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## **Sustainable Supply Chain Finances implementation model and Artificial Intelligence for innovative omnichannel logistics**

### **1. Introduction**

The aspects of supply chain management that have particularly attracted the attention of both researchers and business in recent years according to authors research based on Scopus are Supply Chain Finance (SCF) and Sustainable Supply Chain Management (SSCM). The implementation of SSCM is a big challenge for companies as it requires comprehensive actions and is burdened with financial risk, therefore the aim of article is to identify and analyze the ways of supporting the implementation and development of SSCM with use of Artificial Intelligence and SSCF implementation model.

Potential paths to improve supply chain's sustainability based on SSCF and AI are presented on the example of two internationally operating companies from the clothing industry using omnichannel. SCF is most often defined as solutions implemented with the help of financial institutions or technologies, the ultimate goal of which is to adapt financial flows to physical and information flows in the supply chain (Hofmann, 2003; Camerinelli, 2009;

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Lamoureux and Evans, 2011; Wuttke et al., 2013). M. Steeman (2014) defines SCF as a financial arrangement applied by at least two supply chain partners and supported by a chain leader to improve overall financial performance and reduce the overall level of supply chain risk. The concept of SSCM is defined as supply chain management in a way that integrates the goals and requirements of sustainable development defined by the company, suppliers, customers and external stakeholders (e.g. consumers, decision makers, associations). Among these goals, there are distinguished economic, social, environmental and ethical that all members of the supply chain must achieve in order for the supply chain to be sustainable (Fritz, 2019, p. 2).

The assumptions and goals of SCF and SSCM are linked by the concept of Sustainable Supply Chain Finances (SSCF). The essence and main challenge of the SSCF is to solve the problem of the lack or difficult access of the supply chain members, who are not its leaders, to financial resources for financing investments in sustainability of the products (Karaosman et al., 2017). Usually it is connected with difficulty of that companies to access the capital and related high costs of capital, while often small suppliers from the beginning of the supply chain are the links in the supply chain where sustainability issues need improvement and would bring the greatest benefits (de Boer et al., 2017). SSCF is therefore the implementation of SCF in financing products improving the level of companies sustainability. Based on author's research in Web of Science (access 05.10.2021), there is significant research on the topic of Supply Chain Finance(s) (over 5000 records), also linked with sustainability (over 500 records) and artificial intelligence (78 for sustainable supply chain management, finance and AI). However there is a gap in literature about SSCF implemented in omnichannel logistics (just 8 records for supply chain finance + omnichannel and 0 records for supply chain finance + omnichannel + sustainable/sustainability).

Due to the asymmetric distribution of access to capital and the sustainability level of individual links in the supply chain, the implementation of sustainable supply chain finance solutions is particularly important for the links at the very beginning of the supply chain, although the entire supply chain achieves long-term benefits. An important is the distinction between "direct" and "extended" supply chain, because tools facilitating access to capital for the implementation of innovative working capital solutions are offered by chain leaders to the links forming a direct chain, while the lack of such assistance for indirect suppliers causes the so-called SME financing "missing middle" (Milder, 2008; Alibhai et al., 2017).

Artificial intelligence (AI) is one of the tools and technologies used to manage the supply chain, which can contribute to achieving significant benefits for the development of enterprise innovation. Artificial intelligence is understood as a field dealing with the creation of machines and algorithms, the functioning of which is based on the characteristics of human intelligence, including the ability to adapt independently to changing conditions, abstract understanding and continuous learning (Wyskwarski, 2015; Stawiarska, 2016). There are several publications among research in this field particularly worth interest. Lee et al. (2018) write about the warehousing management incorporating the internet of things to ensure a smart warehousing for the innovative logistics in the industry 4.0. A goal is to improve the efficiency of the warehouse functioning and to enhance the job satisfaction for the workers. The subject of AI in relation to warehouse automation was discussed in their works by, among others Mahroof et al. (2019), Han et al. (2018), Kayikci et al. (2017). AI can function as hardware and / or software in a system representing human intelligence, this type of representation is already visible in all business processes and operations (Vipul, 2009; Min, 2010).

## **2. Materials and methods**

### **2.1. Case study methodology**

In previous section, we have defined the different concepts related to Supply Chain Finance (SCF), Sustainable Supply Chain Management (SSCM), Artificial intelligence (AI) and there was indicated that there is a gap in literature about how they are implemented in logistics of clothing industry, which nowadays functions as part of the omnichannel. The use of a case study is justified due to the limited state of knowledge in a given area of research, recognition of the current phenomenon in real conditions and the blurred boundaries between the phenomenon and the circumstances of its occurrence (Yina, 2014, p. 3). Thus, a case study methodology has been adopted (Noor, 2008). This approach is also considered suitable for research on operational management (Voss et al., 2002). The research procedure consisted of (Czakoń, 2013, pp. 105-109): 1. data collection (enterprise websites, literature review), 2. analysis of data, documents, reports of the enterprises under research, 3. unstructured interviews with industry specialists, 4. formulation of generalizations, 5. confrontation with literature, 6. development of a generalizations model and closing the study.

To develop a model, it is necessary to adopt many assumptions and limitations (Czakon, 2013, p. 182). These conditions result from the approach to the implementation of changes, the influence of the environment on the subject of the study and the determinants of organizational culture. The process of creating the model of implementing the SSCF consisted of four elements. The procedure began with the identification of the types of variables that make up the construction of the model. The next step was to collect source materials - the interviews and the current SSCF literature were the basis. Then, the collected data was visualized in the form of a clear diagram. The resulting model was verified in terms of practical identification and degree of compliance.

The subject of the study were two deliberately selected companies from the clothing industry - one with headquarter based in Poland, the other - in Turkey. Both operating on the international market using logistics for omnichannel. A. Pettigrew (1997) notes that the importance of the size on the sample selection does not lie in the number of cases but in an in-depth study in each case. Currently, both companies do not apply the SSCM guidelines and do not use AI for this. After a detailed case study of enterprises, a model for the implementation of the SSCF was developed, guidelines for the implementation of the SSCM (based on AI) were proposed and recommendations were formulated in the form of potential benefits and threats resulting from the implementation of the project. The data used for the case study comes from the company's website as well as press releases, reports and interviews with specialists in the logistics industry.

The primary aim of the research is to identify and analyze the ways of supporting the implementation and development of SSCM with use of Artificial Intelligence and SSCF implementation model. Moreover, two specific objectives were formulated. The first of a theoretical nature, consisted in determining the possibilities of supporting the implementation and development of SSCM with the use of AI technology. It was possible to achieve after a detailed review and analysis of the literature. The second, empirical goal, concerned the SSCF implementation model and the presentation of potential paths to improve supply chain's sustainability based on SSCM and AI on the example of two companies from the clothing industry using omnichannel. The construction of the SSCF implementation model was based on the model proposed by de Boer et al. (2017), which combines popular supplier classification methods - Kraljić Matrix and supplier classification based on Wildemann (Kraljić, 1983; Wildermann, 1999) to determine where to apply reward mechanisms, where support mechanisms, where to replace suppliers, and where solutions other than SSCF may be more

appropriate. On contrary, the model that is the subject of this study is based on the author's classification of suppliers, developed taking into account the specificity of the clothing industry. The model was supplemented with additional variables to enable precise indication of the method of dealing with the type of suppliers when implementing SSCF.

## 2.2. Objective scope of the research (selected companies)

The first analyzed company, established in Poland, has been operating on the market for over 30 years, currently employing 22,000 people in its offices, logistics centers and sales networks in Europe, Asia and Africa. The company's offer includes five brands targeting different segments. The enterprise has (data as of Jun 2021) a network of 1,800 stores with a total area of over 1 million m<sup>2</sup> and operates under the omnichannel strategy that integrates traditional and online sales. At the end of 2020, the company's offer was available in a total of 38 countries, including 30 on-line. Its headquarter is located in Poland, offices are located in several Polish cities, Shanghai and Dhaka. Selected Polish company applies the principles of sustainable development, described in a separate strategy. Current activities include environmentally friendly production, chemical safety of production, elimination of packaging that is not subject to closed circulation and ecological solutions in the buildings of the headquarters and sales network, however, these areas do not directly concern the supply chain finances.

The second of the analyzed clothing companies, also established in 1991, has its headquarter in Turkey. Enterprise currently operates in 33 countries, incl. Turkey, USA, Canada, Germany, Russia and Australia and sells its products through 439 monobrand stores, located mostly in Turkey and approx. 4,500 points of sale. The company has approximately 159,000 sq m. net retail space and a medium-sized store of 498 sq m. (in 2020). The company has been offering online sales since 2013. The analyzed Turkish clothing company, unlike Polish one, designs, manufactures and sells mainly jeans and denim clothes, and is classified as premium denim brand. The company shapes its image by emphasizing high quality and a strong price position, and the products are between the top of the "core" and "premium" segments in the ready-to-wear clothing market. The company is committed to sustainable jeans production.

The key difference that characterizes analysed Polish and Turkish companies is that first one manages five brands, while second is one own brand. Brands of the polish company are dedicated to the group of middle-class customers with

one brand at very low prices, while Turkish one offers more expensive premium class products. The companies are also differentiated by the sales market, which in the case of Polish company focuses more on several European countries, Russia and the United Arab Emirates. Turkish company has a much lower availability of stationary stores in Europe, but has offices in North America and Australia. In case of online sales, both companies operate in similar markets.

### **3. Implementation of AI for analyzed companies**

Determinants of AI such as human intelligence, data analysis, prediction and optimization are essential for designing sustainable supply chain finance (Patnaik, 2015; Zahraee et al., 2016). According to G. Yu, F. Li and Y. Yang (2017), the main problem of supply chain finances is the issue of linking financial processes with material flows. The solution is AI, which strengthens partnership and information exchange between customers and suppliers in the supply chain by sharing available financial resources (Venkatesh et al., 2019). AI brings together FDIs and supplier networks for financial services sharing, especially given the supply chain finance criteria and regulations of financial institutions and brokers (Olan et al., 2021). Full availability of information and financial data in individual links of the chains ensures supervision and optimization of transactions. Enterprises operating under such assumptions achieve the necessary balance, equal access to resources and unified measures of performance monitoring, which contributes to generating benefits for all network participants.

In order to implement AI in both analyzed companies, there should be analyzed certain activities, which were formulated in the form of four points constituting the principles for the project implementation. The company's board should collect and present the reasons why AI is being implemented, such as value for money, the scope of work and the need to undertake the project at any given time. Preparing a valuable business case and including it in the company's strategy will increase the chances of obtaining maximum benefits from the implementation of AI and avoid problems with overestimating the return on investment or omitting the potential risk.

Second, a comprehensive database must be built. It is impossible to use artificial intelligence for any area without access to appropriate information sets. Therefore, both companies should standardize and catalog its own data, including archived data. It is also worth checking if and how they can obtain further data sets that can bring a competitive advantage, e.g. information on

consumer moods or the location of various events in real time (Rewolucja AI, 2017). In many companies, synchronizing data from various systems (in case of Polish company - WMS, a system cooperating with an RFID code reader, goods allocation system) is a big challenge, for which good solution is Big Data Analytics (BDA). BDA is a set of tools, algorithms, simulations and optimization that can be applied to Big Data in order to analyze them and extract unknown, hidden, important and useful relations, patterns and information (Adams, 2010). BDA can improve the supply chain sustainability, used in areas such as supporting modern sustainable production, designing sustainable ship routes and schedules, or assessing environmental performance (Chalmeta and Barqueros-Muñoz, 2021).

Third, it is recommended to assess resources and potential implementation models. Appropriate knowledge and experience are necessary in the implementation of each project, which is why managers of both analyzed companies should consider using expert services, e.g. by outsourcing or the experience of consulting companies. Integration within the enterprise is just as important as acquiring the right know-how on the market. AI solutions most often relate to seemingly independent departments of an organization, such as warehousing, distribution, finance and accounting, or customer service. However, they should be treated holistically. The choice of the project management model is also a very important aspect. For AI and the apparel industry, Agile seems to be the most appropriate approach. It divides projects into smaller tasks and stages. Dividing the work into smaller parts gives agile teams the opportunity to analyze the initial results, re-evaluate the work done and adopt an iterative approach at each stage of the project (Serrador and Pinto 2015).

Fourth, all processes should be integrated with particular emphasis on the financial aspect. After considering the conclusions from the pilot AI implementation, it is worth synchronizing them with the company's core business processes. Doing so will allow companies to fully achieve the benefits assumed in the business case. Integration should be holistic and usually requires process changes - their automation or thorough redesign in cooperation with people responsible for a given area (Rewolucja AI, 2017). In the case of AI, the most important thing is to ensure clear standards of human-machine and / or robot cooperation. The most difficult changes in the organization concern human capital and not innovative technological solutions. Therefore, managers of the analyzed companies should prepare employees for the implementation of AI through training and full access to information about the stage of project work.

After the correct implementation of AI, it is possible to achieve a number of benefits, manifested in gaining a sustainable competitive advantage as a result of effective forecasting of demand and reducing the costs of operations in the supply chain (Someh et al., 2020). On this basis, it can be concluded that the use of AI for the implementation of the omnichannel strategy is particularly desirable, as it allows to predict trends, optimize logistics operations for two distribution channels, synchronize prices and personalize promotions. Some of them anticipate the needs of customers by sending them the goods without waiting for the order confirmation. The potential benefits of AI implementation for a clothing industry company include: 1. Increase in innovation, particularly in robotics and automation dedicated mainly to warehouse processes, 2. Achieving a higher margin, 3. Better forecasting of customer needs, 4. Increase in sales, 5. More effective procurement management and cost control.

The use of AI allows company to optimize the costs of the global supply chain and flexibly respond to changes in the environment. Clothing brands can perfectly use this in the event of another (hypothetical) closure of stores in shopping malls due to a pandemic or other unpredictable situation and efficiently switch to online sales, without unnecessary inventory or having to move the collection over time (as was the case with lockdown in 2020). Digitally integrating manufacturers' systems with suppliers using AI will provide full information on the availability of production capacity, the availability of materials for production, and will also let company to optimize the availability of transport, as well as extraordinary events and failures.

The listed benefits for the clothing industry company resulting from the implementation of AI can be used to improve all dimensions of sustainability (social, environmental and economic), examples of which are shown in table 1.

**Table 1. Implications for the supply chain sustainability resulting from the implementation of AI**

Result of AI	Implications for supply chain sustainability
Increase in warehouse processes innovation	The use of solutions that save resources - energy, fuel, water, etc. Improving the efficiency and productivity, quality of service as well as working conditions, increasing safety, e.g. by reducing the risk of accidents
Achieving a higher margin and increase in sales	The excess margin can be used for investments in the social and environmental dimension of sustainability Improving profitability, economies of scale benefits through greater sales



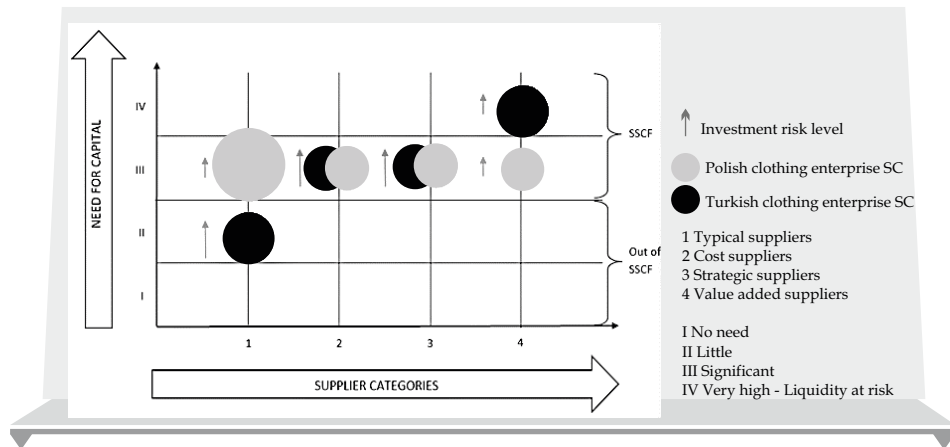
Better forecasting of customer needs	Assortment matched to the demand is reducing the problem of overproduction in the clothing industry that cause dead inventory harmful to the environment and constituting an unnecessary cost. Reducing returns cuts costs, e.g. environmental costs of implementing and handling
Effective procurement management and cost control	Reduction of costs resulting from disruptions in the supply chain, e.g. maintaining larger stocks, organizing additional transport Improving the stability of employment

**Source:** own elaboration

#### 4. Result - implementation of sustainable supply chain finances in clothing industry

An additional justification for the implementation of AI for both Turkish and Polish clothing company is the support for the implementation of SSCF. When implementing SCF, companies typically use analytical models to help determine the order in which a program is introduced to vendors. These models are typically a transformation of the Kraljic matrix where supplier segmentation is based on factors such as relative strategic importance for the buyer and risk. Another segmentation model focuses on the potential value that SCF can bring to a supplier and buyer base together. The analyzed criteria are the difference in the credit ratings of individual suppliers and the buyer, the suppliers' cost of capital rate, total expenses for all suppliers with a specific credit rating (de Boer et al., 2015, p. 33).

The implementation of sustainable supply chain finance, however, has some specific features that should guide both analyzed representatives of the clothing industry. According to R. de Boer et al. (2017), in this case, both the capabilities and required financial resources of analyzed suppliers should be additionally specified. For this purpose, selected Polish and Turkish clothing companies should divide the solutions for its suppliers into "rewarding", addressed to suppliers with a better rating and greater financial resources, and "supporting" addressed to prospective suppliers with limited possibilities of independent implementation of solutions consistent with the idea of sustainability, for reasons such as low rating and limited resources. A supporting SCF solution may be, for example, fixed assets financing or collaborative innovations, while an example of a rewarding solution is selective or performance based reverse factoring and dynamic discounting.



**Figure 1. Model of implementing the SSCF solutions in various suppliers of the supply chain**

Source: own elaboration

As part of the empirical goal, an implementation model for the SSCF solutions in various suppliers of the supply chain has been developed and then it was proposed to use it in business practice (figure 1). The model is used to segment suppliers in terms of SSCF implementation based on four variables: supplier type, its financial needs, the percentage share of this group of suppliers and the level of investment risk. The types of suppliers have been distinguished taking into account the specificity of the clothing industry: suppliers have been divided into four categories differentiating them according to their strategic importance for the supply chain and the degree of maturity of the partnership with the supply chain leader. Among the types of suppliers, the following were distinguished: typical, cost, strategic and value-added. Typical suppliers are group of suppliers offering standard materials which, due to their low specificity, can be easily replaced with others. Cost suppliers are those guaranteeing the lowest production costs. Strategic suppliers are characterized by lasting partnerships based on trust. Value-added suppliers are a group that offers unique materials and semi-finished products that allow brand to gain an advantage in the market.

Suppliers' demand for capital is based on an approach focusing on managing the cost of capital, also distinguishing four categories: *No need*, *Little*, *Significant* and *Very high - Liquidity at risk*. This is the main criterion indicating whether a given group of vendors should be included in the SSCF program. Thus, the

*No need* and *Little* categories indicate that a given contractor is able to finance the necessary changes and investments in sustainable development on its own, while contractors in the *Significant* and *Very high* categories should be included in the SCF support program for such activities.

The relative size of the group of suppliers, which is indicated by the size of the circle (blue for Turkish company and green for Polish company, respectively) is an auxiliary variable that will help in planning the order of implementation of the program with individual contractors. For example, despite the fact that, according to the model, Polish company's typical suppliers were included in the group eligible for the implementation of the SSCF program, the size of this group may indicate a longer program implementation period, which should be taken into account in determining the implementation priority. An additional criterion - business risk is determined by the length of the arrow. Shorter length means lower business risk, i.e. smaller negative effects of breaking cooperation with a contractor, e.g. due to loss of liquidity. This criterion also indicates the priority of implementation - in the case of high risk, a given group should be included in the SSCF program first.

Typical suppliers are by far the largest group of Polish clothing company's contractors. In the case of Turkish clothing company, the difference in the size of individual groups of suppliers is clearly smaller, but typical suppliers are also the most numerous. This is the only category in relation to which the legitimacy of continuing cooperation should be considered, which especially applies to Polish company's contractors - with a greater demand for capital and lower risk resulting from a possible breakdown of cooperation. Analyzed Polish enterprise is mainly owner of brands with affordable, low prices, hence they have many suppliers offering cheap materials that are relatively easily available and common on the market. It is therefore relatively easy to switch from one supplier to another. This is not the case with the Turkish analyzed company, that offers premium products which implies that quality of the materials offered by the suppliers must be higher.

Cost suppliers are an equally valuable category of contractors for both companies. The recommendation resulting from the model is to develop partnerships, also by implementing the SSCF program, due to significant difficulties in accessing the capital of this group. It is characterized by a significant level of business risk, therefore the priority of SSCF implementation should be high. The reduction of delivery costs is one of the significant effects of the implementation of the SSCF. Therefore both companies should act in a similar way in relation to providers of cost advantage.

Strategic suppliers are the type of contractors for whom the benefits of permanent cooperation based on trust are of particular importance. Like cost-effective suppliers, these are businesses that need SSCF because of difficulties in accessing capital. Due to the nature of the relationship and the resulting easy flow of information, also of sensitive nature, this category of suppliers is characterized by a high business risk, while the implementation of the SSCF in this case will be relatively easy and quick. This is the best category to be piloted in. At this stage, it is worth using advanced AI technology to implement the SSCF, which will allow the effectiveness of the project to be evaluated. In the variant of strategic partnership relations, large, automatic data exchange takes place, which is not always verified, but can be significantly facilitated by AI. This technology will facilitate modeling of supply chain finances, which do not require significant control but are associated with a relatively high cost of capital.

The type of value-added providers is a particularly important category for the analyzed Turkish clothing company, as good-quality, distinctive materials are the brand's strength. At the same time, these are often small manufactories specialized in the production of one type of product, very sensitive to problems with access to capital, as well as to problems related to all aspects of sustainable development. Therefore, company's management should place a high priority on this group, and carefully select SCF tools appropriate to the specifics of its suppliers' activities. SCF solutions related to the co-financing of activities, especially fixed assets, will be appropriate in this case. The Polish company's group of value-added providers is very diverse in terms of capital availability due to the diversity of the portfolio of owned brands. This group includes companies specializing in sewing youth fashion, as well as controlling companies with which company cooperates under the Accord on Fire and Building Safety in Bangladesh agreement, enabling the company to implement the More Safe project. Generally, however, this group includes suppliers that should be covered by the SSCF. Also in that case, the key will be to choose the right SCF solutions.

To apply the model, it will therefore be necessary to collect a large amount of sensitive information about suppliers and their complex analysis, which both companies can achieve because they use integrated systems such as WMS or SAP. The difficulty related to the implementation of the model in the supply chain for both analyzed clothing companies will be the need to obtain data from cells such as cotton plantations and processing plants, chemical plants or factories belonging to the extended and ultimate supply chain and located in

developing countries. In order for this process to be effective, it should therefore be supported by IT solutions that facilitate the collection and analysis of Big Data, taking into account qualitative data.

## 5. Discussion

The subject of implementing AI in SSCM has been already widely discussed (e.g. Someh et al., 2020), also problem of efficient implementation of SCF has been already noticed by researchers such as de Boer et al. (2015). However, the authors note that in order to gain effective implementation, implementation model must necessarily be adapted to the specifics of the industry and other characteristics of the business model, such as operating in the omnichannel system. As part of further research, there is a field to refine the model by adding second level of analysis for certain groups of suppliers. In case of the discussed companies, such an additional segmentation level would be helpful in terms of e.g. the priority of SSCF with AI implementation and would apply to the most numerous groups of suppliers – “typical suppliers” and the most internally differentiated – “value-added suppliers”. There should be also considered possibility of modifying the SSCF implementation model with other variables (apart from: the type of supplier, its financial needs, the percentage share of the group of suppliers and the level of investment risk), taking into account factors of the further environment, such as the economic environment, including competitors, the political and legal environment, or the socio-cultural environment.

## 6. Conclusion

The developed model of implementing the SSCF solutions for various suppliers of the supply chain is utilitarian and performed a descriptive, analytical and explanatory function. The correctness of the model is confirmed by literature studies and a case study of the analyzed companies. There are no apparent contraindications for using the variables analyzed in the model for segmentation of suppliers in a non-textile industry, which speaks for its universality. As a result, the model can be used for the theoretical analysis of the implementation of the SSCF solutions in the various suppliers of the supply chain. Despite the identification of the relationship between the researched factors in the supply chain, it is not possible to fully confirm the universality of the model, which results, *inter alia*, from the small number of companies analyzed. The

background to this problem is the small number of companies using the SSCF and the associated quality of the model fit.

Referring to the empirical goal of the article, companies from the clothing industry (nowadays operating mainly within the omnichannel framework) by implementing AI, can more easily improve all dimensions of sustainability (social, environmental, economic and financial). They will achieve it especially in the strategic field, based on growing partnership and cooperation with suppliers offering value-added materials that guarantee a competitive advantage. Thus, the use of AI has a direct impact on the development of the SSCM, an element of which is the SSCF. This is particularly evident in two areas. First of them is the use of machine learning to optimize supply and inventory management, which is crucial for fast fashion and is also a prerequisite for improving sustainability of the supply chain.

Second is proper segmentation of suppliers according to specific criteria (including, in particular, financing methods tailored to their needs), which is of key significance in successful SSCF program.

## Summary

Whilst there is significant research on supply chain finance, there is little information about its application to the omnichannel logistics. Hence, the primary adopted goal is to identify the ways of supporting the implementation and development of SSCM with use of Artificial Intelligence and developed SSCF implementation model. Potential paths to improve supply chain's sustainability based on SSCF and AI are presented on the example of two internationally operating companies from the clothing industry using omnichannel. An exploratory case study has been conducted. Three methods were used to gather data: document/ reports analysis, direct and participative observation and unstructured interviews. By implementing AI, supply chain leaders can more easily improve all key dimensions of sustainability, especially in the strategic field, based on strengthening partnership and cooperation with suppliers offering value-added materials that guarantee a competitive advantage. The paper contributes to the limited existing literature on SSCF and AI and disseminates this information to provide impetus, guidance and support toward increasing the productivity, efficiency, consistency and quality of service.

**Keywords:** *sustainable finance, supply chain management, artificial intelligence, omnichannel.*

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