development of research tools such as questionnaires. Surveys of anonymous nature were sent by e-mail to top management representatives organizations operating in the south-eastern Poland (125 organizations) and Slovakia (75 organizations) who hold a certified quality management system according to ISO 14001. The survey was addressed to representatives of top management who, due to their functions, should have full knowledge of the main processes implemented in their organization

and supply chains that co-create. In addition, members of the top management have a decision-making role in standardized management systems. Properly completed survey forms were obtained from 28 organizations (19 Polish and 9 Slovak). More than one form (filled in by several members of the board) was obtained from 14 companies. As a result, 43 respondents were involved in the research process.

3. Analysis of the obtained research results

The first stage of the research was to determine the impact assessment of the implementation of the ISO 14001 standard requirements on the improvement of selected processes affecting the creation of SSCM in the textile industry. The results are presented in Figure 1 (the respondents assessed the influence using a 5-point scale: from 1 – very low level of realization to 5 – very high level of realization).

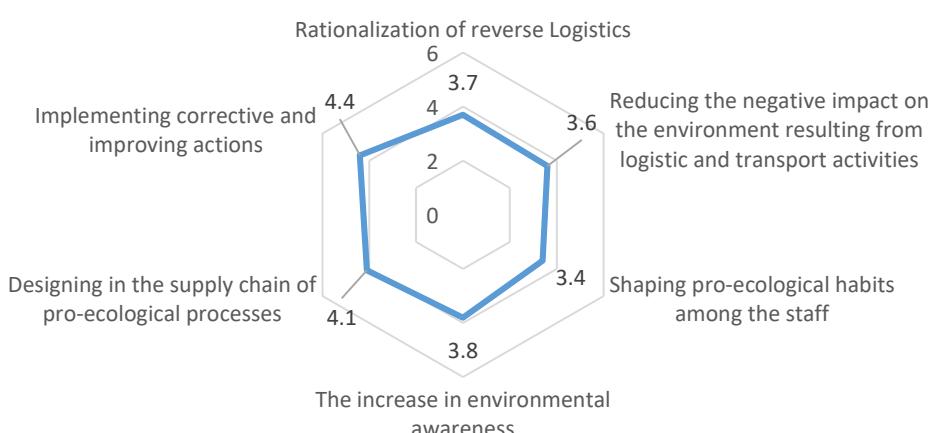


Figure 1. ISO 14001 and it's improvement of selected processes affecting the creation of SSCM

The analysis of the distribution of responses presented in Fig. 1 allows to state that according to the respondents, the implementation of the ISO 14001 standard has a relatively high impact on supporting processes to improve sustainable supply

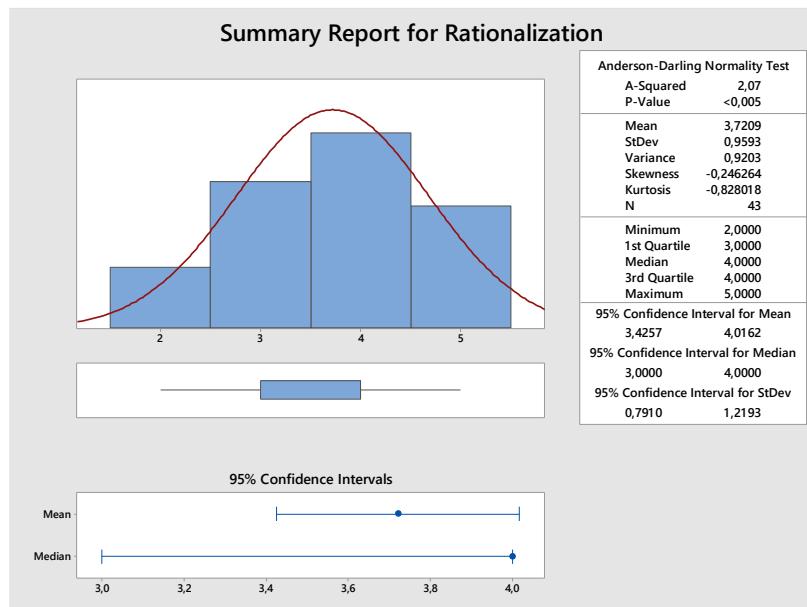
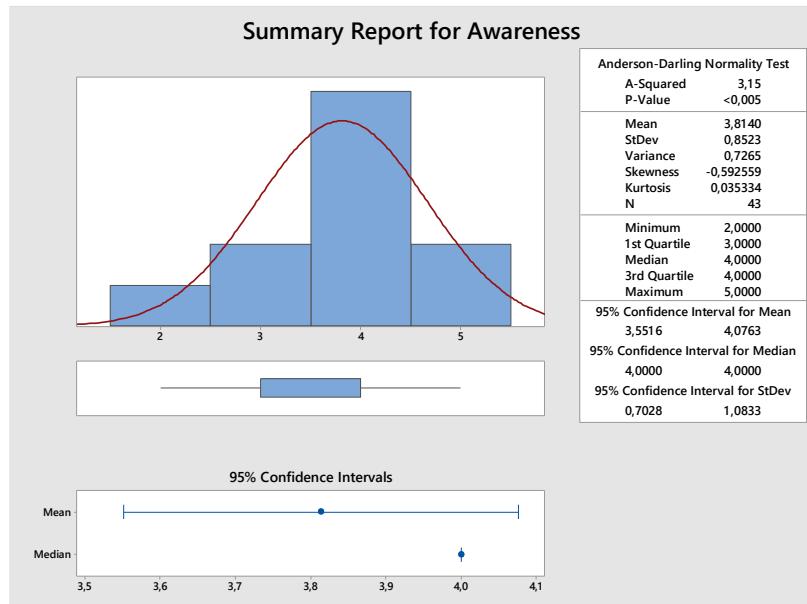
chain management in the textile industry (average rating of all aspects was 3.8). It is also noted that the respondents most favorably assessed aspects such as follows: Implementing corrective and improvement activities (4,4) and Designing pro-ecological

processes in the supply chain (**4,1**): Environmental management systems can be considered as complementing quality management systems (Martí-Ballester & Simon, 2017). These systems indicate how to handle products produced in companies that co-create supply chains (Fernandes et al., 2017). The difference lies in the fact that quality management systems are focused on developing ways to manage processes to enable such organization of processes that company could produce products that meet accepted quality standards. On the other hand, environmental management systems focus on the management of the side effects of this activity: waste, sewage, gas emissions, sustainable and economical management of materials and energy, etc. The ISO 14001 environmental management system can therefore be considered as an integral part of the overall enterprise management system (Sroufe, 2003), including the organizational structure, planning, responsibility, rules of conduct, procedures, processes and resources needed to establish, implement, review and improve environmental policy. According to the research in the analyzed supply chains, the ISO 14001 standard works perfectly as a tool stimulating the involvement of the management staff and significantly contributes to the development of procedures, compliance with which stimulates the development and implementation of improvement actions. It is worth noting that streamlining processes and eliminating errors in the supply chain not only minimizes the negative impact on the environment but also improves the financial condition of enterprises.

The lowest responses were given by the respondents to the following aspects: Limiting the negative impact on the environment resulting from logistic and transport activities (**3,6**) and shaping pro-ecological habits among employees (**3,4**): a fairly low assessment of the impact of the ISO 14001 standard on the improvement of this aspect may result from significant investments that supply chains would have to

make as part of the exchange and improvement of infrastructure and a fairly long time horizon that requires developing and undertaking improvement actions in this area. A significant problem is also the fact that the provision of logistic services with the use of energy-saving methods and concepts requires higher expenditures, which in turn translates into the price of the product. Customers choose cheaper products whose production contributes to a large extent to the accumulation of environmental losses and related threats. Organizations co-creating supply chains, therefore, are less interested in undertaking pro-ecological activities. To the main barriers in this aspect should be included the lack of awareness of the top management representatives of individual links and the limited financial capabilities that are necessary to implement pro-ecological solutions in the supply chain. Despite this, the ISO 14001 standard can contribute to improvements in this area by gradually changing the mentality of management and employees of enterprises co-creating supply chains and focusing on the choice of environmentally friendly modes of transport, minimization of empty runs, consolidation of cargoes, reduction of exhaust emissions, preference for means of transport meeting high emission standards, the use of biodegradable bio-based packaging, the use of reusable packaging, etc. However, the implementation of these changes requires time, a number of trainings, changes in management habits (moving away from concentration only on economic issues) and developing environmental awareness of consumers.

On the other hand, the assessment of aspects such as rationalization of reverse logistics (**3,7**) and the increase in environmental awareness (**3,8**) can be regarded as relatively high. Those aspect have been shown as statistically significant relationships (linear Pearson correlation 0,576). With this in mind, the distribution of responses was reviewed (Figures 2 and 3) and linear regression analyzes were performed (Figure 4).

**Figure 2.** Summary report of rationalization of reverse logistics**Figure 3.** Summary report of increase in environmental awareness

The analysis of the data contained in Fig. 4 allows to conclude that residuals has normal distribution (top left and histogram on bottom left) and that there are no system errors in this relationship: the residual look random even in the view of fitted value (top right) and of data

order (bottom right). With this in mind, it is assumed that there is a close relationship between the studied aspects. The obtained results therefore seem to suggest that the increase in the awareness of pro-ecological management staff (resulting from the

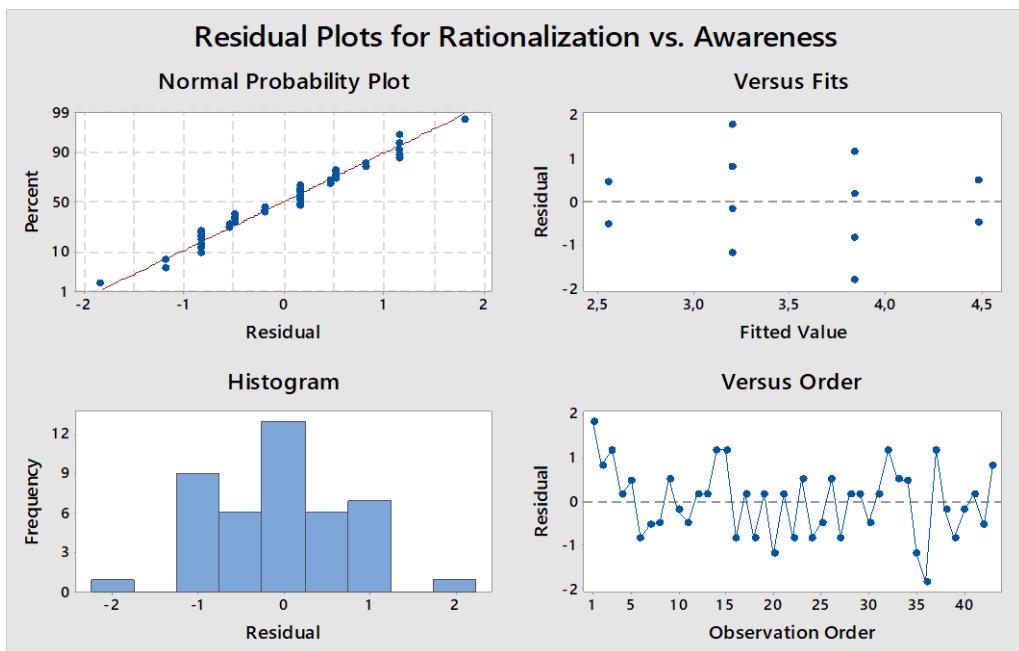


Figure 4. Rationalization vs Awareness

implementation and improvement of ISO 14001 requirements) translates into the design and implementation of solutions in the supply chains that would enable re-use and recover value of the products already used (Mastrogiacomo et al., 2016). Entrepreneurs are therefore more aware that solutions in the sphere of production and logistics, aimed at restoring the lost products during their exploitation and re-entering the market and creating a green image has become an important element of the strategy of supply chains operating in the textile industry (García-Arca et al., 2014). The re-use of products is economically attractive due to the limited resources and new opportunities to create added value (Meng et al., 2017). This aspect seems particularly important for companies in the textile industry, which significantly contributes to the degradation of the natural environment.

At the end of the research process, the respondents were asked an open question, in which they were asked to express their opinion on the suitability of the ISO 14001 standard in the context of SSCM in the textile

industry. The analysis of the responses allowed formulating the following conclusions:

- The pressure to implement sustainable solutions in the supply chains is gaining momentum. SSCM in the textile industry is both a great challenge and a great opportunity for entrepreneurs. The ISO 14001 standard can be a good foundation for SSCM and it is recommended that as many links in the supply chains apply to its guidelines.
- It is worth pointing out that the implementation of sustainable management in the supply chain is associated with the need to develop, implement and improve concepts integrating different spheres of business operations, which were usually considered separately. The ISO 14001 standard provides the basis for developing and formalizing the overall SSCM framework, which is its major advantage.

- The ISO 14001 standard is a good tool supporting the implementation of ecological processes within the enterprise; however, there is a problem in developing an overall strategy for managing the entire supply chain on its basis. It is necessary to use more complex models in which the ISO 14001 standard may play one of the key roles.
 - Implementation and reliable improvement of the ISO 14001 standard requirements and incorporation into supply chain management strategies strengthens relations with employees and external stakeholders and enables more effective risk and cost management.
 - Improving the requirements of the ISO 14001 standard gradually makes us aware of the need to implement pro-ecological actions in the supply chain and create a system that will allow designing eco-products and to manage returns and reverse logistics in an informed way.
- This is evidenced by the averaged result which the respondents admitted to the impact of system requirements on the improvement of the analyzed processes (the average score was 3.8 on a scale of 1-5) and the statements presented by the respondents in the open question.
- The most noticeable is the impact of implementation of the ISO 14001 standard on the implementation of corrective and improvement activities and the design of pro-ecological processes in the supply chain. On the other hand, the smallest impact of the ISO 14001 norm has had an impact on limiting the negative impact on the environment resulting from logistic and transport activities as well as shaping pro-ecological habits among the staff.
 - The obtained results seem to suggest that the increase in the awareness of pro-environmental management staff (resulting from the implementation and improvement of the ISO 14001 requirements) translates into the design and implementation of solutions that streamline reverse logistics in the supply chains.
 - The ISO 14001 standard may be the starting point for the implementation of more complex SSCM models in the textile industry, which should be particularly involved in processes related to broadly understood sustainable development.

As a summary of the above conclusions, it can be stated that the representatives of the organizations surveyed notice that there is currently a trend for sustainable management and the ISO 14001 standard may be an important step that will support the processes of improving the concept of balanced management in supply chains.

4. Conclusions

The research process carried out as well as the analysis of the obtained results allowed to respond to the research questions posed and to state that:

- The ISO 14001 standard is an instrument that has a noticeable impact on improving the concept of sustainable supply chain management in the textile industry.

In summary, the management of a sustainable supply chains is a messy and complicated process. Supply chains will only be more complex in the future and the paradigm of sustainable development cannot be effectively implemented without the active involvement of top management and the entire supply chain. Sustainable development is now a source of differentiation, potential competitive advantage, and integrated value

creation. SSCM implementation opportunities can be found in both developed and developing country markets. Wherever there are consumers of products and services, there is a way to source, make, and deliver value that meets evolving social and ecological sustainability standards.

Finally, it is worth pointing that the results obtained can be helpful for entrepreneurs who want to start working on the implementation of sustainable solutions in supply chains. The article will allow them to better understand the advantages and limitations of ISO 14001 in this specific context. In addition, the article will complement the theory of reflection on the rationality of the implementation of ISO 14001 in the textile industry. The limitations of the studies may include a relatively small

test sample for this reason the studies should be continued and extended in the future.

Suggestions for future research focus on the evolutionary rather than the revolutionary nature of ISO standard implementation within firms and their supply chains. To this end, there is a need for a qualitative and further quantitative assessment of relationships identified from this study. Researchers should expand supply chain constructs to include a supplier's operational, tactical, and strategic orientation. It is also worth conducting research on the impact of such standards as ISO 9001 or ISO 50001 on SSCM in the textile industry and to compare the obtained results with the results obtained in other industries.

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