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# **Environmental and Social Aspects of Supplier Relationship Management**

**Abstract:** Due to the rapid growth of significance of sustainable development in recent years, there have been many ideas regarding the practical application of environmental and social concepts in business management. Many of these concepts include the field of supply chain management, which is also a very evolutionary issue. One of the main areas of supply chain management is supplier relationship management. Our goal is to present environmental and social aspects of supplier relationship management taking into consideration individual approaches of specific researchers and to aggregate the gathered information. As a research tool, we used literature analysis, taking into account current works of researchers.

**Keywords:** procurement, supplier relationship management, green supply chain, sustainability, sustainable development

**JEL:** M11, M14, Q01

# 1. Introduction

The issue of sustainable supply chain management has become very influential in many areas of business science because it connects two significant fields of operation: Supply Chain Management (SCM) and Sustainable Development (SD). It is also very significant as it links the environmental element with the social element. Our goal is to present and analyse those elements taking into account many aspects of sustainable supply chain management. We will also summarise the gathered information taking into consideration different views of researchers using literature analysis as a research tool.

Müller and Seuring define sustainable supply chain management as “management of material, information and capital flows and the cooperation between the stakeholders of supply chain that set their goals taking into consideration three dimensions of sustainable development: economic, environmental and social” (Müller, Seuring, 2008: 1700). They also identified two triggers for Sustainable Supply Chain Management (SSCM): supplier management for risk and performance and supply chain management for sustainable products.

Gupta and Palsule-Desai define SSCM as a set of practices that include all of the following aspects (Gupta, Palsule-Desai, 2011: 235):

- 1) an environmental impact as an imperative;
- 2) consideration of all stages across the entire value chain for each product;
- 3) a multi-disciplinary perspective, encompassing the entire product life-cycle.

Hassini, Searcy and Surti provide the following definition of sustainable supply chain management: management of supply chain operations, resources, information and funds with three simultaneous goals: to maximise supply chain profitability, to minimise an environmental impact, and to maximise social well-being (Hassini, Searcy, Surti, 2012: 70).

Kasturiratne, Liu and Moizer define SSCM as “strategic, transparent integration and achievement of an organisation’s environmental, social and economic goals in the systematic coordination of key inter-organisational business processes for improving long-term economic performance of the individual company and its chains” (Kasturiratne, Liu, Moizer, 2012: 582).

As one can see, all the above definitions of sustainable supply chain management have three common features: focus on economic, environmental and social factors of supply chain and a shared view on the matter that let us formulate a basic SSCM definition: sustainable supply chain management is management integrating economic, environmental and social factors of operations regarding the flow of resources, finances and information in a supply chain.

The idea of sustainable supply chain management is also closely related to the concept developed by John Elkington: Triple Bottom Line (TBL), which defines

three dimensions of sustainability: profit (economic dimension), planet (environmental dimension), and people (social dimension) (Elkington, 1997).

Kumar and Rahman define supply chain sustainability as: “a holistic perspective of supply chain processes and technologies that go beyond the focus of delivery, inventory and traditional views of cost” (Kumar, Rahman, 2016: 836).

Akhavan and Beckmann provide a categorisation of ways of integrating sustainability into sourcing strategies (Akhavan, Beckmann, 2017: 140–142): internal integration and governance, external governance and inter-organisational collaboration along with collective initiatives, supplier screening with focus on social issues, supplier screening with focus on environmental issues, supplier development with focus on social issues, and supplier development with focus on environmental issues.

These categories provide a framework for analysis of results of integrating sustainability into sourcing and supply management.

## 2. The literature review

The selected literature on the subject under discussion is presented in Table 1.

Table 1. The literature review

Publication	Subject	Focus and results
Müller, Seuring (2008)	Sustainable supply chain management (SSCM)	Identification of triggers and strategies for sustainable supply chain management
Gupta, Palsule-Desai (2011)		A framework summarising the existing literature regarding sustainable supply chain management
Hassini, Searcy, Surti (2012)		A framework for sustainable supply chain management (SSCM)
Kasturiratne, Liu, Moizer (2012)		A hub-and-spoke integration model for integration of sustainable supply chain management (SSCM) and green marketing
Seuring (2013)		A review and categorisation of modelling techniques for sustainable supply chain management (SSCM)
Barnes, Wu (2016)	Sustainable supply chain	A model for partner selection in a sustainable supply chain
Kumar, Rahman (2016)		Identification of key factors that determine the buyer-supplier relationship in a sustainable supply chain
Adrien-Kirby, Hoejmose (2012)	Socially and environmentally responsible procurement (SERP)	A framework of socially and environmentally responsible procurement (SERP) literature for the years 2000–2010

Publication	Subject	Focus and results
Dooley, Ellram, Tate (2012)	Environmental purchasing and supplier management (EPSM)	A review of literature and business practice on environmental purchasing and supplier management (EPSM) and categorisation of EPSM practice
Masoumik et al. (2015)	Green supply chain	A conceptual model for developing the strategic green supply chain
de Sousa Jabbour, Jabbour (2016)	Green Human Resource Management (GHRM) and Green Supply Chain Management (GSCM)	A framework for integration of Green Human Resource Management (GHRM) and Green Supply Chain Management (GSCM)
Lasch, Winter (2016)	Corporate social responsibility (CSR)	Examination of application of social and environmental criteria used in supplier evaluation
Urbaniak (2016)		Identification of key factors that determine the role of corporate social responsibility in managing the supplier relationship
Akhavan, Beckmann (2017)	Sustainable sourcing and supply management strategies (SustSSM)	Identification of configuration types of sustainable sourcing and supply management strategies (SustSSM)

Source: own elaboration

The concepts described above that were not introduced earlier – socially and environmentally responsible procurement (SERP), environmental purchasing and supplier management (EPSM), green supply chain, sustainable sourcing and supply management strategies (SustSSM), Green Human Resource Management (GHRM), Green Supply Chain Management (GSCM) and corporate social responsibility (CSR) will be presented later in the paper.

### 3. The triggers and strategies for sustainable supply chain management

Müller and Seuring have identified a set of triggers that affect a supply chain and are used to develop strategies that might be applied in a sustainable supply chain.

Those triggers are presented in Figure 1.

Pressures and incentives come to the focal company from three groups: government, customers and stakeholders, while two-way dependencies occur between the company and its suppliers.

Moreover, two strategies were identified. They show how companies deal with the issue of sustainable supply chain management. The first one is called “supplier evaluation for risk and performance” and it is focused on making the

supply process sustainable. The other one is called “SCM for sustainable products” and it is focused on making products more sustainable (Müller, Seuring, 2008: 1703–1704).

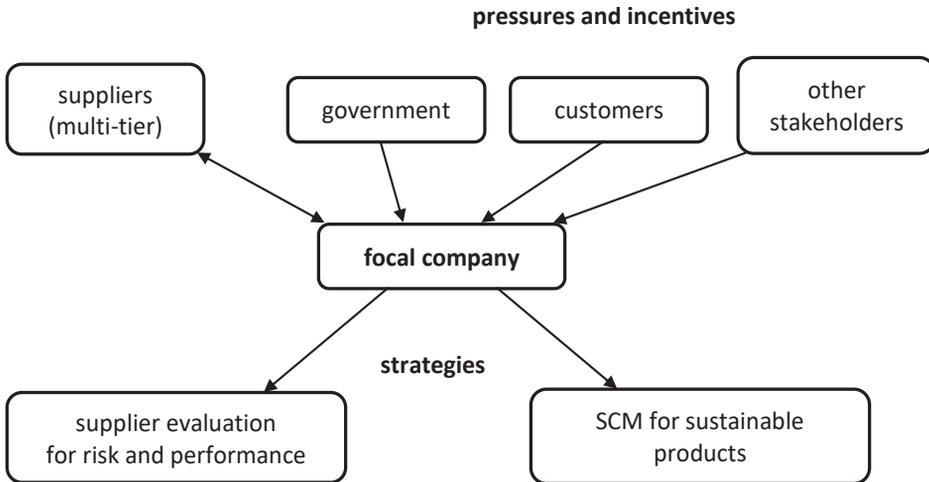


Figure 1. Triggers for sustainable supply chain management

Source: own elaboration (Müller, Seuring, 2008: 1703–1704)

Akhavan and Beckmann identified five strategy profiles for sustainable sourcing and supply management profiles based on their framework for analysis of results of integrating sustainability into sourcing and supply management (Akhavan, Beckmann, 2017: 144–147):

- 1) the minimalist – minimal focus on sustainability in the sourcing strategy;
- 2) the social risk manager – a narrow approach to sustainability in the sourcing strategy, high activity in internal integration and social screening;
- 3) the collaborator – high activity in internal integration and external governance, inter-organisational collaboration and collective initiatives, low activity in social and environmental supplier development;
- 4) the compliance networker – very high activity in internal and external governance, high activity in social and environmental screening, low activity in social and environmental supplier development;
- 5) the proactivator – very high activity in internal integration and governance, social and environmental screening, as well as social and environmental development, high activity in external governance.
- 6) This categorisation allows us to assess corporate sourcing practices.

## 4. The framework for a sustainable supply chain

The framework for a sustainable supply chain is the next described term. It is a set of functions within the chain (Hassini, Searcy, Surti, 2012: 73–74):

- 1) sourcing – a set of green procurement practices;
- 2) transformation – processing product in the way that is the most effective economically and the least affective environmentally;
- 3) delivery process – a set of decisions concerning supply chain operations: transportation, facility location, inventory and waste emission;
- 4) value proposition – marketing and PR activities, the “pay more and feel good” factor, the snowball effect – higher standards provided by the company imply higher consumer demands that affect other companies;
- 5) consumer and product use – energy efficiency, use of green energy, customer education, GHG emissions;
- 6) reuse, recycle, return (3R) – the way of dealing with a used product – the answer to the question whether its components should be reused, recycled or utilised.

The last function indicates that a sustainable supply chain is closely connected with the concept of closed-loop supply chain and reverse logistics.

Hassini and Surti describe a set of factors that may cause a supply chain to become sustainable. Those factors are (Hassini, Searcy, Surti, 2012: 75–76):

- 1) market forces – clients and suppliers that provide needs and possibilities as the market environment; it might be conditioned by fair trade practices and environment-friendly or ethical operations;
- 2) policy and regulations – they demand that company operations meet environmental, ethical and law requirements;
- 3) science and technology – they provide new methods of elimination of waste and toxic emissions and maximising energy efficiency;
- 4) product development – possibilities of using more recyclable or reusable materials for existing products and developing new more sustainable products;
- 5) process capability – makes the existing process more environment-friendly (e.g.: by energy efficient machines or fuel-efficient transportation);
- 6) sourcing and operations – reducing waste emission through a supply chain, including suppliers’ facilities;
- 7) transport and logistics – issues regarding ecological transportation, reverse logistics and the concept of the closed loop supply chain;
- 8) marketing and PR – efforts to create value propositions for clients;
- 9) social issues – issues regarding environmental and social impact of business activities on local communities.

Those factors should provide comprehensive information whether a supply chain should be considered sustainable or not.

## 5. Supplier relationship management in a sustainable supply chain

Managing the relationship between the buyer and the supplier (the buyer-supplier relationship – BSR) is becoming an increasingly important field of action for company executives – especially in the case of sustainable supply chain.

Kumar and Rahman present factors regarding the BSR that affect sustainability adoption in a supply chain. They show that an external influence and expected benefits are antecedents of top management commitment towards incorporating sustainability into supply chain operations resulting in the inclusion of BSR practices, such as supplier selection, supplier development and supplier performance review, into supply chain operations, which further influences economic, social and environmental sustainability performance of supply chain (Kumar, Rahman, 2016: 844–845).

The main factors are presented below (Kumar, Rahman, 2016: 844–845):

- 1) external pressure and expected benefits of sustainability adoption are important antecedents for developing top management commitment towards sustainability;
- 2) top management commitment is directly related to the incorporation of BSR development practices such as supplier selection, supplier development and supplier performance review;
- 3) supplier selection positively influences economic, social and environmental sustainability performance of supply chain.

The factors listed above also suggest actions to be taken in companies that wish to implement green performance activities, e.g.: development of relationships with supply chain partners, creating awareness of expected benefits of sustainability adoption among supply chain partners, as well as special attention paid to such BSR activities as supplier selection, supplier development and supplier performance review (Kumar, Rahman, 2016: 844–845).

## 6. Selection and evaluation of suppliers in a sustainable supply chain

There are many ways of selection and evaluation of suppliers in a sustainable supply chain.

Lasch and Winter propose criteria of evaluation based on codes of conduct of examined companies, presented in Table 2.

Table 2. Social and environmental criteria of supplier evaluation

Category	Criteria
social criteria	<ul style="list-style-type: none"> <li>– no child labour</li> <li>– working hours</li> <li>– no forced labour</li> <li>– no discrimination</li> <li>– employment compensation</li> <li>– freedom of association</li> <li>– health and safety practices</li> <li>– no disciplinary and security practices</li> <li>– employment contract and working permit</li> <li>– further ethical and social aspects</li> <li>– home worker conditions</li> </ul>
environmental criteria	<ul style="list-style-type: none"> <li>– end-of-pipe control (wastewater treatment system)</li> <li>– use of environmentally friendly material</li> <li>– carbon and hazardous substances management</li> </ul>

Source: own elaboratio (Lasch, Winter, 2016: 184)

The presented criteria are grouped into two categories: social and environmental.

Seuring developed a categorisation of modelling techniques for sustainable supply chain management taking into consideration the following modelling approaches: the life-cycle assessment (LCA) model, the equilibrium model, the multi-criteria decision making (MCDM) and analytical hierarchy process (AHP) (Seuring, 2013: 1516–1517).

Barnes and Wu propose a method of selection of green supply chain partner that combines two methodologies: analytic network process (ANP) and multi-objective programming (MOP). Those two methodologies were combined into analytic network process-multi objective programming (ANP-MOP) because neither methodology could solve the problem of a green partner selection in a comprehensive way. Such a model might provide an effective and efficient solution to the problem of evaluation of a potential co-operator in a sustainable supply chain (Barnes, Wu, 2016: 2118).

The proposed method divides the selection process into four steps (Barnes, Wu, 2016: 2118):

1. Identification of the ANP network structure and relationship.

The goal of this step is to construct a green supply chain by formulating the structure of the analytic network process to express internal and external relationships using four clusters: two for environmental evaluation (pollution control – PC and resource consumption – RC) and two for business evaluation (cost – CC and quality – QC). This structure and relations are presented in Figure 2.

The structure shown above provides us with relations between specific factors, without neglecting the business or ecological factor, and it is flexible enough to meet requirements of decision makers.

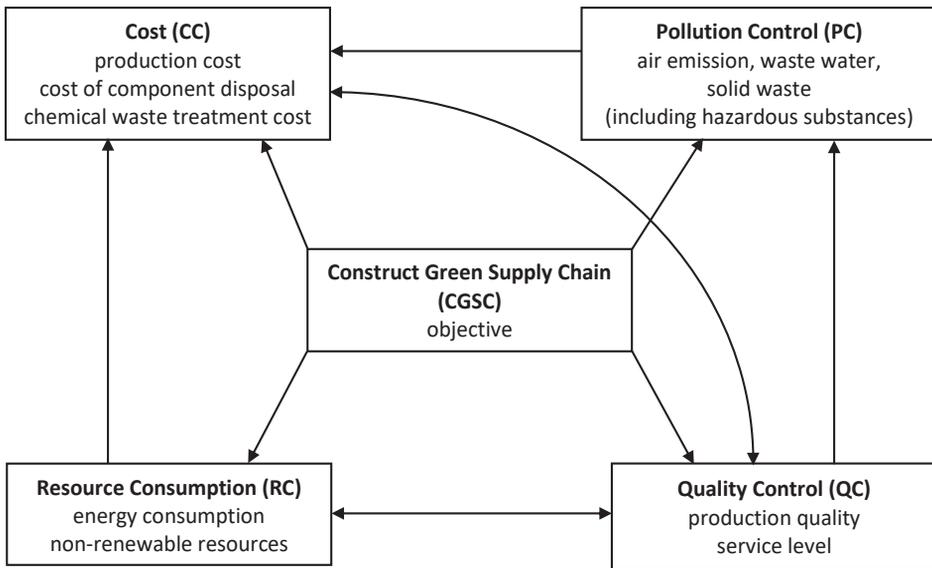


Figure 2. The structure and relationships of the network for partner selection in a green supply chain

Source: own elaboration (Barnes, Wu, 2016: 2119)

## 2. Building a matrix and defining priorities for different criteria.

Having the network structure and relations described, we construct priorities taking into consideration different criteria. There are three stages involved: generating an unweighted matrix for green partner selection based on the structure and internal relationships of analytic network process, calculating a weighted matrix in terms of unweighted matrix, and computing a limiting matrix in accordance with the weighted matrix.

## 3. Construction of optimisation objectives of the MOP.

Next, we define the notations and decision variables taking into consideration the constituents of supply chain: suppliers (S), producers (P), distribution centres (DCs), customer zones (C), raw materials (R) and products (s).

## 4. Formulation of constraints of the MOP.

We can define several constraints to be taken into account in the case of different product structure, production capacities of producers, transport capacities, warehouse limitations, and market demand:

- a) material balance;
- b) supplier capacity limit;
- c) production capacity limit;
- d) distribution centre throughput limit;
- e) total supply and total demand limit;

- f) defective rate constraints;
- g) distribution centres constraints;
- h) variable constraints.

Depending on the complexity of supply chain, there might be more constraints.

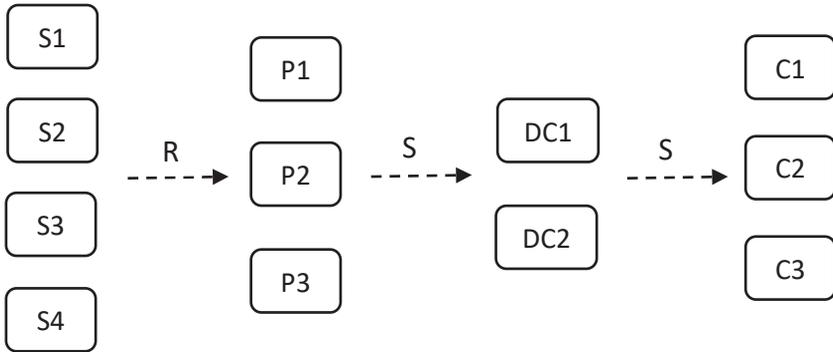


Figure 3. The structure of supply chain before application of the ANP-MOP model

Source: own elaboration (Barnes, Wu, 2016: 2123)

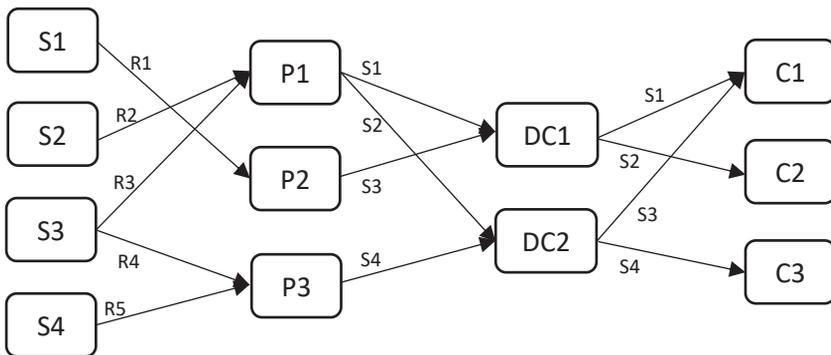


Figure 4. The optimal structure and lot-sizing of a green supply chain

Source: own elaboration (Barnes, Wu, 2016: 2123)

For our example, we can assume that there are several potential partners for our supply chain: suppliers (S) = 4, producers (P) = 3, distribution centres (DC) = 2, and customer zones (C) = 3. Lines R and S are sizes of material flow which are not determined yet. Neither the optimal routes between specific facilities nor optimal material lot sizes are known at this point. Our supply chain before applying the ANP-MOP model is shown in Figure 3.

After application of ANP-MOP model, we obtain the optimal structure and the optimised lot-sizing of our green supply chain – shown in Figure 4.

As we can see in Figure 4, optimal routes between specific facilities are identified. Furthermore, optimal material lot sizes (R1, R2, R3 etc.) are known in this case. This form of supply chain structure is supposed to provide an optimised flow of resources taking into consideration economic and environmental variables.

## 7. Corporate Social Responsibility in managing the relationship with the supplier

The important social aspect of supplier relationship management is the practical application of Corporate Social Responsibility in a supply chain. The examples of this kind of application are the following: a code of conduct (ethical principles and standards of supply chain management), a supply chain CSR deployment guidebook, a supply chain CSR checklist and SCR self-evaluation questionnaires (Urbaniak, 2016: 237–238). Many international companies also use CSR practices, such as a supplier social & environmental responsibility agreement, as an integral part of their cooperation with suppliers.

Another example of practical application of CSR in a supply chain is a supplier ethical code of conduct that takes into consideration such operational elements as: compliance with work standards, keeping open communication with employees, recruiting new employees on the basis of their qualifications, and investing in professional and personal development of employees (Urbaniak, 2016: 242).

Many international companies or groups of companies launch their own CSR-based programmes related to supplier relations management (green supplier development programmes) that are based on setting targets for suppliers and formulating task programmes. Companies from the chemical industry, such as Akzo Nobel, BASF, Bayer, Evonik Industries, Henkel, Lanxess and Solvay, launched an initiative called the Chemical Initiative for Sustainable Supply Chain in order to develop common criteria for auditing and supplier evaluation (Urbaniak, 2016: 243–245).

Companies from the electronic industry (Acer, Apple, Dell, Eastman Kodak, Flextronics, Hewlett-Packard, Hitachi, HTC, IBM, Konica Minolta, Lenovo, Lexmark, LG Electronics, Logitech Medtronic, Microsoft, Motorola, Philips, Samsung, Sony, Texas Instruments, Toshiba, Xerox) established the Electronics Industry Citizen Coalition in order to help their suppliers with socially responsible development, for example, by implementation of a platform that allows data analysis and generation of reports related to the evaluation of suppliers (Urbaniak, 2016: 243–245).

Other companies implementing sustainable solutions in their supply chain are (Urbaniak, 2016: 243–245): Toshiba, Sharp, Mazda (Green Procurement Guidelines), Canon, Kyocera (Green Procurement Standards), Fujitsu (Green Procurement Directions), Sony (Green Purchasing Standards), and NEC (Green Procurement Policies).

## 8. Other sustainable concepts in supplier relationship management

There are other sustainable concepts related to supplier relationship management. For example, socially and environmentally responsible procurement (SERP) concentrates on preserving social and environmental responsibility in procurement processes (Adrien-Kirby, Hoejmoose, 2012: 232–242).

The next concept is environmental purchasing and supply management (EPSM). It is defined as the integration of environmental criteria into the selection of suppliers and distributors taking into consideration the buyer's requirements and evaluations of suppliers related to environmental performance (Dooley, Ellram, Tate, 2012: 174).

Dooley, Ellram and Tate suggest the following general categories of EPSM practices: general practices and philosophy, supplier involvement, supplier development, supplier selection criteria, and supplier environmental outcomes.

Another concept, Green Supply Chain Management, is defined as a subsystem of Sustainable Supply Chain Management that integrates environmental issues into inter-organisational practices of Supply Chain Management by the integration of the following practices: internal environmental management, green purchasing, cooperation with customers, ecodesign, recovery of investments, and reverse logistics (de Sousa Jabbour, Jabbour, 2016: 1827–1828).

There is an ANP model for the strategic prioritising of GSCM initiatives, it is presented in Figure 5.

Gupta and Palsule-Desai refer to Extended Producer Responsibility (EPR) as a successful market-based approach to sustainability. It has two primary objectives: to shift responsibility for environmental performance of a product towards its producer and to provide incentives to manufacturers to incorporate environmental considerations into the design of their products. In order to successfully apply EPR and to make their products and processes sustainable, companies use strategies such as (Gupta, Palsule-Desai, 2011: 241):

- 1) changing the product design in order to incorporate end-of-life take-back, disassembly and reuse;
- 2) rationalisation of parts and components in order to decrease material usage, eliminate hazardous substances and facilitate manufacturing;
- 3) choosing optimal product durability with a view not only to planned obsolescence but planned take-backs and replacements as well.

Another significant sustainable concept is green marketing. It is defined as identifying and satisfying green customers and promoting environmentally-friendly products, using branding techniques to introduce green products into the green market, taking into account such aspects of corporate demand manage-

ment as: prediction of demand for environmentally-friendly products, positioning and demand stimulation for recycled and remanufactured products, generating demand for build-to-order products, and building competitive advantages from a focus on environmental priorities (Kasturiratne, Liu, Moizer, 2012: 582).

**Goal: strategically prioritising GSCM initiatives**

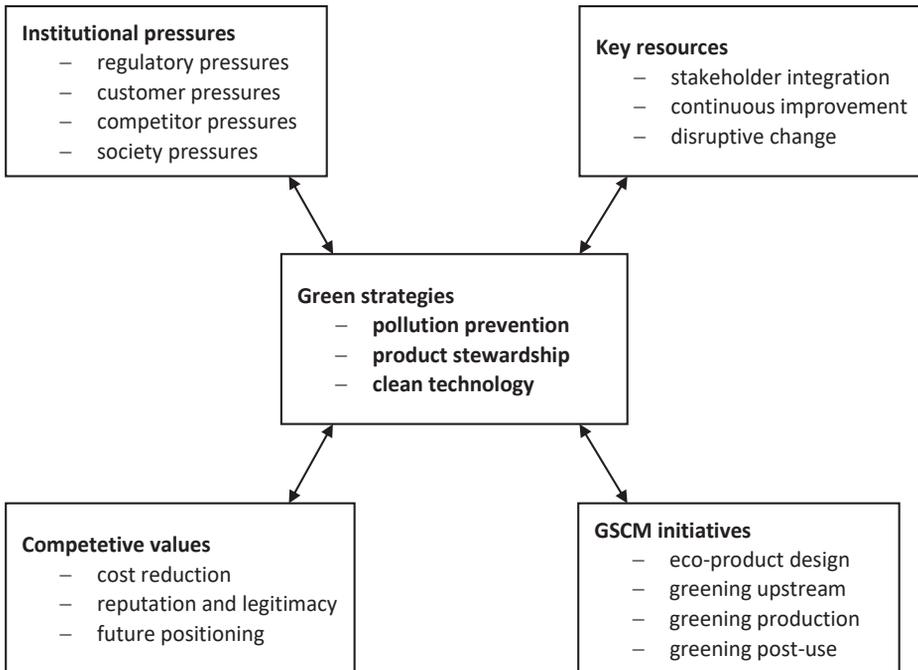


Figure 5. ANP model for prioritising green supply chain initiatives

Source: own elaboration (de Sousa Jabbour, Jabbour, 2016: 1827–1828)

Kasturiratne, Liu and Moizer propose an integration model for integrating sustainable supply chain management and green marketing using 6P components (Kasturiratne, Liu, Moizer, 2012: 583–584):

- 1) product – green product requirements, ensuring green credentials of products;
- 2) promotion – green branding, capability to deliver green products;
- 3) planning – green purchasing, supply-chain-wide CSR, requirements for green materials and people training;
- 4) process – process re-engineering, new technology and knowledge requirements;
- 5) people – green enterprises, green customers;
- 6) project – right resources to deliver green products, ecological and social benefits.

De Sousa Jabbour and Jabbour also emphasise the importance of integration of Green Human Resource Management (GHRM) with Green Supply Chain Management (de Sousa Jabbour, Jabbour, 2016: 1831–1832).

## 9. Conclusions

There are many ways and criteria to describe environmental and social aspects of supplier relationship management in a sustainable supply chain due to many various concepts investigated by particular researchers. Depending on the individual approach, we can distinguish many concepts related to supplier relationship management in a sustainable supply chain which are presented in Table 3.

Table 3. Relations of sustainable concepts with company operational areas

Sustainable concept	Operational area
corporate social responsibility (CSR)	strategic management
environmental purchasing and supplier management (EPSM)	purchasing, supplier relationship management
green supply chain management (GSCM)	supply chain management
socially and environmentally responsible procurement (SERP)	procurement
sustainable supply chain management (SSCM)	supply chain management

Source: own elaboration

Although certain concepts are in an indirect relationship with supplier relationship management (green marketing and green human resource management), the research has shown that they can be integrated with supplier relationship management due to the presence of environmental or social factors.

The main observation is as follows: there are many different environmental and social aspects of supplier relationship management and there are many miscellaneous concepts regarding environmental and social issues in supply chain management due to different perspectives of companies that implement sustainable activities in their operations.

In conclusion, two things are needed for the issue of environmental and social aspects in supplier relationship management:

- 1) unification of environmental and social aspects in a supply chain in order to successfully apply sustainable concepts in the whole supply chain;
- 2) integration of environmental and social activities in the whole supply chain in order to achieve synergy and, as a result, have additional benefits of implementation of sustainable concepts in the supply chain.

The main suggestion for future research is further analysis of environmental and social concepts related to supplier relationship management in order to provide the possibility for integration of sustainable activities in a supply chain.

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## Środowiskowe i społeczne aspekty zarządzania relacjami z dostawcą

**Streszczenie:** W związku z dynamiczną popularyzacją w ostatnich latach znaczenia zrównoważonego rozwoju pojawiło się wiele idei związanych z praktycznym zastosowaniem koncepcji środowiskowych i społecznych w zarządzaniu przedsiębiorstwem. Wiele z nich uwzględnia problematykę zarządzania łańcuchem dostaw, który jest również bardzo rozwojowy. Jednym z głównych obszarów zarządzania łańcuchem dostaw jest zarządzanie relacjami z dostawcami. Celem artykułu jest przedstawienie środowiskowych i społecznych aspektów zarządzania relacjami z dostawcami przy uwzględnieniu indywidualnego podejścia poszczególnych badaczy do tej kwestii oraz agregacja zebranych informacji. Jako narzędzie naukowe wykorzystano analizę literatury.

**Słowa kluczowe:** środowisko, zarządzanie relacjami z dostawcą, zarządzanie zakupami, zielony łańcuch dostaw, zrównoważony rozwój

**JEL:** M11, M14, Q01

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