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# Proposal of a Concept for Improving the Sustainable Management of Supply Chains in the Textile Industry

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## Abstract

*Improving the concept of supply chain management and consideration of the environmental aspects and impacts on it, is the basis for the development of enterprises operating in the textile industry. It should be emphasised that the issue of sustainable supply chain management, due to its inherent complexity, requires continuous analysis of the situation of internal and external decision-making and is burdened with greater or lesser risk concerning the choice of strategy and resource allocation. Therefore supply chain management should be supported by a variety of instruments to streamline organisational structures and processes. These activities should be planned in detail and adapted to the specific nature of the industry. With this in mind, the aim of this article is to develop guidelines for the concept of sustainable supply chain management in the textile industry.*

**Key words:** sustainable supply chain management, textile industry, improvement.

duction and consumption has contributed to increasing pollution, water shortages, fossil fuel and raw material depletion, and climate change. The production of polyester fibre, the most widely used man-made fibre, consumes non-renewable resources and high energy levels, and generates atmospheric emissions. In fact, in addition to modern automated textile plants consuming large amounts of energy, textile finishing consumes large amounts of water, often producing harmful effluent. Apparel production is more environmental friendly, but sourcing from low cost countries consumes more fuel for transportation [2]. Among consumers, the trend towards fast fashion and cheaper clothing has led to a throw-away mentality.

Therefore it can be assumed that in the coming years, the issue of sustainable supply chain management in the textile industry will be crucial for companies who intend to maintain their existing competitive position. This view is justified in regulations introduced by national and European legislators and in the increase in consumer awareness, demanding optimal quality of products developed, taking into account human rights and the environment. 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 characterised 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:

- strong dispersion of individual links in the supply chain resulting from efforts to minimise 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 the Fast Fashion strategy based on maximum shortening of the product flow time in supply chains.

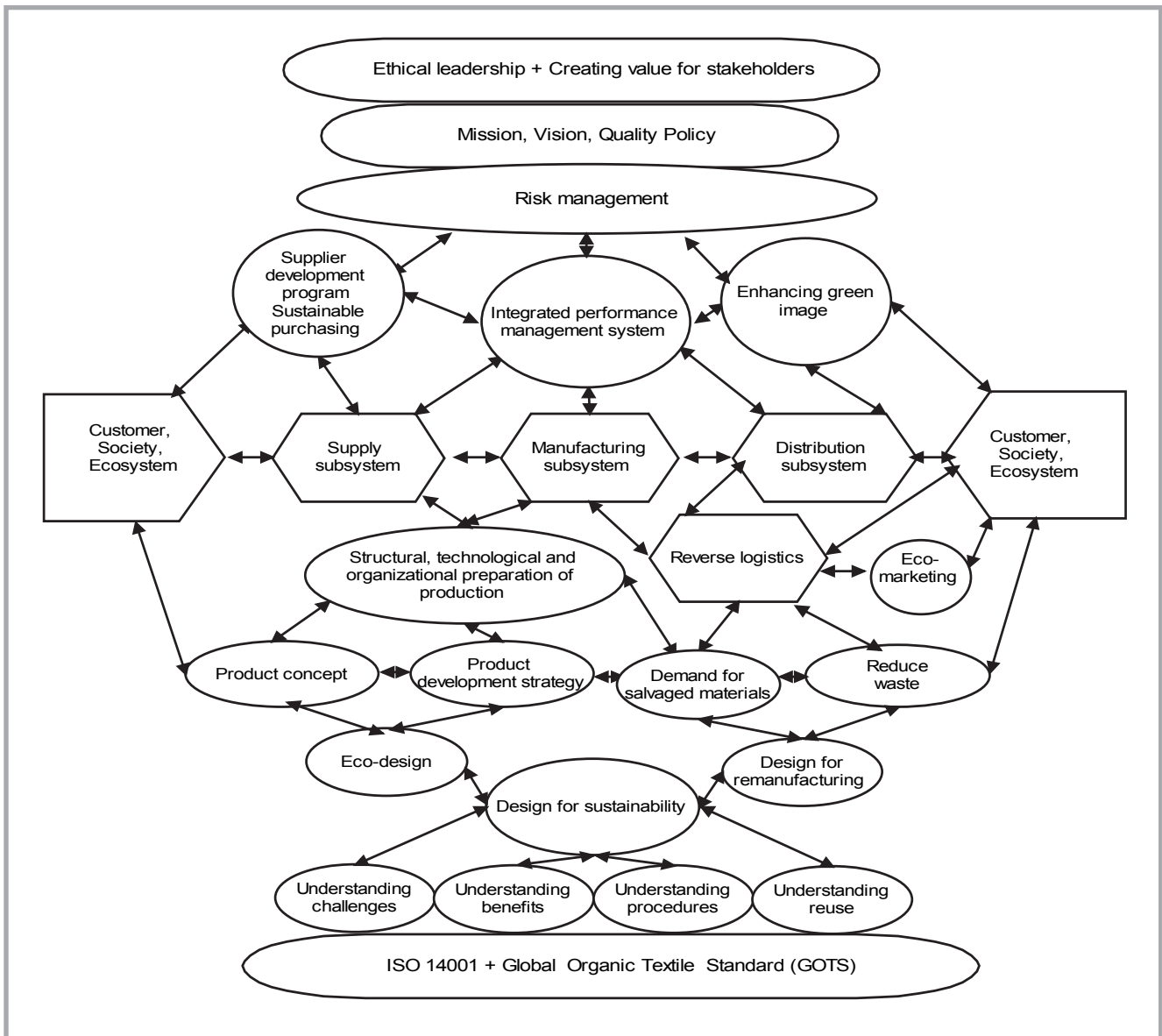
Therefore the main aim of this article is to develop a concept that will aid businesses operating in the textile industry in implementing solutions that have a measurable impact on sustainable supply chain management. This study is particularly important due to the fact that there are no papers in literature on this subject. Although there are concepts presenting general guidelines for sustainable supply chain management [3, 11, 23, 28], they do not take into account the specific character of the textile industry. Having this in mind, it is necessary to develop a model addressed to enterprises operating in the textile industry.

## Sustainable supply chain management – theoretical introduction

Sustainable development attempts to formulate a program which would integrate the different dimensions of human activity on the basis of a moral reflection as to human responsibility for nature. This integration is connected with moral, ecological, technical, economic, legal, social

## Introduction

The issue of sustainable supply chain management in the textile industry is becoming increasingly important. This is due to the fact that enterprises operating in the textile and clothing industry are particularly exposed to the occurrence of social and environmental problems [10] both in the production phase and entire supply chain. As Coster [6] rightly emphasises, environmental issues arise at all stages of the textile and apparel supply chain. The expansion of textile pro-



**Figure 1.** Proposed concept of improving the sustainable management of supply chains in the textile industry  
**Source:** own research results.

and political dimensions [20]. Mieszajkina [18] adds that one should strive to harmonise these areas and consider them in accordance with the principles of the system approach, which will allow them to be integrated and to achieve synergy. Pawłowski, emphasising the multidimensionality of sustainable development, distinguishes the following dimensions [21]:

- the ethical dimension (the issue of humanity's responsibility for nature),
- the ecological dimension (nature conservation, spatial planning etc.),
- the social dimension (since the social environment and not merely the natural one may experience degradation),
- the economic dimension (taxes, grants and other economic instruments),
- the technical and technological di-

mension (new technologies, being economical with raw materials),

- the legal dimension (environmental law),
- the political dimension (formulation, implementation and enforcement of sustainable development strategies).

Considering the problem of sustainable development in the context of supply chain management, it is noticed that it is a management concept in which links of the supply chain, beyond their own goals, make efforts to implement environmentally friendly solutions and support current and future generations in moral, economic and technical aspects, as well as legal, social and political. A similar view is presented by Sisco and co-authors [25], who define a sustainable sup-

ply chain as a management concept that takes into account environmental, economic and social influences and implements friendly manufacturing practices throughout the product life cycle. Seuring and Müller [24] present a very similar definition, and on the basis of their research process, also found that a particularly important role in a sustainable supply chain is played by a constructive relationship between suppliers, which results in minimising environmental and social risks. Similar opinions can be found in the work of Grekava and co-authors [13]. Brandenburg and co-authors [3] recognize, however, that the key to building a sustainable supply chain is to find a compromise between economic and environmental issues. In addition, sustainable supply chains should develop

and implement the latest technological solutions, the adoption of which will be more environmentally friendly. In conclusion, one can agree with Dey et al. [9], who suggest that modern supply chains should implement sustainable solutions not for economic but mainly moral reasons. The same authors also claim that sustainable management is particularly important in the textile industry due to the high position it occupies in the ranking of the most polluting industries.

### Proposed concept for improving the sustainable management of supply chains in the textile industry

In this chapter the authors will present a proposal of a model which, hopefully, will enable companies operating in the textile industry to develop and implement solutions leading to sustainable supply chain management (an outline of the model is presented in *Figure 1*). According to the authors, implementation of the model proposed will achieve synergies, which will increase the effectiveness and efficiency of the supply chain.

While developing and implementing the guidelines of the model proposed in the supply chain, particular attention should be paid to the following issues:

1. **Development of vision and mission:** The model developed is of an auxiliary nature and should closely support the implementation and deployment of the mission and strategy adopted throughout the supply chain. The formulation of a policy for sustainable supply chain management is of the utmost importance. The goals included in it should correspond to the strategy adopted (Fast Fashion, Slow Fashion etc.) and be formulated in a measurable way. Additionally it is also recommended to adopt them in such a form that they can be implemented in a relatively short period of time. It should be clearly stated that the policy of sustainable supply chain management is a strategic declaration for organizations that co-create the supply chain and sets out modes of action for all links and nodes in this chain. The assumptions of the model, however, must be implemented and developed in such a way that the supply chain has the ability to achieve the objectives contained therein.
2. **Creating value for stakeholders:** Organisations that co-create supply chains in the textile industry need to be aware that they operate in a specific environment, affecting them at each stage of the supply chain. Creating value for stakeholders is possible when they know their needs and expectations in relation to the company. Therefore understanding and relationships are critical elements, and these are impossible without proper communication. Thus it is recommended to develop solid communication channels between external and internal stakeholders and to consider their needs and expectations in the policy of sustainable supply chain management. Furthermore special attention should be paid to transparent and honest relations with business partners, building an offer in a responsible manner, promoting sustainable consumption, strengthening a positive impact and reducing the negative one on the environment, taking care of the development of partners in the supply chain, and applying standards such as the Fair Wear Foundation (FWF), the Eco label and GOTS.
3. **Cooperation with suppliers:** In today's competitive corporate environment, all dimensions of product delivery, quality, flexibility and the response time need to be incorporated through the effective design and operation of the supply chain. Supplier evaluation and selection is one of the most important components of the supply chain, which influences the long term commitments and performance of the company [26]. With this in mind, it is recommended to include ecological and social criteria in the procedures for selecting suppliers, maintaining partner relations and developing a common pro-ecological philosophy. This is an extremely important issue, especially in the textile industry, in which there is a trend to acquire raw materials in countries with a cheap labor force. Yu et al. [27] found that supplier and customer quality integration has a positive impact on green purchasing and customer green cooperation, which improve environmental performance. Supplier and customer quality integration also influence environmental performance indirectly through green purchasing and customer green cooperation.
4. **Technology management:** Implementation of technologies in supply chains is necessary to improve many aspects of their functioning, starting from information exchange through process optimisation aiming at an improved competitive position [15, 16, 19, 30]. Entrepreneurs operating in the textile industry should pay particular attention to implementation in the supply chains of solutions improving production and transport processes. It is recommended to select environmentally friendly modes of transport, minimise empty runs, consolidate loads, reduce emissions, and favor transport vehicles that meet high emission standards. In addition, it is worth using outsourcing as it is considered by Cosimato and Troisi [5], Sarkis [22] and Colicchia and co-authors [4] that the activity of logistic operators has a significant impact on creating a sustainable and environmentally friendly approach to supply chain management as well as improving energy efficiency and increasing reliability. Moreover logistics operators play an important role in reverse logistics, which is designed to improve the environment in a positive way as well as the image, and reduce costs [8].
5. **Implementation of the ISO 14001 standard:** The implementation of the ISO 14001 standard specifies important pro-ecological processes, whose careful design and adherence can be an important step towards the implementation of sustainable solutions in the supply chain. In addition, the implementation of the ISO 14001 standard's requirements and the resulting increase in environmental awareness mobilises entrepreneurs to reduce the use of components, implement the widespread use of recycling, search for alternative components (more environmentally friendly), or to design energy-saving products [1, 29]. Curkovic and Sroufe [7] state that ISO 14001 has the potential, when adopted under the right circumstances, to improve sustainability across the supply chain (in other words, it is a tool aiming at corporate sustainability). It can be applied across firms so as to tap into the synergies associated with the greening of a supply chain, i.e. better understanding of environmental processes, lower waste, pollution prevention and improved performance.

6. **Design for sustainability:** Supply chains from the textile industry should pay particular attention to the identification of environmental aspects related to the product and take them into account in the design process at the initial stage of its development. It is also recommended to provide the environment with reliable information on the environmental aspects of products produced in the supply chain and to emphasise the care for ecological aspects of the functioning of logistics processes. Moreover pro-environmental attitudes among potential customers should be promoted [14].

7. **Integration of cells in the supply chain:** The foundation of the model relies on integration processes taking place in the supply chain. It is not about integration with suppliers of first-order integration within its scope but about the covering of all links in + supply chain cooperation. As rightly pointed out by Gimenez and Tachizawa [12], the assessment and control of suppliers is not enough to ensure that supply chains can efficiently implement the assumptions. According to these latter authors, the basis should be an approach based on integration and cooperation extended to all parts of the supply chain. It should be clearly stressed that without full integration it will not be possible to implement the assumptions of the model. This is a necessary step to take further action.

8. **Risk management:** Risk management is mandatory in the majority of international supply chains and contributes to strengthening their structures and potential. Marian [17] emphasises that the noticing of risk by persons coordinating the supply chain management process stimulates integration activities, contributes to the minimisation of environmental threats and initiates improvement undertakings, significantly improving the supply chain.

### Initial assessment of the assumptions of the model

At the outset, it should be noted that the implementation of the model is a significant investment and requires a longer time (even several years) so that it can be fully integrated into the supply chain. However, long-term investments are a must for future-oriented organisations and sustainable development.

The concept of the model developed was presented for assessment and consultation to representatives of three companies operating in the textile industry. During direct interviews, representatives of the organisations surveyed suggested that:

- at this moment, the model cannot be assessed but there are prospects for this,
- the model contains a number of guidelines that will enable a more comprehensible and conscious way for the creation of a sustainable supply chain,
- the model, due to its complexity and multifaceted nature, requires from entrepreneurs to adapt its stipulations to the specific needs of a particular situation,
- it is worth conducting further research in this direction and to develop several models targeted at enterprises performing different functions in the supply chain.

### Model limitations

The model developed presents some shortcomings:

- The development and implementation of the model is relatively expensive. However, according to the authors, the costs incurred to implement sustainable solutions in the supply chain should be considered as an investment that in the long term will bring benefits (related to improved corporate image and economic situation),
- Due to the significant costs of implementing and adapting the model to specific supply chains, it is addressed mainly to larger enterprises. Smaller companies can also implement certain assumptions of the model, but in their case its implementation is not recommended globally.
- The proper functioning of the model is not possible without the full involvement of representatives of top management. Unfortunately the authors' observation shows that not all representatives of top management are able to set aside sufficient time to actively engage in the process of implementing and improving the model [31].
- Implementation of the model requires the involvement and cooperation of many links and nodes throughout the supply chain, which can significantly hamper the implementation of the assumptions presented in the model.

### Conclusions

The implementation of the model is a significant investment and requires a long time to allow it to be fully integrated into the supply chain. However, long-term investments are a must for future-oriented organisations and sustainable development. According to the authors, the implementation of the model guidelines is particularly important in the textile industry, which is at the forefront of the industries that have the most negative impact on the environment. The implementation of even selected elements proposed in the model should translate into creating a more conscious business and sustainable supply chain management. It is worth noting that the model developed stands out against the background of other concepts presented in literature, as follows:

- It is based on instruments, concepts and systems that are often proposed as separate solutions to problems without showing their mutual relations.
- It emphasises the importance of systemic product and technology management, as well as the relationship between supply chain management and the creation of ethical attitudes in business.
- It is characterised by high versatility, which allows its implementation (at least fragmentary) in almost every supply chain in the textile industry, intending to improve the implementation of pro-ecological concepts.
- The model emphasises relationships between sustainable development, supply chain management and technology, which are scarcely reported in available literature.

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